



Hinds ON! Art

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Getting Your Hands on Art

We don't teach art; we teach art students. People sometimes ask, "Why bother with art when there are so many practical things the kids need to learn?" Creativity and self-expression has always been essential to our humanity. Our earliest creative expressions were recorded in petroglyphs, cave paintings, and ancient sculptures. One of the first things kids do is draw, paint, and use their imaginations to play. Art reaches across language barriers, racial stereotypes, religious barriers, and socio-economical levels and prejudices.

Art develops the whole brain, it strengthens focus and increases attention, develops hand-eye coordination, requires practice and strategic thinking, and involves interacting with the material world through different tools and art mediums.

Art Teaches Problem Solving. Making art teaches that there is more than one solution to the same problem. Art challenges our beliefs and encourages open-ended thinking that creates an environment of questions rather than answers.

Art Prepares Kids for the Future. Creative, open-minded people are highly desired in all career paths. Art and creative education increases the future quality of the local and global community. Being creative is a life long skill and can be used in every day situations.

The following two project samples were found at a website called Deep Space Sparkle, www.deepspacesparkle.com, which is full of

hundreds of creative projects created by Patty Palmer with step by step instructions, photos of each step, and samples of student work. You can either use these projects or additional ones from this website that are related to chalk pastels. So, take some time to think about your students and their interests and develop a one-session chalk pastel art lesson for your students, including in your plan which project you'll be using, a link, and sample picture from Deep Space Sparkle of which project you'll be using.



Chalk Adobe Project



Want a quick, easy project where every student is successful? This is it!

Take a 12" x 18" black sheet of paper and fold in half. This is a way of protecting the artwork from the chalk. Using a black oil pastel, draw adobe shapes.

Have children draw adobes starting at the bottom of the

paper and moving upwards. Encourage them to use simple shapes. Fill in with adobe colored chalk pastel. Talk about contrasts: brown adobe with a bright teal door, etc.

Define lines by using the black oil pastel to trace over all original lines. This step really makes the colors pop, so don't skip over it!

When the picture is complete, fold the black paper over the artwork.



This keeps the chalk from smearing during storage. When the time comes to display the artwork, cut off the extra paper.



Cool and Warm Modern Landscapes in Chalk

This is an easy lesson to do with any grade level. Starting with a black oil pastel and a piece of black paper, have the children draw rolling hills, rounded mountains and finally, a sun/moon with concentric circles.

Encourage the children to press hard with their oil pastels. Next, bring out boxes of chalk pastels. If the chalk is new, the colors are usually already divided into warm and cool colors. Easy! But if you have a hodge podge of colors, go over what makes a cool color and what makes a warm color.

Now the kids have a choice. They can either color the mountains with warm or cool colors and then the opposite with the sky. Cool colors turn the sky into a night sky, warm colors turn it into a daytime sky (see samples below).

Finally, the last and most important stage, have the children go back over their oil pastel lines again with the oil pastel. If you have time, add white highlights with white chalk.



Lovely Lepidoptera

Source Unit: Lepidoptera

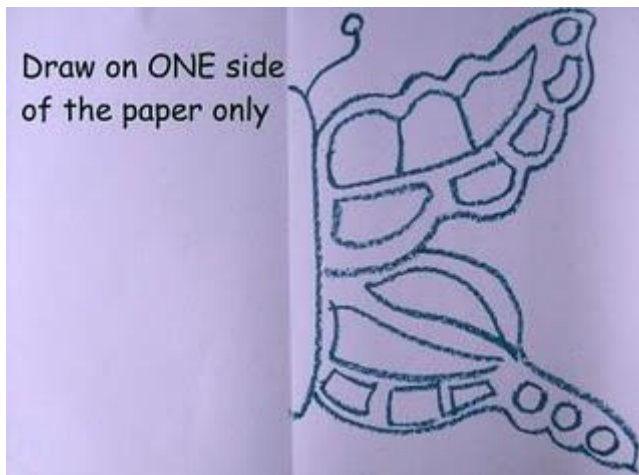


It's great to have a variety of butterfly pictures posted on the white board for visual interest and inspiration.

This lesson begins with a sheet of 12x18 white construction paper.

Instructions:

Step One:



Instruct the students to fold their paper in half (width wise).

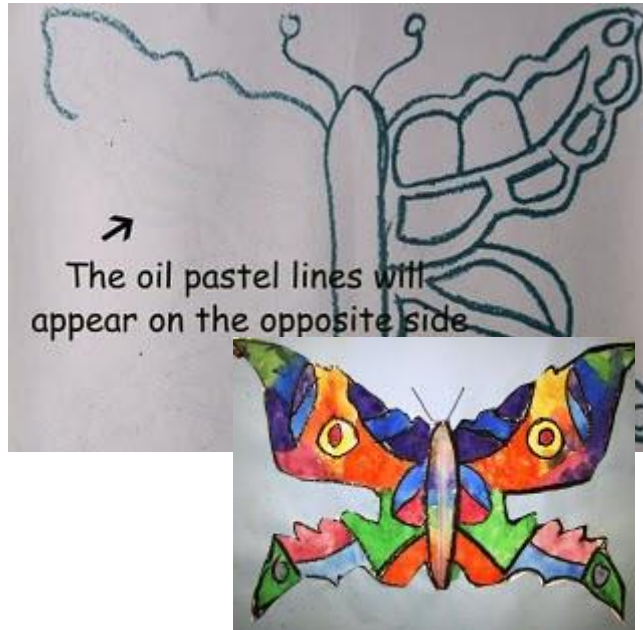
Now, on one side of the paper (using the fold as a guide) flatten out the paper and draw one half of a butterfly. For younger students simply have them put B for butterfly first and then add in shapes.

Step Two:



After drawing half the butterfly, **fold the paper** over and **rub the paper**. The oil pastel will transfer onto the other half of the paper. It's important to use a dark color oil pastel that is creamy not brittle, otherwise, the pastel will not transfer properly. Also, make sure the kids generate a little

heat! This aids in the transferring of the oil pastel. *Tip:* Give each student a craft stick and tell them to use it as a “magic” wand and rub it over the top of their picture, making sure to apply some pressure. The image transfers very easily this way and the little kids love that they get to use a “magic wand”. Makes it a bit more fun and eliminates little ones from becoming frustrated with images that don’t transfer so well.



Step Three:

Open up the paper and you will see the lines appear of the



other side of the paper. They will be faint. Now, trace over the lines to create a perfect symmetrical butterfly!

Step Four:

Paint the butterfly with watercolor paints. Cake form is best. Stress how important it is to keep the colors the same on both sides of the butterfly.



Step Five:

Cut out butterfly. Have students illustrate the four stage life cycle of their butterfly on a larger (ex. 12x18) colored piece of construction paper and glue their butterfly onto the page.

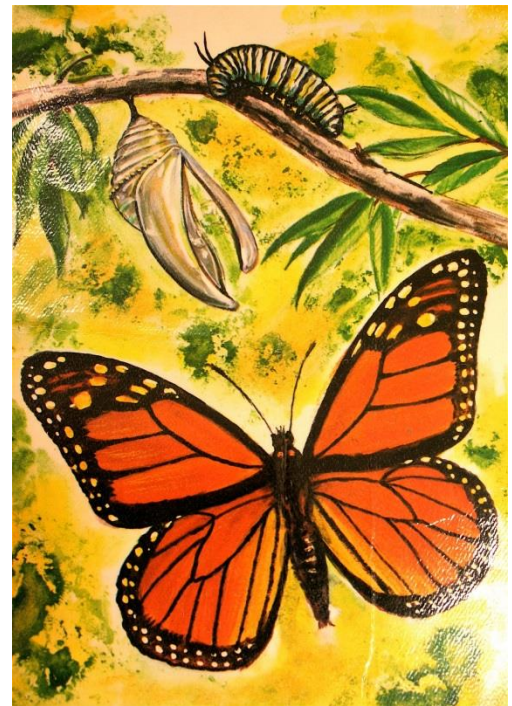


Image Credits: Art Project Girl

<http://artprojectgirl.blogspot.com/2011/05/monarch-lifecycle-illustrations.html#uds-search-results>. Accessed 8/19/11. All Rights Reserved.

Here Be Dragons!

Source Unit: Poseidon's Steeds

Project idea, instructions, and images from Deep Space Sparkle Lesson Plans/ "Eric Carle" Inspired Seahorse www.deepspacesparkle.blogspot.com © Deep Space Sparkle/Patty Palmer 2009. All Rights Reserved

Tip: Before completing this project, read the book *Mr. Seahorse* by Eric Carle to help inspire your students' imaginations.

Materials:

- Stack of White 12" x 18" Construction Paper
- (2-3 sheets per student for "Eric Carle" painted paper)*
- Tempera Paints (see tips below)
- 1 sheet of 12" x 18" white paper per student
- Watercolors (either liquid or cake)
- Brushes and water
- Glue sticks
- Scissors
- Pencils
- Glitter and/or sequins
- White School Glue

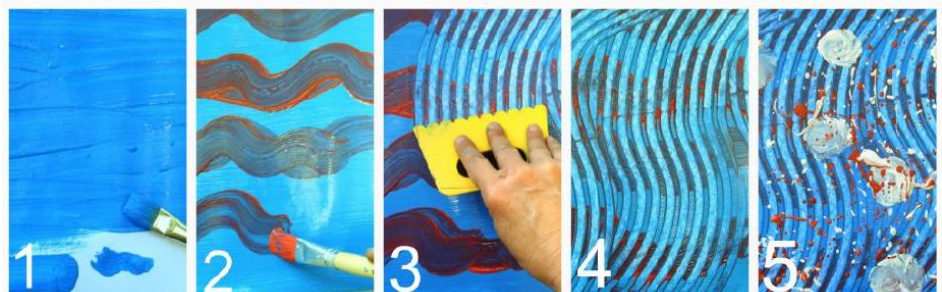


*Tip: If you don't have the time, resources, or room to have students make their own Eric Carle paper interestingly printed scrapbook paper or origami type papers can be substituted to make the seahorse (or seadragon) bodies.

Sea Dragon Image Credit: Sherri Y of Brush and Baren.
<http://brushandbaren.blogspot.com/2009/12/are-these-sea-lions-on-wharf-at-santa.html>. Accessed 9/8/11. All Rights Reserved.

Tip: Mix your own colors!

Squeeze a dab of red, yellow and white paint together to create a beautiful tangerine. Add blue and green to make teal, add white to red to make pink. You get the



idea! The more interesting the colors, the better the project. Put three containers of paint at each table/area for the children to share. Make sure the other tables have different colors of paint. Once the child has complete one painting, he can rotate to the next table, to experience a different set of colors.

Step 1: Painting “Eric Carle” Style Seahorse Paper

Nothing will bring bigger smiles to your students this year more than saying these two words: Splatter Painting! Of course, we’ll be doing more than that, but it’s nice to get them excited. Make sure that each group has a tray that includes many nifty texture producing items you can come up with like rollers, brayers, scrapers, plastic forks, etc. Use what you have round, or scour art and crafts, play dough tool sets, or paint departments for inexpensive and interesting scrapers.

1. Have students choose **one** color from the three tubs of paint and paint the entire paper with that *one* color. Have them use *large* brushes or else the children will be painting all day.
2. Next, chose a contrasting color and paint stripes, polka dots or zig-zags over the wet paint.
3. Then, using one of the texture tools, scrape the paint and watch the colors swirl together.
4. Wait for the *ooh’s* and *ahh’s* then splatter paint or continue adding textures.
5. Of course, splattering is not necessary, so demonstrate other options: dots, swirls, more scraping, etc.

Tip: This is a fun stage of this project, so when it’s time for the children to have a go at their painting, watch them. It’s quite inspiring, not to mention utterly adorable!

Step 2: Painting the Ocean Background for the Seahorse

This step is the easiest of all the steps and takes very little time to do. The idea is to have the children paint lines to imitate water. Using a small watercolor brush, have the students paint swirls and wavy lines of blues, green and purple watercolor paint to the white construction paper. That’s it. Now you have an ocean!

Step 3: Seahorse Template

Either drawing their own or using one of the templates provided, have students trace a seahorse onto the back of an “Eric-Carle” painted paper. Cut out the seahorse and glue to the “ocean.”



Image Credit:

<http://www.libravarts.com/seasonal.html>

Step 4: Embellishing the Artwork

Now it's time for students to give their seahorse a personality.

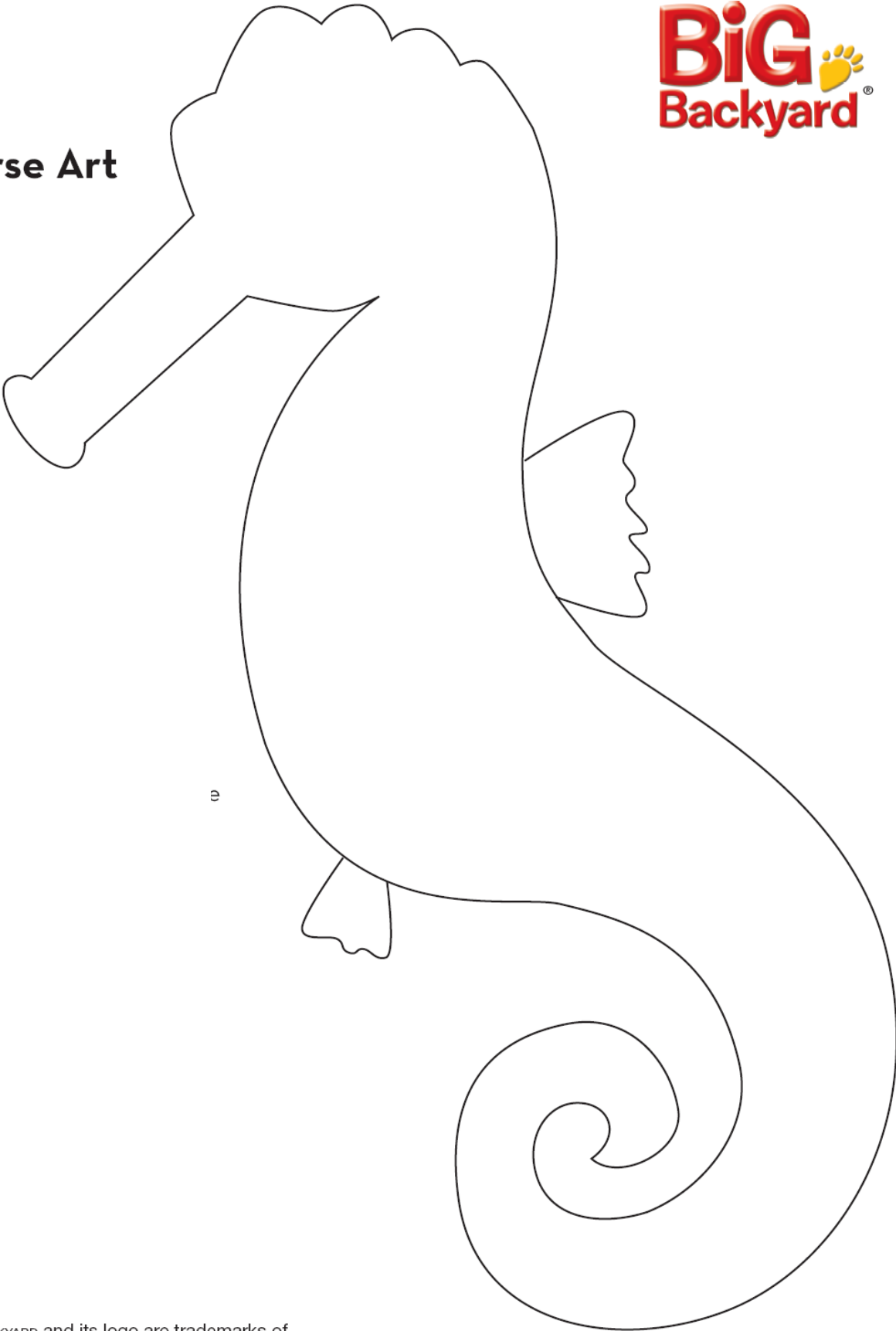
1. Add eyes (plastic wiggly eyes are fun if you have them), buttons for spots, a mane, stripes, etc. using the scraps of extra "Eric-Carle" paper. They may want to stretch it out a little, add extra fins, and create a leafy sea dragon!
2. After decorating the seahorse, create his habitat by adding seaweed, schools of fish, shells, starfish, etc. Don't be disappointed if some kids bow out at this point. It's been a long lesson, and for them, their seahorse is perfectly fine without an eye.
3. This is a good time, however, to bring out the **glitter shaker** and ask if they are *completely* sure they're done. If they suddenly perk up, hand them a bottle of white school glue and ask them to "draw" where they would like the glitter to go. Suggestions include hair, dots, eyes for fish, etc.

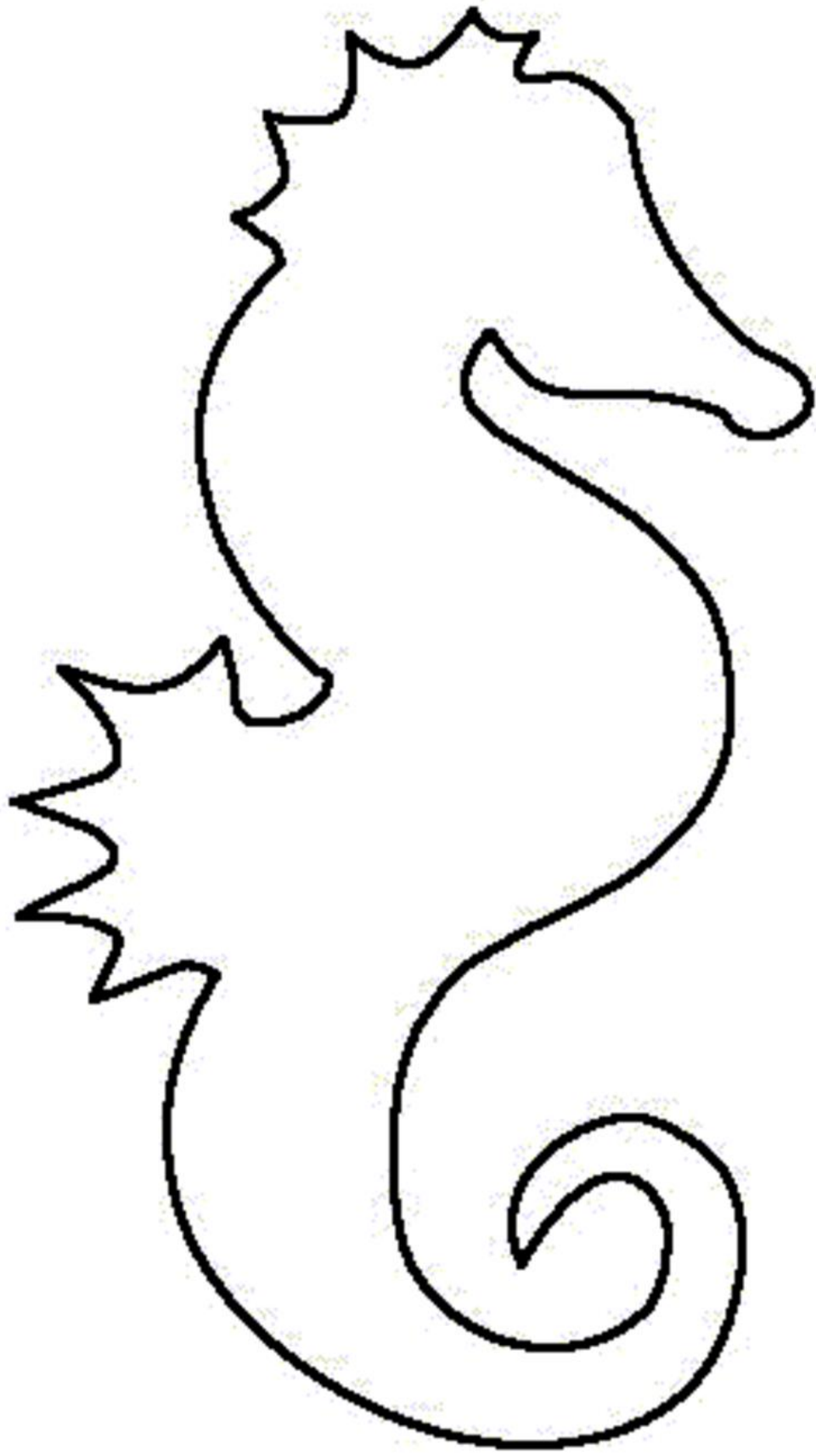


Tip: Always shake the glitter for the children. Encourage them to point and direct, but to avoid a supreme mess, keep the glitter shaker tight in hand! If you can, it's always best to do glitter over a box or outdoors.



Seahorse Art

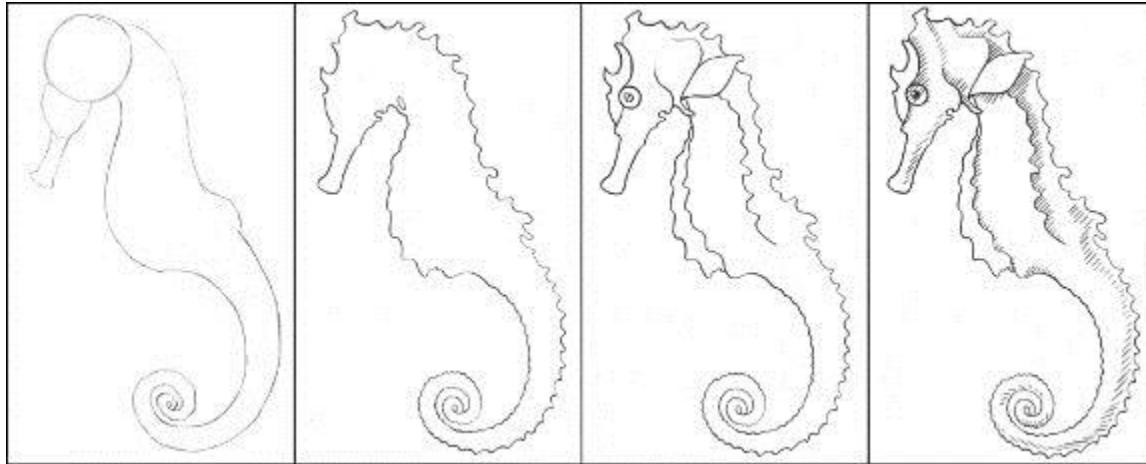




Quick Idea: How to Draw a Seahorse

<http://www.drawspace.com/lessons/f12/seahorse>

Talk about fun to draw! Always moving, always changing! Have students stop and focus on one thing at a time: shape of head, undulating shape of body, locations of appendages, shape of appendages. First lightly sketch proportions, then outline the various contours, and finally add hatching lines.



Can students add details and create their own leafy sea dragon?



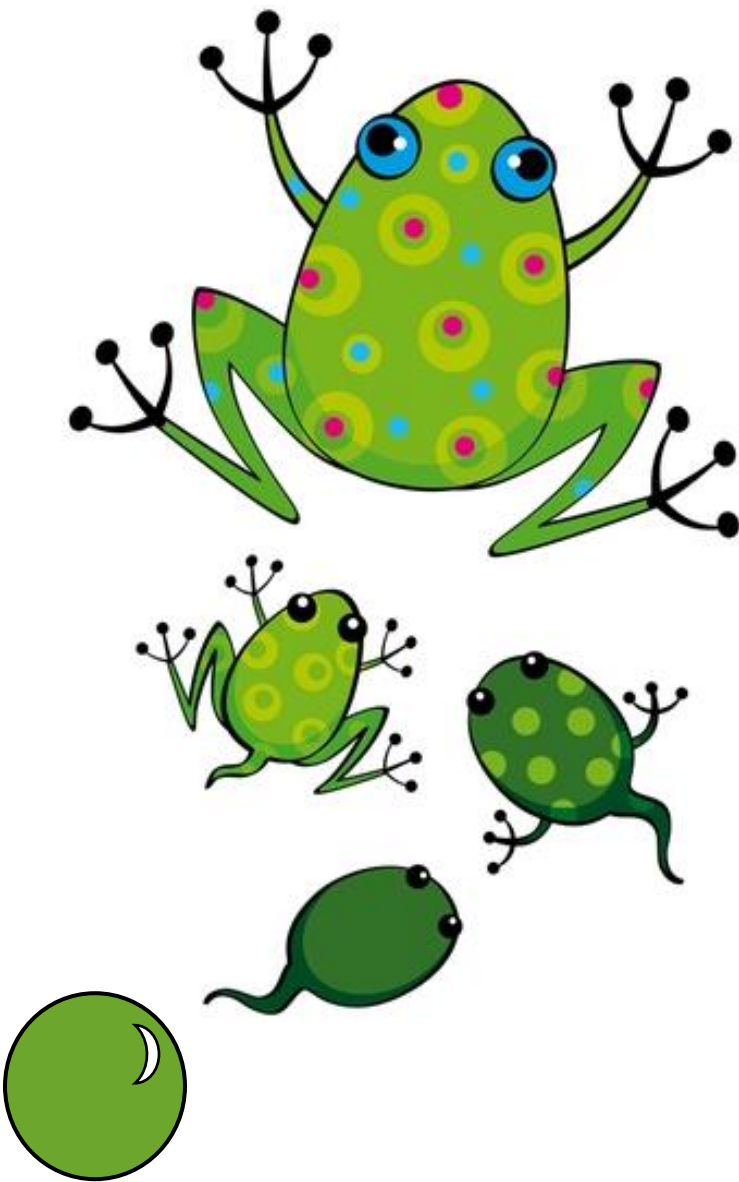
Sea Dragon Image Credit: Sherri Y of Brush and Baren.
<http://brushandbaren.blogspot.com/2009/12/are-these-sea-lions-on-wharf-at-santa.html>. Accessed 9/8/11. All Rights Reserved.

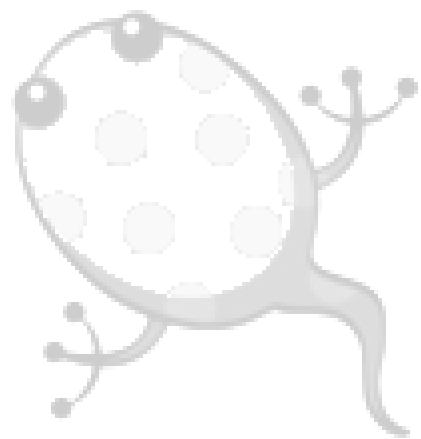
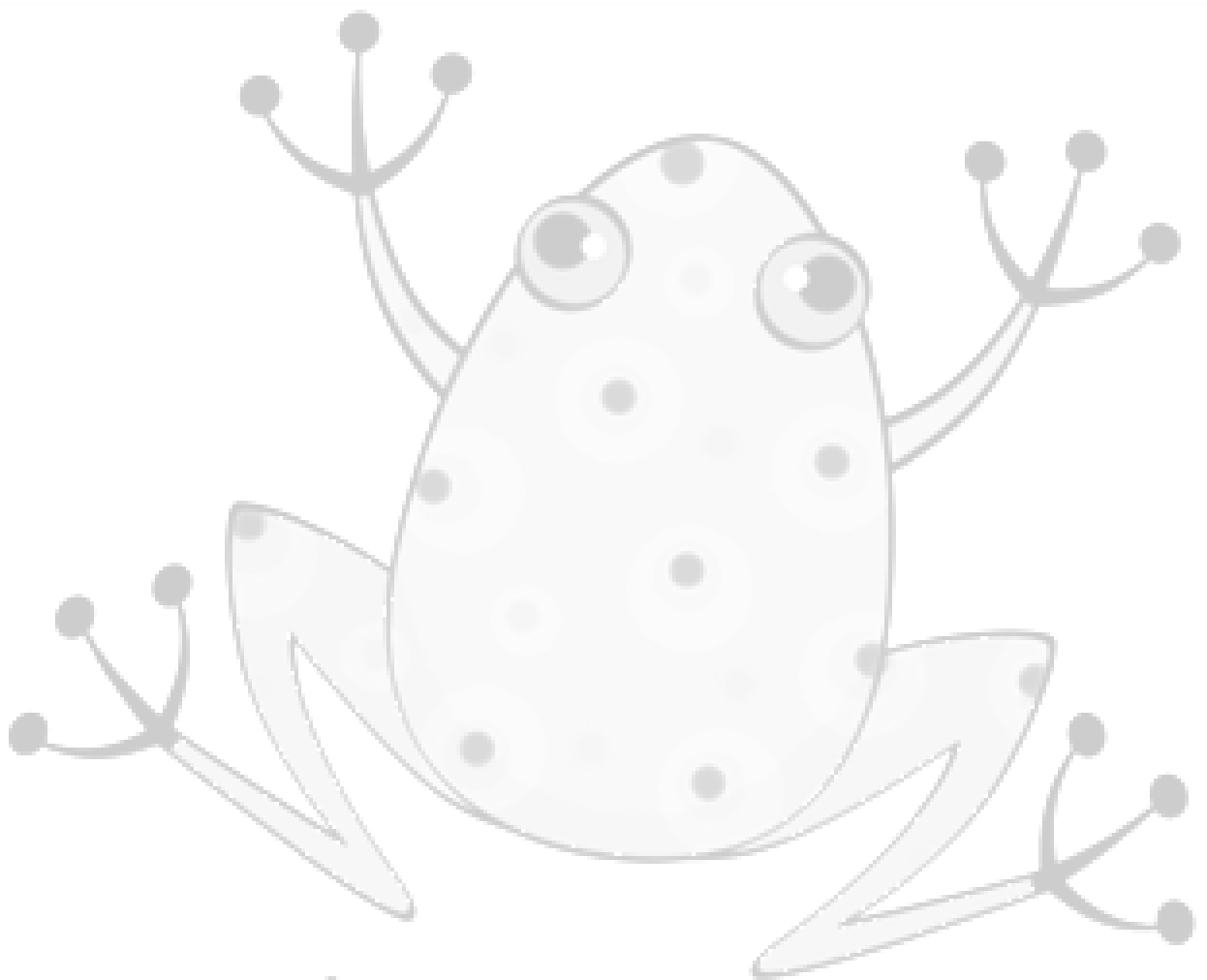
Frog Life Cycle Art

Source Unit: Herpetology

Have the students use the following templates to create their own modern art frog life cycle, either using them as templates, tracing the basic shapes, and using paint, markers, or scrapbook papers to decorate the frogs, putting in the toes and outlines with black markers, or decorating the templates themselves. Note that the frog life cycle shown is a generalized one. Some frogs, such as tree frogs, do not go through all of the phases shown in the diagram or develop in a slightly different manner.

Option: Have students create their own “above and below” the surface modern art pond scene using interesting colors and shapes with paint, crayons, markers, or construction paper shapes and place their life cycles around the pond.





Chalk Frogs

Source Unit: Herpetology

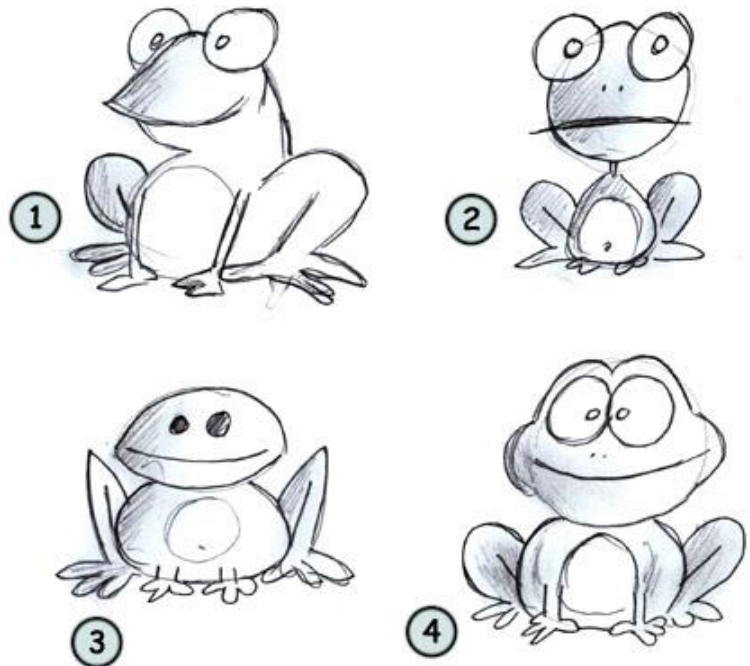
Project inspired by a project created by Patty Palmer at Deep Space Sparkle:

<http://www.deepspacesparkle.com/2009/03/chalk-pastel-lizards-for-fifth-grade/>. Accessed 10/4/11. All Rights Reserved.



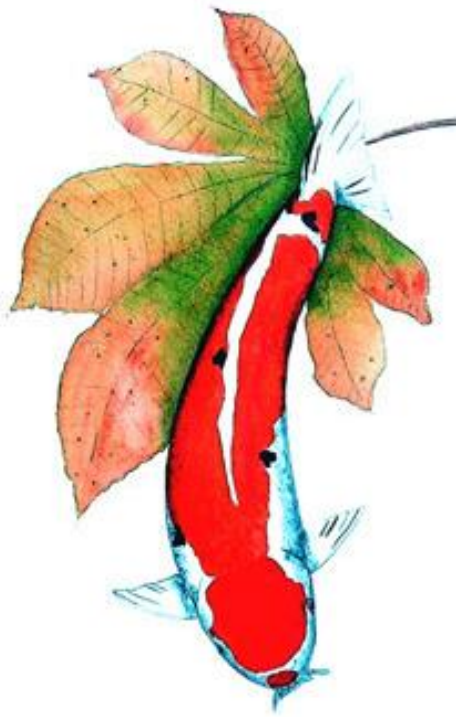
Demonstrate your strategy for drawing frogs on a white board or sheet of paper. This is the key to the success of the piece. You don't have to draw well, and there isn't really a wrong way to draw a frog, but it helps to draw things in order. Ex: always start with step one: with a black oil pastel, draw a circle for the eye. Teach them to draw lightly at first, then trace over all the "good" lines they want to keep with a darker line.

Then bring out the chalk pastels and let the kids go wild. The more colors the better. You may want to have images of different frogs on the board, and each student can pick their favorite for inspiration. This can be hard to do. Not every child will be successful unless you can provide some basic instruction (see above). Using chalk pastels, have students color in everything. You may want to have them to start with the animal because it's the most exciting, but it really doesn't matter. Use one finger to smudge the colors all the way to the black oil pastels. Of course, the final step is to take the black oil pastel and go over all the original black lines again. This is the key for really making the piece stand out and even the smallest kids can trace, so this is a fairly easy way to finish up a project and make it shine.



Tips: Black paper always yields more intense results than white.

Very basics of frog drawing: Draw an apple shape for the body, and add two circles for the eyes. Put in two football shapes for the legs. Draw the arm shapes and the webbed back feet. Add curved lines for the leg details. Draw small circles for the eye pupils. Add hand shapes, and draw circles for details on the skin. Put in curved lines for the mouth, back feet, and eyebrows. Congratulations! You've learned how to draw a frog.



Creating Koi

Source Unit: Nishikigoi: Living Jewels

Project Idea Found at Deep Space Sparkle by Patty

(<http://www.deepspaceparkle.com/2011/05/koi-fish-art-lesson/>)

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Use the following sample images as a guideline to demonstrate the drawing of

koi. Instead of doing a directed line drawing you may choose instead to demonstrate a basic technique for drawing the fish, then show how to embellish.

Supplies: 12" x 18" white paper, chalk pastels, tempera paints, or watercolor paints.



Drawing the Fish:

Have students:

- Choose to draw one large fish or two smaller ones, or more, and position paper accordingly.
- For the head, draw a curved line (either a letter "C" or a letter "U"). Add a line to connect the two ends of this line.
- Draw a perpendicular curved line. This will be the center of the body. Add a tail.



Basic Shape



Refine/Add Details

- Draw the side lines of the body.
- Add fins.
- Finally, add the dorsal fins. Notice how they're shaped like a letter "S".

Filling in the Fish:

Students may use a variety of mediums for this project or combine them, Ex. some may use chalk on top of paint to enhance the water and add details with black pens.

Have students fill in the background (pond) before fish. Add lily pads if desired. When background is finished, have students use colors such as orange, red, yellow and black to fill in their fish. If using tempera paint you may want to demonstrate a variety of paint techniques (double-loading, stippling, etc). Have students color or paint freely then trace over all lines and refine details with black paint, marker, or oil pastel.



Just in Case: Explanation of Techniques

Double-Loading: Dip your paintbrush in one paint color then immediately dip in another. When you apply the two colors to the paper, the paint mixes together. It's a great technique and also a good time savor. Instead of children mixing paint colors on a palette, they mix it on the paper. Not an exact science, but its fun.

Stippling: take a dry brush, dip it in paint and dab onto paper.

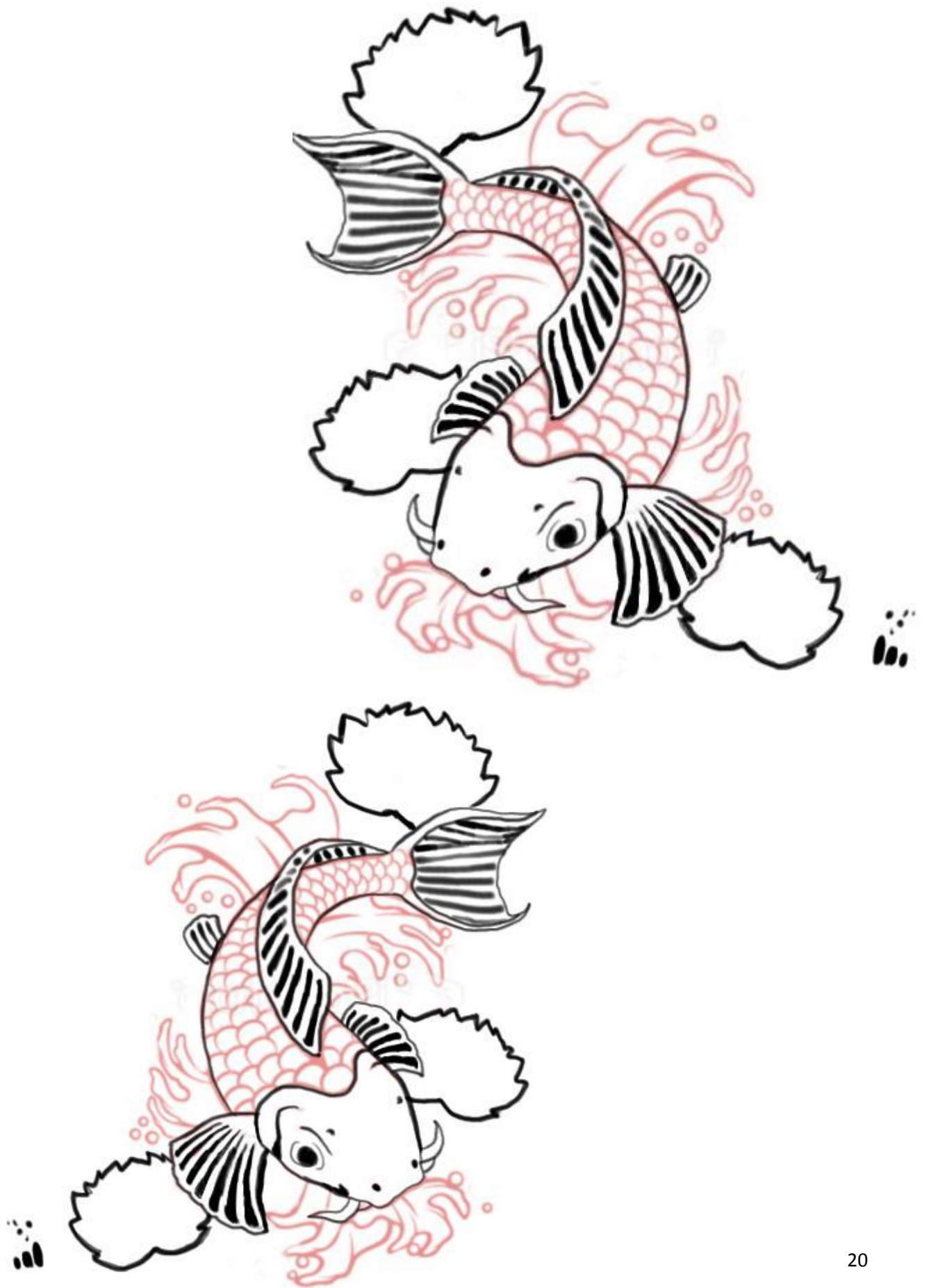
Signing Your Art

Japanese names are usually written in kanji which are Chinese characters. When they are not written in kanji symbols they are written in the more traditional native Japanese 'Kun'yomi'. Kanji symbol names express a meaning whereas names written in hiragana or katakana don't usually have a meaning.

For non-Japanese people, their names are usually translated to Japanese using the phonetic 'Katakana' alphabet syllabary.

English Alphabet = Katakana Japanese					
A	ア	J	ジェ	S	エス
B	ビー	K	ケー	T	ティー
C	シー	L	エル	U	ユー
D	ディー	M	エム	V	ブイ
E	イー	N	エヌ	W	ダブリュ
F	エフ	O	オー	X	エック
G	ジー	P	ピー	Y	ワイ
H	エイテ	Q	キュー	Z	ゼット
I	アイ	R	アール		

www.calligraphylearn.com



Chalk Hummingbird Art Project

Source Unit: *Hummingbirds [Humming Along]*

Idea courtesy of Patty Palmer at Deep Space Sparkle.

<http://www.deepspacesparkle.com/category/art-lessons/birds/> ©DEEP SPACE SPARKLE/PATTY PALMER 2010. ALL RIGHTS RESERVED



Chalk pastels give the dramatic color intensity of tempera or acrylic paint with almost no prep time. For this lesson, give a brief explanation of the basics for drawing hummingbirds. Encourage the kids to use their own ideas for composition; brainstorm what a beak can look like, how you could change the wings, that sort of thing.

You want the children to learn to draw but also want them to be as individual as possible, ex. small bird/large flower, close-up view, etc. With the visual help of black/white drawings of hummingbirds have the children draw their sketches with black oil pastel on black cardstock or construction paper. After coloring with chalk, have them color the bird first, so that if you run out of time, at least the bird is colored. A final tracing of oil pastel will be the picture the finished look. Most important step, by the way!



FIXATIVES: Aerosol hairsprays can be used, but if your chalk is a very low-grade, the hairspray tends to cut right through the chalk particles and creates a blotchy appearance where there was none before. You can buy fixatives at a craft store, use page protectors, or use newspaper to cover the artwork.



Basics: How to Draw a Hummingbird

Instructions and images courtesy of <http://www.howtodrawanimals.net/how-to-draw-a-hummingbird>
Copyright 2010. All Rights Reserved. Accessed 7/12/11.

Step 1: Begin by drawing the back of the head.



Step 2: Draw the beak.



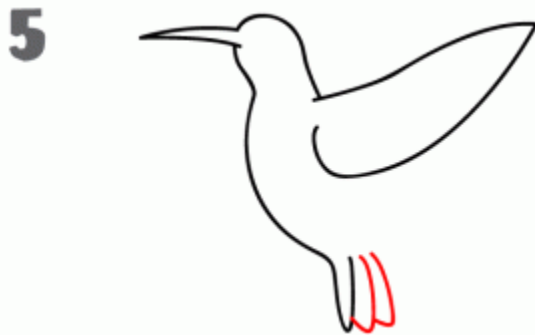
Step 3: Draw the lower body and neck.



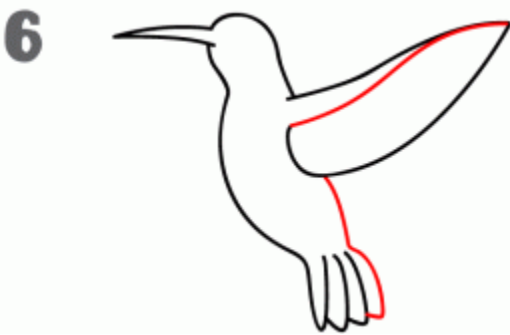
Step 4: Draw the first wing.



Step 5: Draw the lower feathers.



Step 6: Complete the lower feathers and add the wing details.



Step 7: Add more wing details.

7



Step 8: Finish by adding the eyes and the beak details to complete the drawing of the Hummingbird.

8



Bird Art Project

Source Unit: Hummingbirds [Humming Along]

Idea courtesy of Patty Palmer at Deep Space Sparkle.

<http://www.deepspacesparkle.com/category/art-lessons/birds/> ©DEEP SPACE SPARKLE/PATTY PALMER 2010. ALL RIGHTS RESERVED

Supplies Needed:

- Patterned Scrapbooking Paper in blacks, grays, pinks, reds, greens, yellows, blues, purples, etc.
- Colored background paper (ex. 6x9 is a good size)
- White school Glue, Glue sticks, pencils and scissors
- Wiggle eyes (2 per student)
- Option: Pre-cut templates

If you have large sheets of scrapbooking paper, now is the time to cut the paper in half. The children only need half sheets for the next step. Put a variety of each color paper on every table plus, Glue (either school glue or glue sticks or my preference which is white glue mixed with a bit of water and placed in a small container along with a few brushes), scissors, and templates. Have students choose their background paper. You may want to only have a single color, or have several for students to choose from. Arrange the table so that each child has good access to the supplies.



Have students start by making the tree branches.

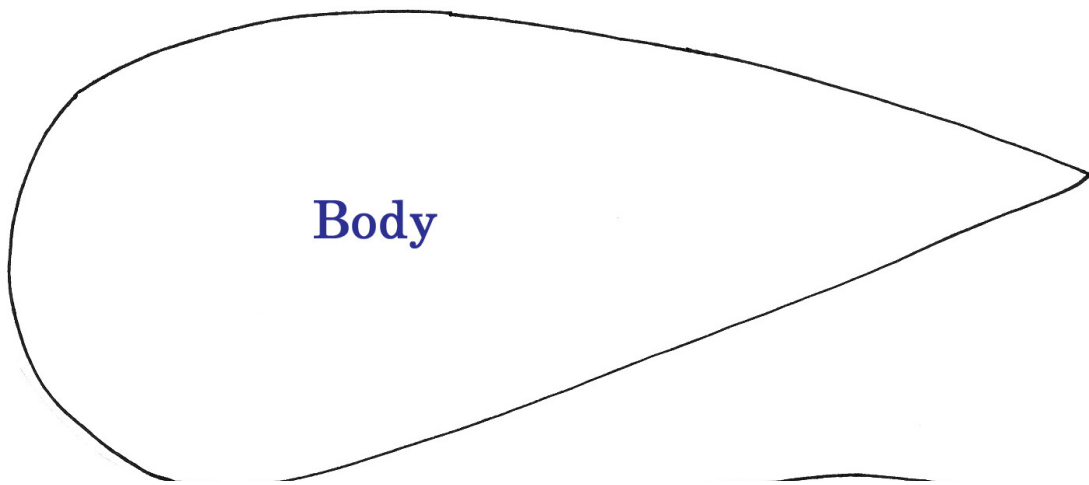
This is a good time to explain layering and how background items need to be glued on first. Select a piece of “tree bark” paper for the branches and cut into thin strips. Add a few leaves now.

Using the template, trace the bird body onto a colored paper of your choice and cut out. Glue the body over the branch.

Teacher Tip: I have one rule: Every child must use the body template. I say this because many children will want to make their own bird, but because of their age, most will make the bird too small. Problems will develop. Of course, this is just my rule and

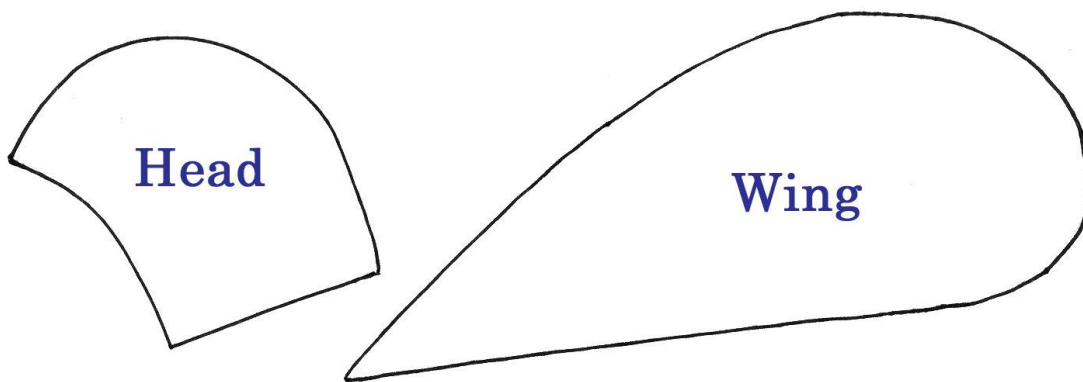


you'll need to decide if even using the templates at all, meets your art standards. If you choose not to use them, the kids can draw the bodies on the backs of the colored paper and go from there. Your choice! Once the body is glue to the paper, the children can chose to make their own wings, head and tail or use the templates provided. Encourage them to think about what they want their bird to do. Fly? Perch? Drink from a flower? Sit in a nest? The choice is up to them. Don't worry if the tail or wings stray off the edges...it'll make the composition interesting. The final details are adding flowers, cherries, nests, flowers, more leaves and finally one wiggly eye per bird.



Bird Templates

Photocopy onto cardstock and cut out (actual size)



Riddled with Light: Light My Way Lantern Collage

*Source Unit: Lanterns Light My Way
[Chinese New Year Part 2]*

Materials:

- Tissue paper in a variety of colors
- White cardstock
- Glue sticks
- Patterns pre-printed or made for the students to trace

Show students the pictures of the lanterns and

a pre-made example of the lucky lantern collage (directions are found farther on) complete with a riddle.

Once their riddles are complete. Tell students they will be making their own lantern collage to bring them luck in the coming year. Tell them they can decorate their lanterns with things that might bring them luck, their Chinese year symbol, dragons, tigers, rabbits, writing, plum blossoms, oranges, gold coins, etc. Have students cut out shapes for their lanterns and glue them to their sheet of white cardstock and decorate it. Have students describe what their decorations mean.

Paper Plum Blossoms

These simple yet elegant paper flowers are perfect scattered across the lantern collage or in student's doily lanterns. Just like poinsettias are for Christmas, plum blossoms are important for Chinese New Year. If flowers bloom on Chinese New Year's Day, it will be a prosperous year. There are some ancient trees in Hubei, China aged more than 1,600 years old that are still flowering today. Plum blossoms are symbols of nobility, beauty, courage, resilience, longevity and hope. They also represent strength in adversity, e.g. people who excel when faced with difficulties or find opportunities in the presence of threats.



Though plum trees bloom in winter, they are regarded as a harbinger of spring.



Materials Needed:

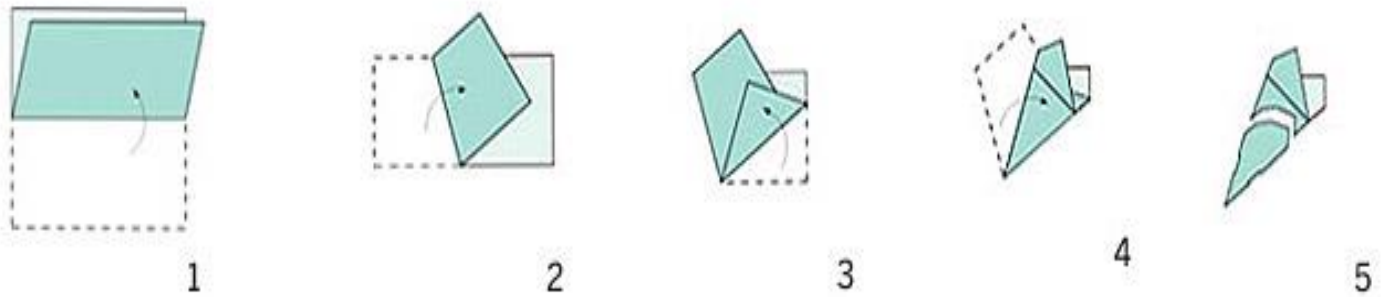
- Scissors
- Tissue Paper
- Glue

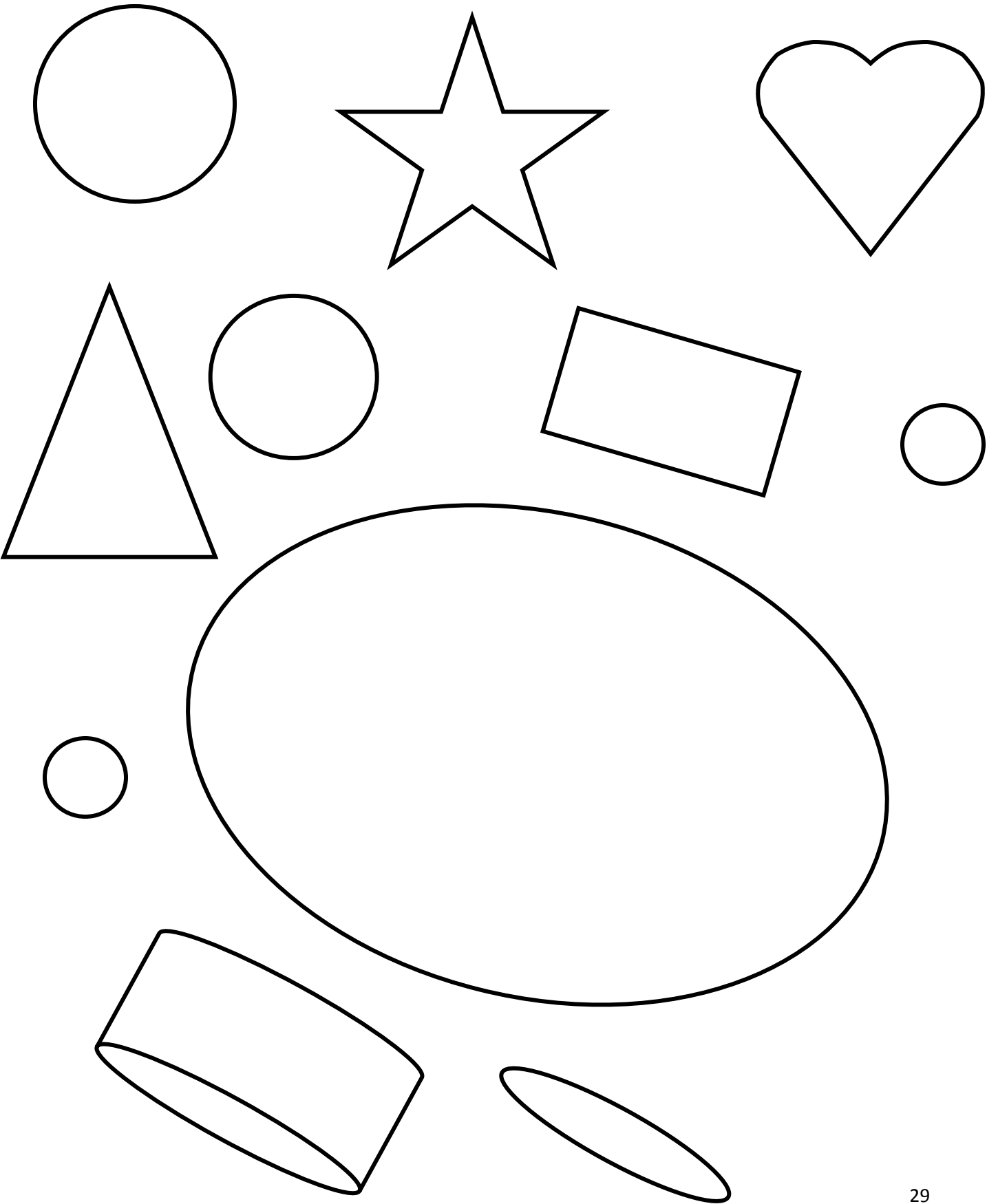
The complete steps from diagramed on Marthastewart.com

[<http://www.marthastewart.com/273275/paper-cherry-blossom-display>] are as follows.

To create five-petal blossoms, start by cutting pink or red tissue paper into 3 1/2-inch and 4 1/2-inch squares. Fold a square into a flat cone, following steps 1 to 4.

Using scissors, make four angled cuts to remove the top of the cone as in step 5. With scissors, cut out a small rectangular sliver on each side of the cone. Snip off a tiny bit of the pointed tip of the cone, and unfold and shape the paper to yield a blossom, and glue it on the lantern collage.





Lace Lanterns

Source Unit: Lanterns Light My Way [Chinese New Year Part 2]

Note: Other methods call for actual crocheted doilies, which are a lot more expensive and can be hard to find. We will be using paper doilies.

Materials:

- Modge Podge or Liquid White glue
- Water (if using liquid white glue)
- Thin balloons (regular party balloons)
- Paintbrushes
- Paper doilies (red would make a traditional red lantern)
- String
- A place to hang the lanterns from
- Flameless tea lights (optional, but fun)

A tip to remember is if using thin doilies then you'll need a thin balloon, or thick balloon = using thicker doilies.

To begin this project, have students blow up the balloon and hang it by a string a bit below eye level (this is not required but it does make it easier to hold onto and glue onto).

Then, to make the adhesive, you can either use Modge Podge or use the more wallet-friendly/conserving method of mixing a little bit of Elmer's glue with water so it becomes a liquidy form. This conserves glue and also makes it a lot easier for students to coat each paper doily with a paintbrush.



Note: Using sugar starch is NOT advised because it takes forever to dry, makes the paper fragile and watery, and really just does not dry in the same effect.)

Next, give each student a paintbrush and have them put a little watery glue on the balloon, put the doily on top, then coat the whole thing with a layer of glue. They should use just enough so that it sticks flat to the surface. If they want to coat it thickly, advise them to be careful. This method will ensure that the paper doily doesn't fall off, but it also can make the doily rip from all the wetness and takes longer to dry.

When adding additional doilies, have students make sure they're overlapping them at least on the corners to make sure that when it all dries, there are no gaping holes that prevent the lamp from maintaining a circular shape. They can either make a fully covered balloon or a $\frac{3}{4}$ covered balloon (like lantern in the picture) to create their lantern.

After they've finished covering the whole balloon, allow to dry completely, still hanging.

Tip: Make sure students take a few moments to occasionally push their fingers on the blank spaces of the balloon **once it is nearly dry** to make sure that the paper isn't sticking to the balloon anymore. That way, when it pops, the doilies don't shrink with the balloon itself.

Once finally dry, you're ready to pop the balloon and pull the remnants out through the opening at the top. Then put in a flameless tea light so that the spaces in the doilies make cool light patterns on the walls and put in your lantern riddle!

Masking the Man & Unmasking the Dragon

Source Unit:

Lanterns

Light My

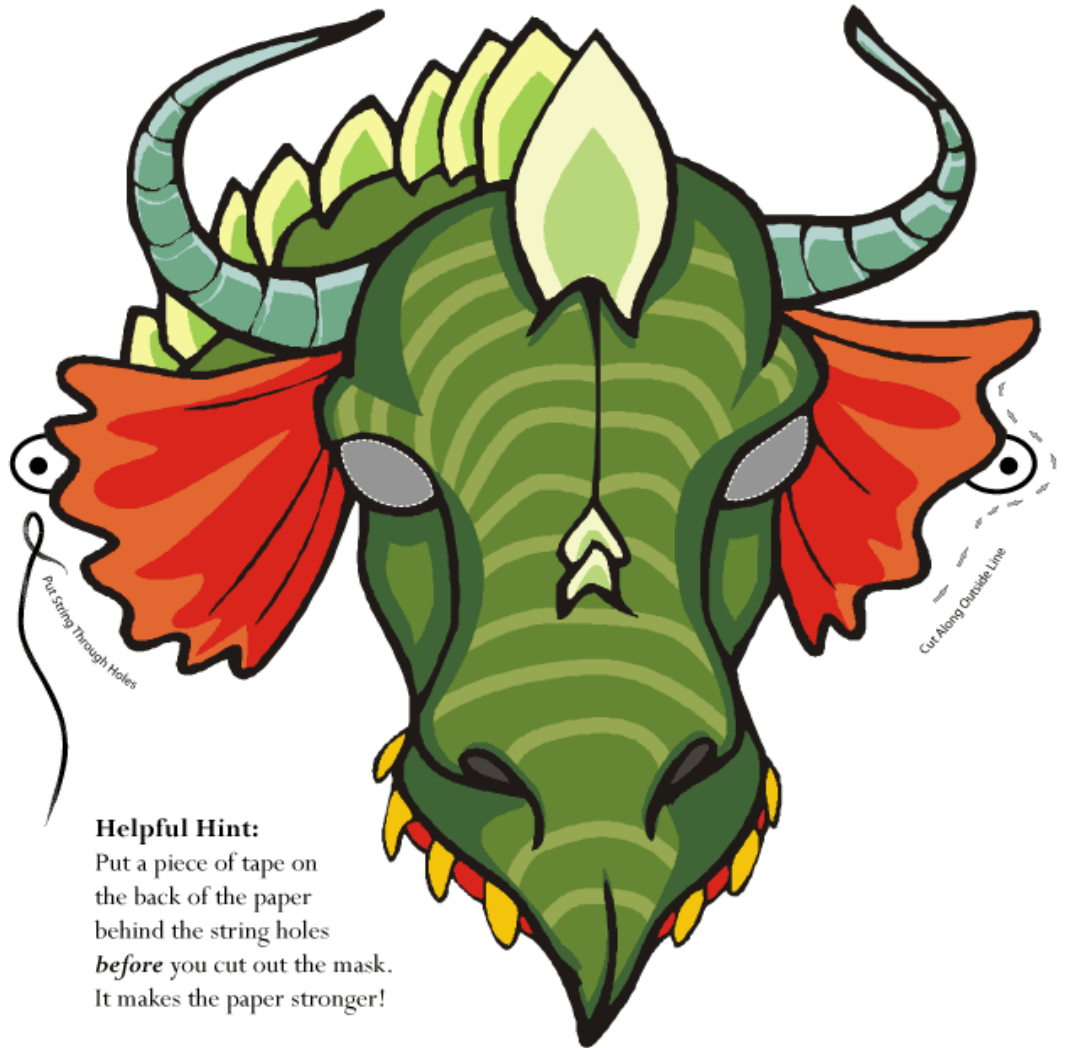
Way

[Chinese

New Year

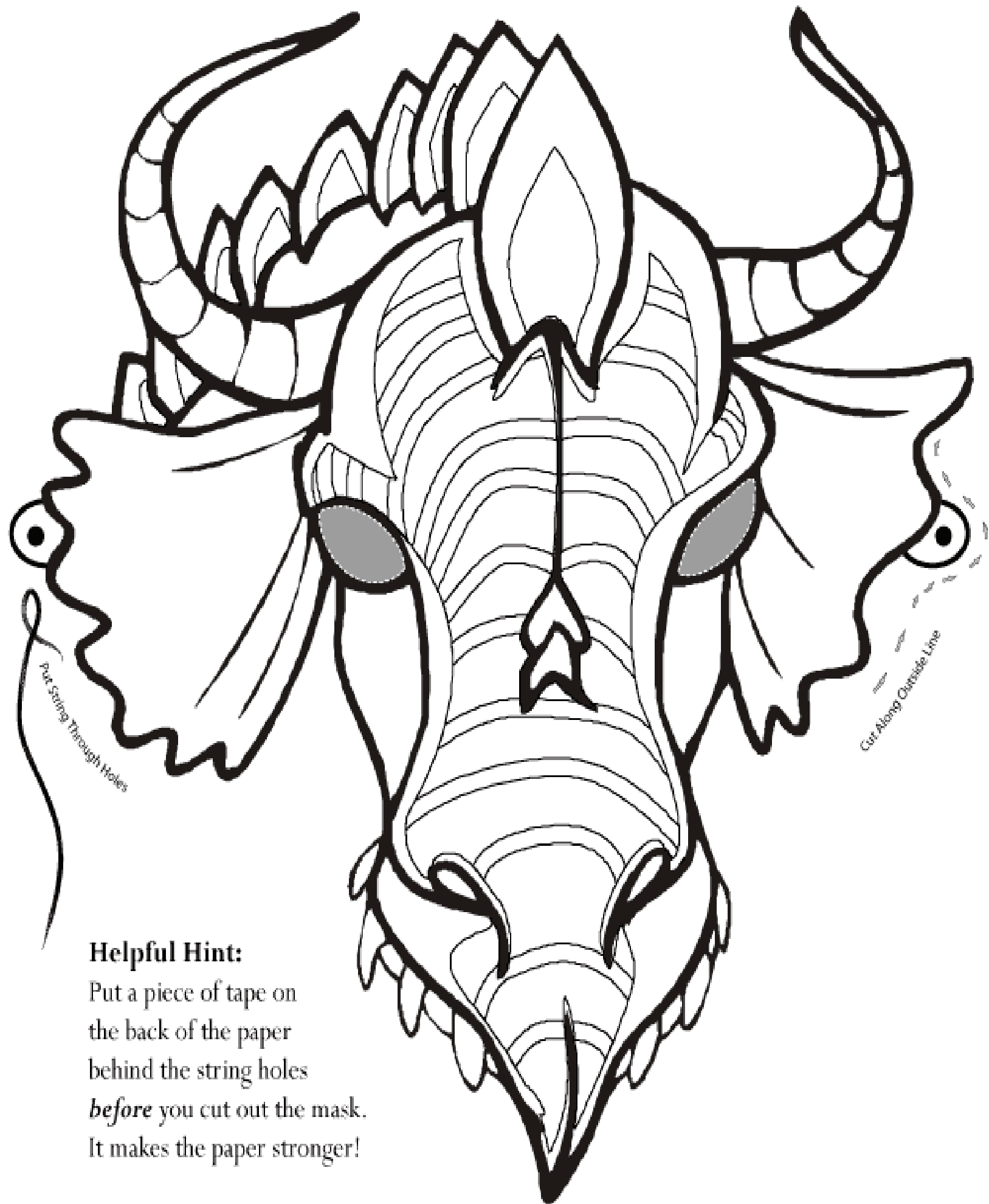
Part 2]

With extra time have students use the included template to make a Dragon mask using crayons, colored pencils, glitter in the colors according to the dragon powers and personality they'd like to have. They can always make their dragon their own and mix types and personalities into a brand new kind of undiscovered dragon.



ANIMAL JR
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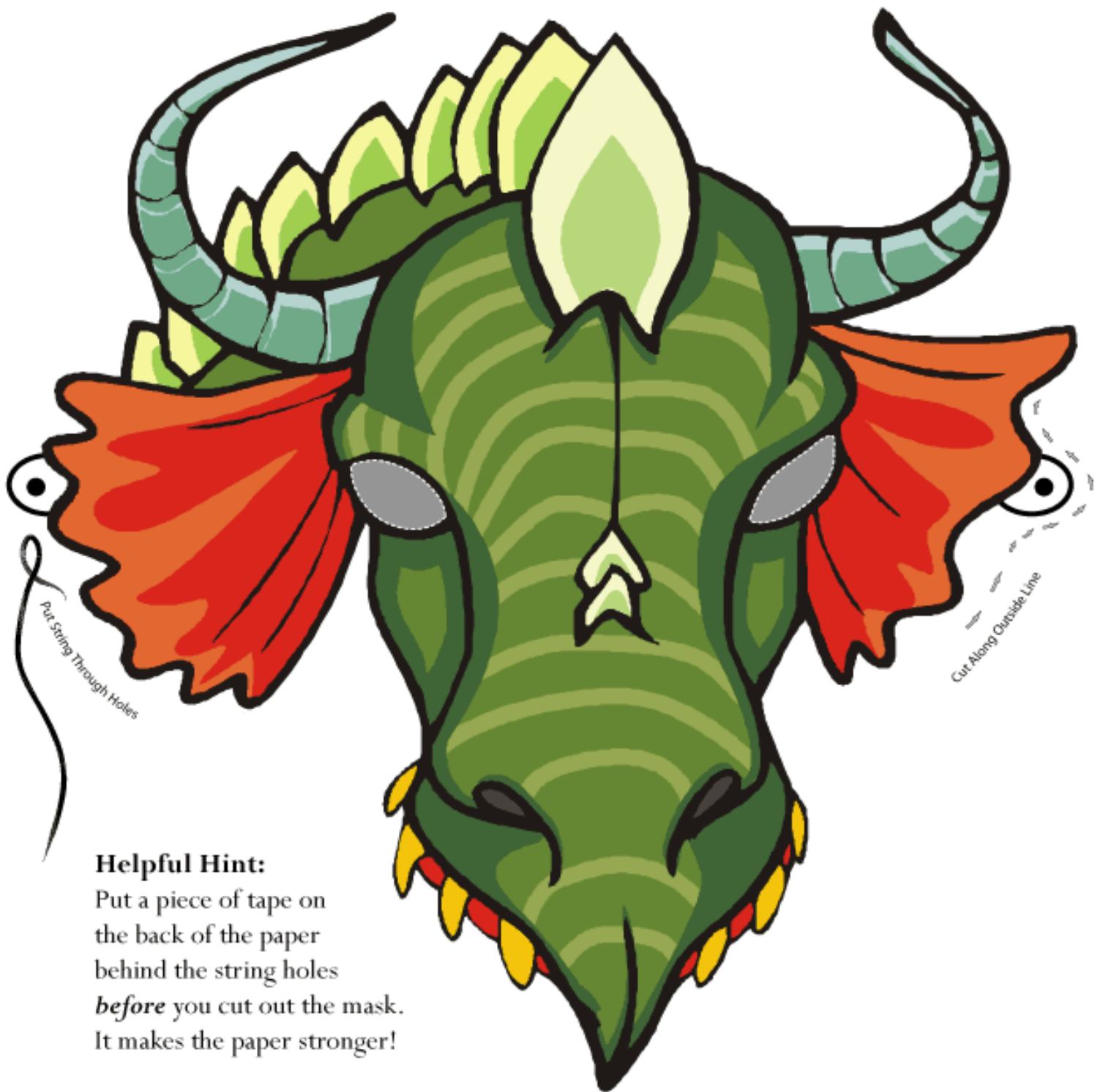




Helpful Hint:

Put a piece of tape on the back of the paper behind the string holes *before* you cut out the mask. It makes the paper stronger!

Chinese Dragon Mask



Helpful Hint:

Put a piece of tape on the back of the paper behind the string holes *before* you cut out the mask. It makes the paper stronger!

Lost Letters and Dragon Hunters

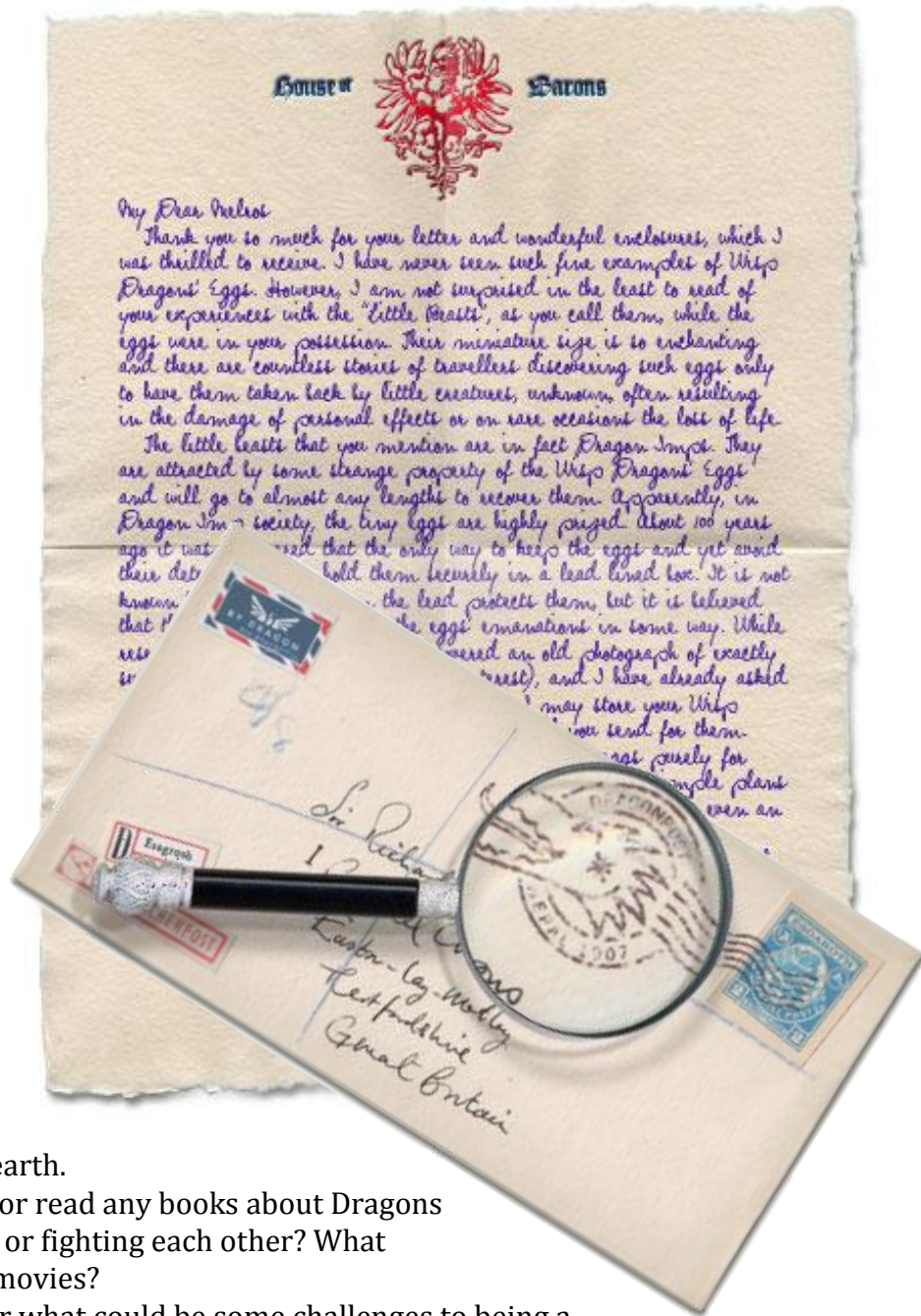
Source Unit: Lanterns Light My Way [Chinese New Year Part 2]

The following included images are from www.dadcando.com and this project was inspired by and modified from several of the projects on their site. They have 100s of fantastic projects to make with your kids, to suit all skill and age levels and projects to suit any ability from children working alone to projects that will be fun to do together and all illustrated with their famous beautiful instructions. All materials and images are copyrighted and all Rights Reserved. © C.Barnardo 2007, 2008, 2009 dadcando ® is a registered trademark.

Almost nothing is better than receiving an interesting looking letter from a far off friend, bearing exotic stamps. What would life be like if, like the Ancient Chinese believed, dragons really roamed the earth? Have students imagine they found a letter from a Dragon Hunter and what it might say.

Discussion Points:

- Imagine what life would be like if dragons roamed the earth.
- Have they seen any movies or read any books about Dragons and humans living together or fighting each other? What happened in those stories/movies?
- If you were a Dragon Hunter what could be some challenges to being a Dragon Hunter?



- What if hunting dragons was illegal?
- What if you found a friendly dragon?
- Chinese dragons are made up of 9 various pieces and parts from other animals, what are the dragons in your world like?
- Where would you live?
- How would you hide?
- How would you hunt dragons?
- What kind of weapons might you need?
- What kinds of abilities or powers could the dragons have?
- How would you protect yourself against their strength/power/abilities?
- What experience about dragon hunting might you want to write about? Who would a Dragon Hunter write to? The government who had him/her locked up for illegal dragon hunting, your friend, your Dragon Hunter trainer who taught you, your parents?

After your group brainstorming session, pass out the graphic organizer sheet and structural worksheet. They can be printed on both sides of the same page. Have students brainstorm their own ideas and write down their thoughts on the graphic organizer and continue to develop their ideas on the worksheet. Once students have brainstormed their ideas, work with them to model a friendly letter

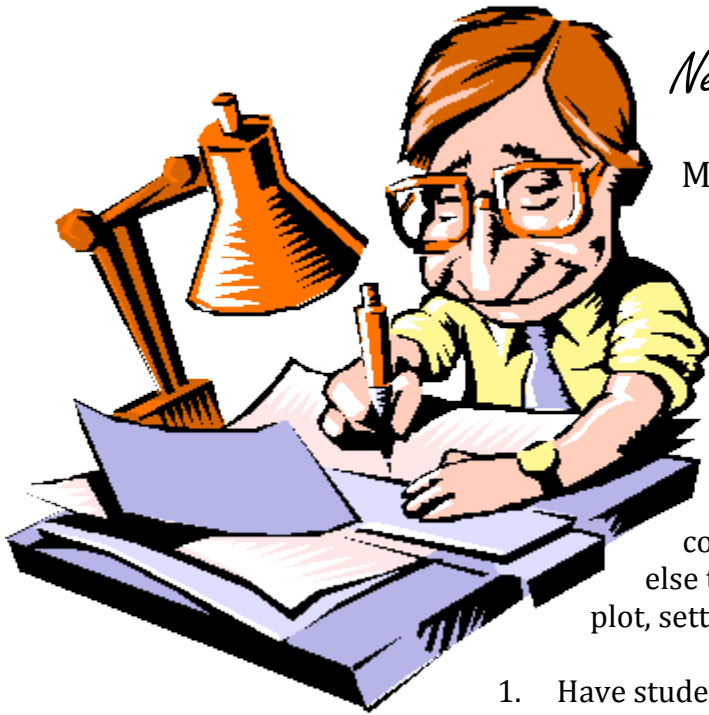
Discuss the following points on friendly letter structure.

1. A friendly letter has a date, salutation (greeting), body, closing, and signature.
2. Usually the first paragraph of the body will consist of an introduction which will give the recipient an idea about why you're writing to them with a short summary of the main topic of your letter. If you don't know the person you are writing to, you may want to introduce yourself in this introductory paragraph as well.
3. The next few paragraphs will usually consist of the message you want to get across along with any details you may want to convey.
4. The last paragraph will usually be the conclusion where you wrap everything up. You can sum up your main idea in this paragraph, thank the recipient for their time, wish the recipient well, and/or ask any questions.



And then have students:

- Finish their brainstorming for ideas.
- Write a first draft of their letter.



Next: The Editor's Corner

Materials:

- Red Pens

Once students have completed their first draft discuss the following with them: Writers and story tellers have editors who make sure that a story is the best it can be, drawing out the best in the story, giving suggestions on where a story could go, where it could be improved, and what else they would like to know about the characters, plot, setting, etc of a story.

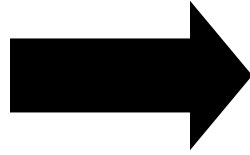
1. Have students trade letters with another student.
2. Give each pair of students red pens.
3. Groups or students get points for correcting each other's papers and lose points for marking things up only to make the page red.
4. Each group or student gets to edit another groups letter (or multiple letters) and give suggestions and ask questions.

Then: Have students write a second/final draft, after revising and correcting the first for punctuation, content, vivid word use, unneeded information, etc.

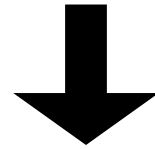
Once students have a final draft: As a group, follow the included directions for making the tattered (and authentic envelope) and book of stamps to house their letters.

Finally, students will trade letters with a student at another site, reading their partner's letter, and then writing back as themselves.

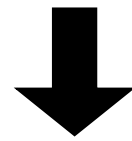
What is the **main idea** of your experience or story?



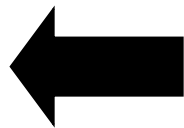
Topic Sentence:



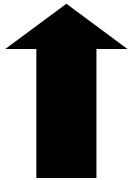
What do you **see** during this experience?



Describe how you **feel** during this experience:



What do you **hear** during this experience?



Closing Sentence:

You, Hunter of Dragons!

Who are you writing to? Sample Suggestions: Your friend, your Dragon Hunter trainer who taught you, your parents.

Your Topic Sentence: Sample Suggestion: Let me tell you about this amazing experience I had!

- What do you want to explain about this experience?
- Think about this experience. What is it you see?
- What is it you feel? Describe it using vivid adjectives. Are you fearless, are you just a little scared, or are you absolutely terrified, shivering with dread, running in panic?
- What is it you hear? Describe it using vivid adjectives. Is it just warm, or is it so hot you can feel your skin blistering from the heat?
- Adjectives to describe what you see around you. Is it hot and dusty, no water in any direction, is it freezing cold, a world made of ice and snow?

Your Closing Sentence: Sample Suggestions:

- And that is how I was able to survive my first Dragon Hunt!
- So, please, come help me before...
- And that was how I discovered...
- Now, I have my own...



Julio Eulafí
2006

Making an old envelope and postage booklet:

If you have an old one then that's good, but it doesn't have to look old to start with, because we are going to age it a bit as part of the project.

For the stamps: All you have to do is cut them out (all very old stamps were unperforated and just cut out) and stick them on your parcel and envelope models.



Aging the Envelope:

Now, dirty the envelope up a bit. Use a soft lead pencil to draw on your finger tips and then smudge some pencil lead round the edge of the envelope. If you want a really tatty look, wipe a wet teabag round the base of a tea cup and use the cup to make part of a ring on the envelope, as if someone had carelessly rested their cup on the front, or used the envelope as a coaster at some point in the past.



stamps on it as if it were a normal envelope, in the top right corner.

Travel Stickers: Then have students make up the Dragonmail sticker booklet, using the instructions. This part of the project is really easy and you learn how to make a simple little booklet that looks really cool, but if

you only want the stickers then you don't even have to make up the booklet.



Note: Tell students that when they tape the Dragonmail stickers on their envelope, they don't

line them up too carefully. Usually, the people sending letters are in a hurry or



careless, because stickers on old envelopes are always stuck on haphazardly, so for the most authentic look, you shouldn't stick them on so that they line up with the edges of the envelope.

In your stickers sheet, for each booklet, you get a few each of three different Dragonmail stickers and a four special Dragon Registered Mail stickers.

Now have students write an old fashioned looking address on the letter (remember they didn't have post or zip codes in the 1800s). For a really original look, you will need to draw a cross right across the front of the envelope and squiggle a number over or near one of the stickers. Have students use a soft blue colored pencil and just draw a couple of straight confident lines across the envelope, like the ones in the picture shown on above.

Postmarks: For the final finishing touch, have students cut out the dragon postmark / franking image and tape it on to the front of the envelope so that it goes over part of the stamp or stamps, just like a real postmark. If they lack the skill to be able to cut between the lines at the end they can tape it next to the stamp and use a pen, pencil, or marker to extend the lines over their stamp.



SKILL LEVEL 7yrs +
EQUIPMENT double sided sticky tape
 or self adhesive inkjet
 printer paper sheet
TIME 10 minutes

SPECIMEN No. 12
 Name/Topic **Kapitan Scarlet**
 Date: **Oct 15th 1872**
 Code: **exp: 12-/345**

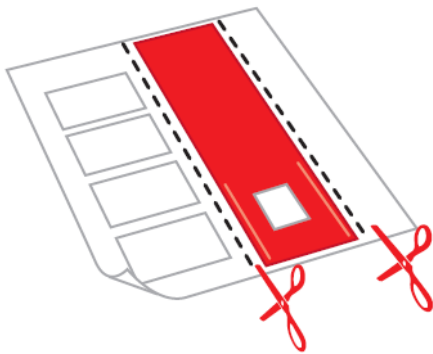
Title: *Imperial Post
 Dragon Stamps*





QUICK REFERENCE	
SKILL LEVEL	8yrs +
EQUIPMENT	Scissors, office stapler
TIME	15 minutes

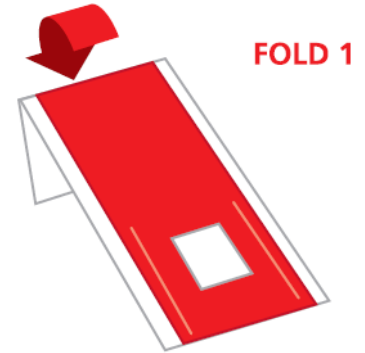
SPECIMEN No. 672	Title: <i>Dragon Airmail Envelope Labels</i>
Name / Name: Kaptin Scarlet	
Date: Oct 15th 1897	
Code: exp: 23-/004	



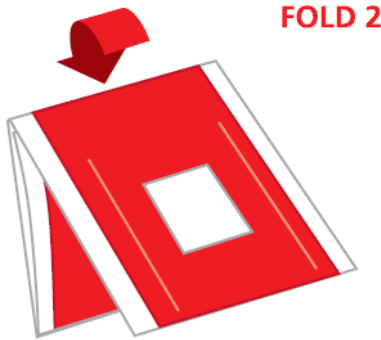
1. PRINT OUT THE ENVELOPE BOOKLET LABEL SHEET AND CUT THE RED BOOKLET COVER FROM THE SHEET



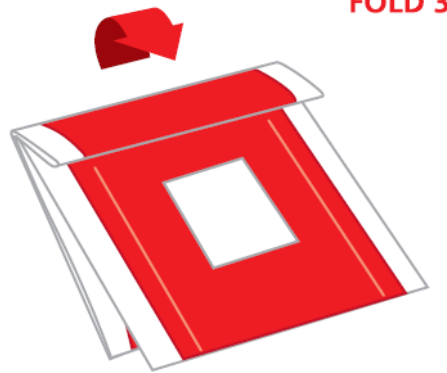
2. NEATLY TRIM THE ENDS OFF SO THAT THERE IS NO WHITE SHOWING AT EITHER END OF THE STRIP



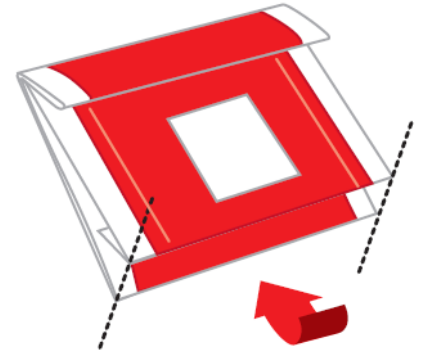
3. FOLD THE END OVER WHERE FOLD 1 IS MARKED. MAKE SURE YOUR FOLD IS NICE AND SQUARE



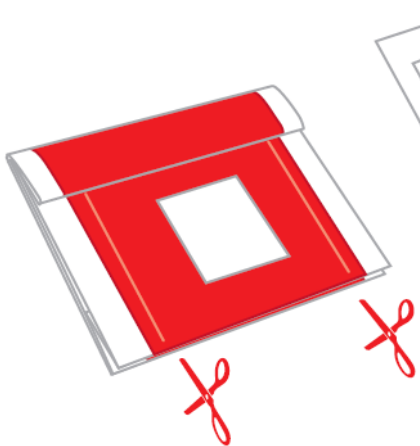
4. FOLD OVER AT FOLD MARKED 2, AGAIN, MAKE SURE THE FOLD IS NICE AND SQUARE



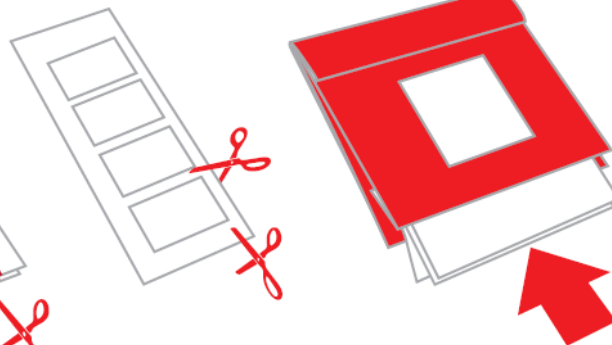
5. FOLD THE SPINE OVER FORWARDS AT THE FOLD MARKED 3, MAKING SURE THAT THE RED LINES UP AND THE FOLD IS SQUARE



6. FOR THE FINAL FOLD, TUCK THE FRONT COVER OVER CAREFULLY SO THAT THE EDGE OF THE FRONT COVER LINES UP WITH THE FOLDED EDGE OF THE BACK COVER



7. HOLDING THE SPINE TIGHTLY TO STOP THE PAPER MOVING, TRIM THE BOOKLET TO THE LIGHT RED LINES ON THE FRONT



8. NEATLY CUT OUT THE BOOKLET PAGES FROM THE OTHER HALF OF THE ENVELOPE BOOKLET LABEL SHEET CUTTING EACH ON TO THE GREY LINE, STACK NEATLY AND INSERT THEM ALL IN THE BOOKLET AS FAR AS THEY CAN GO, SO THAT THEY ARE CENTRED



9. WITHOUT MOVING THE PAGES STAPLE BOOKLET TOGETHER FROM THE FRONT IN THE CENTRE OF THE SPINE. TO USE THE STICKERS, CUT THEM OUT OF THE BOOKLET AND GLUE THEM DOWN OR PUT DOUBLE SIDED STICKY TAPE ON THE BACK OF EACH PAGE AND THEN CUT OUT THE LABEL YOU WANT



QUICK REFERENCE	
SKILL LEVEL	8yrs +
EQUIPMENT	Scissors, office stapler
TIME	15 minutes

SPECIMEN No. 672	Title:
Name: Kaplin Scarlet	<i>Dragon Firmmail</i>
Date: Oct 15th 1897	<i>Envelope Labels</i>
Code: exp: 23-/004	



ENVELOPE LABEL BOOKLET SHEET



D Esagroth Nr. 7425	D Esagroth Nr. 7425
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Fluttering Bits of Paper



Source Unit: Let's Go Fly a Kite!

You may want to introduce this project by reading a book related to the joys of kites and kite flying with the students such as the award-winning laugh-out-loud kite flying story *Stuck* by Oliver Jeffers.

Students will assemble colorful blocks of paper, like a puzzle, and attach them to the cardstock! Mosaics were traditionally made with bits of tile or glass, but a paper mosaic is a great project for students.

Materials:

- Construction paper, tissue paper, or other colored paper
- White cardstock
- Gray crayons/markers
- Scissors
- Glue or glue sticks

Start with a directed line drawing. It's important to note that even though you may use, "directed line drawing", it's rare that you want to give your students just one option, most of the time you'll end up with many drawings all across the white board. Look at pictures and picture books and brainstorm together

what a flying kite can look like, or many kites all in a line, or crazy shaped kites, and create sketches up on the board. Give lots of examples! Draw a few different ones; some realistic, some silly, kites in groups, kites alone, kites flying over landscapes or cityscapes, keeping your then talk with students how you could change the shape, the background, making simple **large** shapes that will be filled in later, and making it interesting, not mundane. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.

In the process of drawing on the white board, always incorporate **Always**. Laugh at your "mistakes", tell the kids to expect them and



mistakes. then show them

how to turn mistakes into something else. It's critical that you show your artistic side, no matter what you privately think of it, and inspire your students.

Have students lightly draw a picture on a piece of white cardstock with a grey crayon, a marker, or a chalk, but they should not shade it or put a lot of details in it. The objective is simply to create an outline for the image they will be creating. Do NOT allow students to use pencils to draw. Pencils make most kids tight, draw small and rely on that eraser. Given the opportunity to work with pencils, the project will take A LONG TIME. For little ones, the pencil lead is just so tiny that tiny drawings are often the result, making it difficult to fit pieces of paper in those miniscule drawings. For older kids, they know they can erase pencil, so they do. Again and again. Encourage kids to draw big. If the kids make mistakes, *recovering* from the mistake is a huge part of art. Teach them, in art: it is not a mistake... it's an opportunity! Mistakes are either fixed or ignored. Mosaic paper hides most mistakes. If a line is drawn where it shouldn't be and paper won't cover it up, then encourage the kids to brainstorm on how that one wayward line can evolve into part of the artwork. It usually does. Option: When you begin a project have them draw on one side, then flip over and start again...then we decide which one we like the best and go forward with the project.

When their drawings are done, have students get some colored paper. For this project construction paper, tissue paper, colored cardstock or printer paper and be used, or look in the junk mail for glossy catalogs with brightly colored photos to add variety. Option: for some mosaics styles objects are included, ex. colored sand can be incorporated, rice and beans can add texture, etc.

Have students their pieces of paper over the sketch they just made. Students can leave a small gap between each piece for a tiled effect, or place them close together or overlapping for a different look.

Tip: Cheap tweezers can help students with placement and avoiding rubbing their hands in the glue.

Wanted! Keeping an Eye on Crime

Source Unit: Guess Who, Gumshoe?

Being an effective detective is all about simplicity . . . making the most out of what you have. Your Probationary Gumshoes will get a kick out of creating their own Outlaw's personality.

Materials:

- White*, manila, or craft paper
- Colored paper for background
- Pencils
- Coloring materials, ex, Tempera Paint in flesh light, flesh dark, brown, black, green & brick red
- *Spray bottle filled with brown liquid watercolor if using white paper [to age it]

Note: If you have manila or craft paper on hand, this step isn't necessary but if you only have white paper, this is one way to give the paper an "aged" look.

After they finish their drawing, have students fill up a spray bottle with water and add a bit of brown watercolor paint or food coloring. Students can adjust the color until they have the patina they're after. Place drawing inside a cardboard box (with one side cut off) and spray over the entire paper. When it dries, the paper will be ready for the next step, paint or coloring!

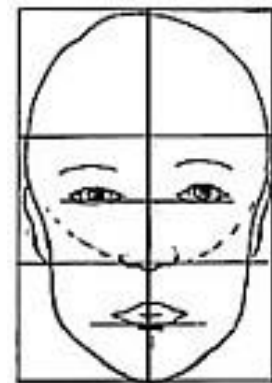


All about Proportions

The first step toward teaching students portraiture is explaining the proportions of the face. Proportions of the face refers to how large and small facial features and areas of the face are in relation to each other. There are basic rules that students can learn to capture the face in a realistic way. Once students have learnt these rules stylizing the various facial features and exaggerating areas of the face to create a character will become much easier.

The face is the feature which best distinguishes a person. Its features - the eyes, nose, mouth and ears - are where we see individuality in people. If students understand the basic components of these features drawing them will become easier and their drawings and paintings will only be better.

Before students can begin to fill in a face with its features they need to map out the face using a ruler and pencil to create a contour image. A contour image is a picture created using only lines, without any shading. The idea in this method is to "build up" the face with the basic face shape acting as a frame.



Egg Heads

For elementary school students have them measure the spaces as they go in order to correctly place the features.

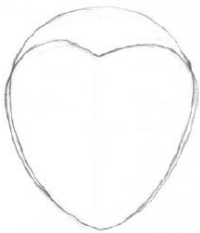
1. Have them draw the head as basically egg-shaped, with the eyes falling half way between the top of the head and the bottom of the chin.
2. The eyes themselves are separated by the width of one eye, in other words, a third eye should be able to fit in the space between the eyes they draw.
3. The nose begins between the eyes and extends halfway between the eyes and the chin. It is as wide at the nostrils as the inside of the eyes.
4. The mouth lies halfway between the bottom of the nose and chin, and is as wide as the center of the eyes.
5. The ears generally start at the top of the eye and end at the bottom of the nose.

Explain these basic proportions the students and have them look into a mirror to see this for themselves. Prompt them to notice the slight differences in their own face from these basic proportions. Give them pencils and paper, and have them attempt to draw a contour picture of their own faces using the basic proportions you have explained to them, a sample of how to do a directed line drawing of a Wanted Poster face is included. Option: If possible, have each student set a small mirror on their desk.

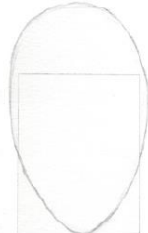
Shapely Faces

Older and more experienced art students can understand there are five basic face shapes- round, oval, square, long and heart. Although these shapes are simply general guidelines it is a great starting point in understanding the individuality in faces.

TYPICAL FACE SHAPES

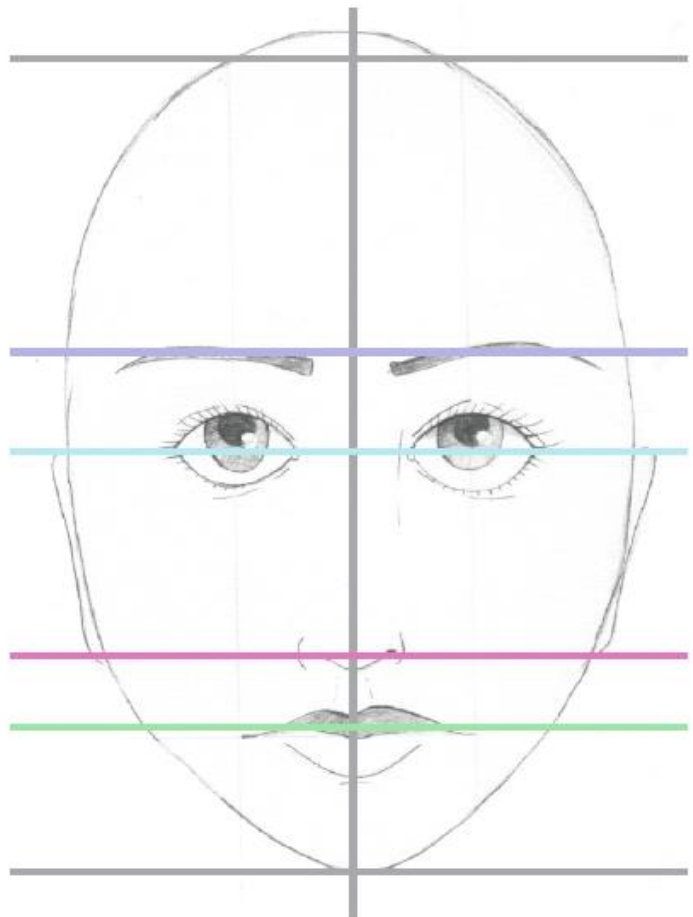


HEART

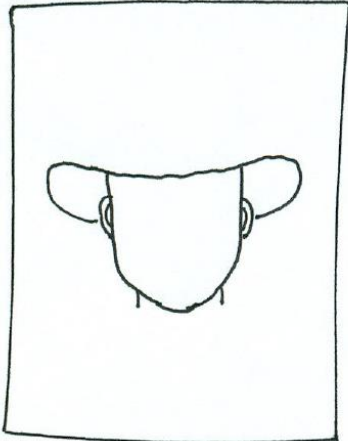


LONG

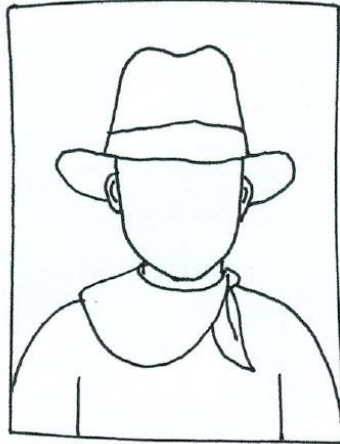
6. Have students start by choosing one of the face shapes and draw it on their page using light pencil lines.
7. Then have them use their rulers to measure and then *very lightly* draw two light lines- one to divide the face precisely in half horizontally and one to divide it precisely in half vertically.
8. Have them draw two eyes half way down the face, remembering that the size of one eye should fit between the two.



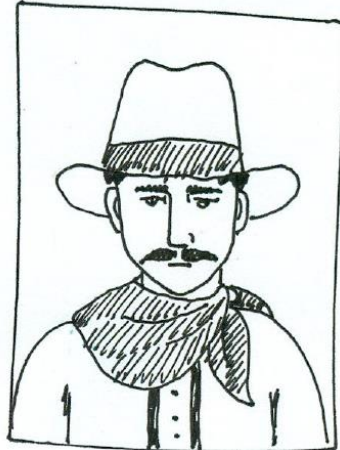
9. Remind them that when shading the eye leave a small white dot on the iris and the pupil to give the illusion that light is glistening on a moist surface. More advanced students can be reminded to consider the direction of the light source when placing this highlight.
10. Have them use their rulers and draw a line one quarter of the way up between the center of the eye and top of the head. This is where the eyebrows generally sit.
11. Draw a line half way between the eyes and the bottom of the head, this is where the bottom of the nose sits. Students may simplify the shape of the nose by drawing three curved lines.
12. Draw a line which sits one third between the bottom of the nose and the bottom of the chin, this line is where the middle of the lips sit.



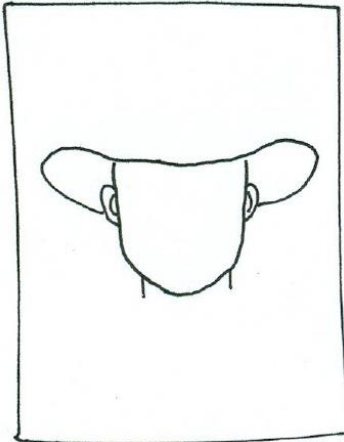
To start, draw a letter "U" in the middle of the paper. Leave room on top and on the bottom. Add ears. Place your pencil next to an ear and draw the brim of the hat. The brim line should touch the top of the letter "U" and curve around to the other ear.



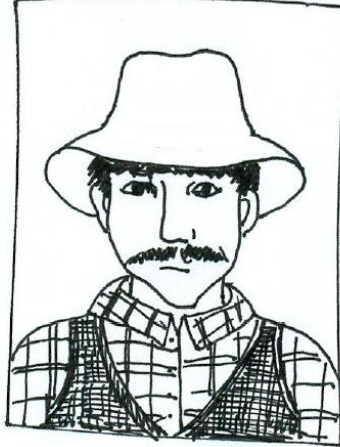
Next, draw the top of the hat by placing your pencil on the brim and making an upside down "U". Shape the hat as you wish. Draw two short lines for the neck, add a bandana and shoulder lines.



Finish your drawing by adding a face. To make the nose, draw an upside-down number "7". Then eyes, mustache and a mouth. Add hair and details to your shirt.



Here is another type of hat. Start the very same way as above but instead of adding the upside-down letter "U", make two angle lines starting at the outer most edge of the hat and drawing inwards a bit.



Next, draw the top part of the hat by placing your pencil on the angle lines and drawing an upside-down letter "U". Shape the hat as you'd like then add a band. Finish off your cowboy or cowgirl.



By keeping the drawing simple, you create more areas to paint. Don't color in your hair (as in the example). Your drawing should look like a coloring book-ready to paint!

WANTED!!!

DEAD OR ALIVE!

Adding a Touch of Color

Now that they have drawn their portrait, it's time to fill it in! Students may use pastels, markers, crayons, paints, or colored pencils. If using paint, divide students into groups and set out a tray of tempera paints for each group. Mixing regular colors together can be done to create different values. If you prefer to have your students get the experience of mixing their own paints and learning about colors, that can be done too. For instance, to create a navy blue paint, have students add a squirt of black to regular blue. Students can either mix it up in plastic containers or use the existing bottle. To give red an added rustic punch, add a squirt of brown. Altering the paint this way establishes the mood students have in their paintings.

Option: Set out two trays of paint per group, one with a skin palette, with skin, hair, and eye colors, and the other with hat and clothing colors to make it easier for students.

Have them use a medium sized brush and paint the face, ears, and neck with a skin color. While the skin dries, they can paint the hat and clothing. After the paint on the face dries have them paint the eyes, mouth, and eyebrows. Instead of painting the nose immediately have them wait until the outlining step to do this. Have them set out the small amount of white paint for the whites of the eyes.

The final touches...

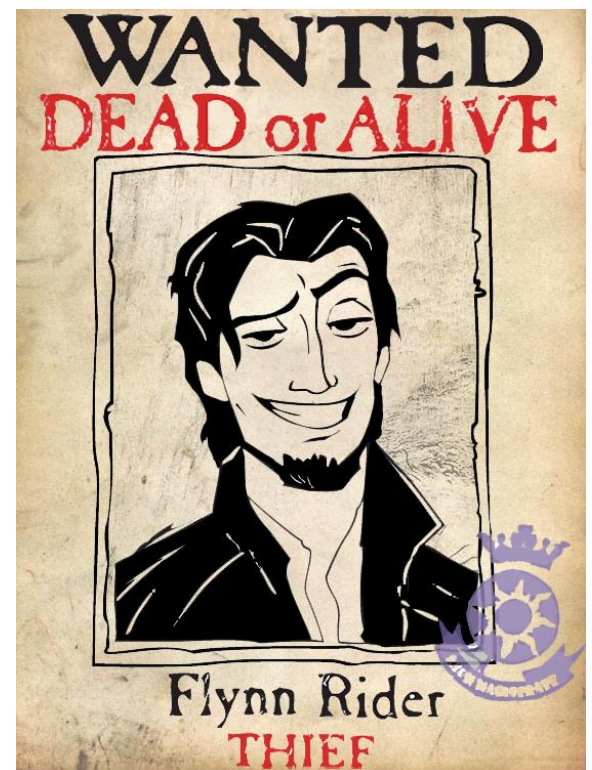
Once everything is painted, set out small tubs of watered down black paint and small brushes, or black markers, or oil pastels. Have students go over all the original pencil lines as well as adding eyelashes, nose lines, mustache hairs, texture in their hats, etc. Tell students this is a great time to add lots and lots of details.

Then have students very very carefully use a ruler and rip the edges of the paper, giving it an authentic tattered look of a wanted poster that's been hanging up in the Effective Detective's office for quite a while.

Once they've finished, give each student an additional strip of paper to go over or under their portrait. Have the students create a name for their villain and a short biography (is there a reward?) and a wild name like Squint-Eyed Gert or Wee Wild Billy McGillicutty!

Making Western lettering...

Have students use pre-cut strips of paper and a pencil and a ruler have students use five lines, two near the top of the strip and two near the bottom one and one line through the middle. Have



students practice their measuring skills. Each letter will have a small “rectangle” where it touches the top and bottom line. That’s why there are two lines at the top and two lines at the bottom. They will form a rectangle once the horizontal lines are added. Have students sketch in the letters lightly, making sure they stretch all the way across the whole strip and where each letter touches the top and bottom lines, have them draw a rectangle. Have them add double lines along each letter to make them thick and then color them in with a blank marker.

Wild Wall Creatures

Source Unit: *There's Fun to be Done! [Thing One]*

Materials:

- Paper
- Pencils
- Erasers
- Modeling Clay
- Newspaper, cardboard, and/or wire for support structures
- Seuss books for inspiration
- Optional: Circle magnets, or sticky

back magnets

Have students dream up, create in sketch form, and then sculpt their own wild character/animal with Seuss-like silly characteristics that they could “wall-

mount” in miniature, ex. on their refrigerators with magnets. Have students look through Seuss books for inspiration for their own art and then come up with something that’s 100% them, in honor of him! (You can be inspired by another without stealing from them.) Students should come up with a name and describe their creature’s habitat, life-cycle (ex. is it a mammal that’s born from an egg?) eating habits, explain how it would acquire food, water, and air and other characteristics.

Have students work to describe their new creation using vivid adjectives and adverbs and in rhyme, in a Seuss-like manner! Ex. “She’s a Bird Nesting Head Moose, a rare piney wood treat. She carries bird eggs in her horns till they’re up, up on their feet! She smells like the juice of the sweet maple gum bush and if you’re too noisy she’ll bellow hush-hush!”



These are copyrighted characters and sculptures created by Dr. Seuss- Theodore Geisel. Property of Dr. Seuss Enterprises, all rights reserved. This image is being used to explain an editorial point and no claim to ownership of this photograph or its contents is being made.

Crowning Glories: Millinery Mindsets & Seussian Sculpture!

Source Unit: There's Fun to be Done! [Thing Two!]

Now, it's time for students to put on their thinking caps and design a new hat inspired by Bartholomew's adventures, Dr. Seuss's world, and the art of 'moses' in a project that is easy, challenging, fun, and full of imagination! The wackier their ideas the better, the only thing limiting them is their imagination! Working with paper is remarkably similar to working with fabric, which is what real-life milliners and artists do. Students will work individually or in a collaborative group to create a paper hat sculpture which mimics the world of Seuss and the art of the sculptor Moses, which they will later model!



Important art terms:

Utilitarian art: art which is functional –can be used. Ex. costume, pottery, silverware

- Sculpture: three-dimensional artwork.
- Adhesive: substance used to bond items together or adhere i.e. tape, glue, paste
- Craftsmanship: quality of work-showing skill and control of materials while creating.
- Additive method: Adding material together to create a form.
- Monochromatic: Tints, shades and tones of one color
- Texture: the way a surface feels to the touch. i.e. rough, bumpy, smooth, fuzzy, etc.

Materials

- Magazines, pictures, books, etc for inspiration
- Plastic grocery bags
- Scissors
- Round objects to use as a head form (ex. a ball, another student, or a cabbage)
- Masking tape
- Double-sided tape (very helpful)
- Measuring Tape
- Paper/construction materials for example:
 - Newspaper

- Paper Bags
- Colored paper
- White printer paper
- Thick white paper
- ribbon, fabrics, unusual papers. You are only limited by imagination!
- Decorating materials
- Glue
- Double-sided tape

Low brims and high brows!

'Think left and think right and think low and think high. Oh, the thinks you can think up if only you try!'-Dr. Seuss

Have students search high and low for inspirations for their hats. A plant, a person, a color, a watch, a sport, an animal, a car, or even a fabric swatch!

What with Pinterest and other digital inspiration board tools, students might think that there's no need for a real-life version. But there's nothing quite as satisfying as clipping photos out of magazines or collecting colorful napkins and creating an action board: a collage of images, pictures, and text to show and collect ideas to help students organize and more clearly delineate their thoughts and help students create a vision. They need to have some specifics in mind when creating their board (do they want something colorful, or just one color, something inspired by nature, etc.), so they have a clear idea of what to look for and what they want to create.

Once they have their action board, have them look for something that seems to be in common across the page, their theme, ex. a color, an animal, shape, etc. Once they have a cohesive idea, then have students sketch out the basics of a design. Then they need to articulate the vision, envision how they will realistically do it or get it, and relentlessly drive it to completion as they transform their ideas into reality.

Time to Transform: Create a hat!

1. Have students measure and record the circumference of their heads. They will need to be able to put their hats on their heads.
2. Have students cut down a plastic grocery bag to create a single sheet of plastic. Place plastic sheet over cabbage or ball.

3. Apply strips of masking tape to plastic, overlapping each slightly, until they have formed the shape of a skull cap (making sure to adjust it to be able to fit the size of their own heads). Add two to three more layers of masking tape to create a firm wig/hat base.
4. Remove cap from cabbage, and trim excess plastic around cap. To add extra support, place a few strips of masking tape around the edge and inside the skull cap.
5. Place cap back on the cabbage and begin styling the hat.



6. **If creating hair:** Cut colored paper or newspaper to 1/2-inch strips, or cut lengths of curling ribbon to create hair. Curl "hair" by carefully dragging across the closed blade of a pair of scissors.
7. Add 4- to 6-inch strips of double-sided tape to the bottom rim of the cap, and begin adding details, ex. hair. Continue adding more tape and "hair" strips until you reach the crown of the cap and the wig is full.
8. Cut strips of paper in a wave pattern but you can do just about anything you'd like with your paper. Cut it straight and curl it like ribbon, cut it short and spikey, make it long and flowing etc. After this step you can start gluing your paper on (both multi-purpose craft glue or white glue, ex. Elmer's, would work). Decide where you wanted the part to be and then glue the paper on in lines moving from the front of the head towards the back. When one line is done, start another line right next to it. When the ear area is reached they may wish to begin to weave the strips into each other to create the volume. Option: Add some hair, ex. ringlets, around the ears to hide the cap and create a more realistic feel for the wig. Then repeat that process on the right side and finally, the back of the wig.

Note: A sample video of this process is available at: <http://goodwillrocktherunway.org/my-wig-tutorial/> and a sample of Martha Stewart's version: <http://www.marthastewart.com/249923/paper-wigs>

9. Continue to add hat elements until the design is complete.

10. Have students assemble an inspiration (mood) board telling the story behind and inspiration for their hat!
11. Give students 10 minutes to add any last minute touch-ups. During that time, they can practice their presentation.

12. Students vote for their favorite hat based on the following categories:

1. Largest or tallest
2. Most detailed
3. Best presentation
4. Best overall hat: craftsmanship, presentation, theme, creativity

Some tips for creating a hat out of paper:

- Paper is very forgiving so don't worry if it's looking a little like a jumbled mess at first.
- Use color! Colored paper makes fabulous hats
- Accessorize! Origami makes perfect hair/hat accessories.
- Be creative! No two hats will be (or should be) the same so don't put pressure on yourself to replicate things. Be yourself and express yourself through the wig.

Additional Paper Hat Inspiration









<http://zu4ki.livejournal.com/33755.html>



Life is Your Adventure

Source Unit: Life is your adventure: Paleontology

My Dear Friend,

While working late in the map room last night doing some research for my next dinosaur dig, I chanced to come across an old box tucked away in a corner, unopened. When I searched inside I found map that I had not seen before. I would have dismissed it immediately if I had not recognized my father's own handwriting, as you know, he was a world renowned paleontologist himself, and he disappeared when I was young. Accompanying the map were a few tattered journal pages, amongst which was this intriguing passage, "Discovered new species...couldn't believe my eyes...many nests...incredible discovery! May be the answer to...I leave this map for my son, to assist him to follow me and aid him in finding Fossil Island." I recently had an accident at my last dig, and cannot make the journey now until my injuries heal, but my

patience is not so great that I can wait, so I am sending the remainders of the map, this dinosaur embryo, and these few clues to you, the only person I can trust to keep them safe, and understand his handwriting.

I need you follow the clues and find what it was my father discovered and bring evidence back for the world of the true fate of the dinosaurs. I have had our London cartographer, Wiggins, prepare a blank map for you to fill in as you travel, so I can follow you after I heal, and I have also



dictated instructions on the map creation technique my father pioneered, which I believe Wiggins has had illustrated, and are also yours for the taking. Take good notes, the world will want to read your tale of your, and hopefully soon, our adventures. Perhaps my father's journal will lead us to discovering the answers to some of geology's greatest mysteries, and further fossils, species, and adventures of our own. Welcome back to the most exciting hunt in the world!

Adventure awaits,

P.H. Torik, Ph.D.



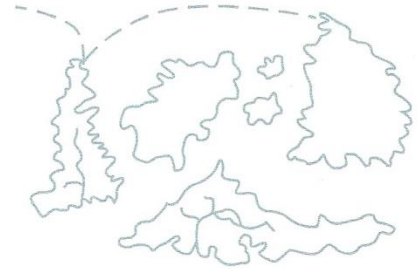
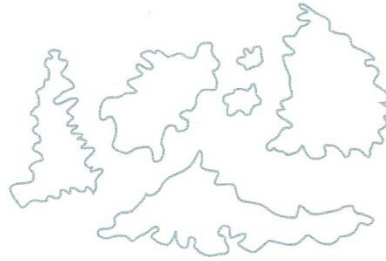
Image Credits: Aurified Dragon Embryo and Banknotes, Journal, Map, and antique package © C.Barnardo 2007, 2008, 2009 dadcando ® is a registered trademark. All rights reserved.

Note: Have students include a crater impact and fossil and nest site discovery markers on their maps.



QUICK REFERENCE	
SKILL LEVEL	6 yrs +
EQUIPMENT	THIN BLACK PEN, BLUE AND GREEN COLOURED PENCILS
TIME	1 hour

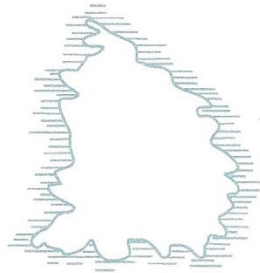
SPECIMEN No. 72	Title: draw your own
Name: Kaptin Scarlet	<i>Antique Map</i>
Date: Oct 15th 1897	
Code: exp. 23-/004	



1. PRINT OUT THE BLANK MAP TEMPLATE. CAREFULLY CUT IT OUT TO REMOVE THE WHITE EDGE IF YOU WANT

2. DESIGN AND DRAW YOUR ISLANDS OR COUNTRY. USE A WIGGLY LINE AND MAKE LOTS OF LITTLE ISLANDS NEAR THE MAIN ONE. REMEMBER TO DRAW COVES, BAYS AND RIVER INLETS

3. DRAW IN THE RIVERS AND SEA ROUTES LINKING SOME OF THE SMALLER ISLANDS WITH THE MAIN ONE. USE A DASHED LINE FOR THE SEA ROUTES

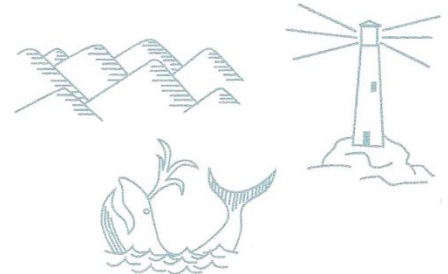
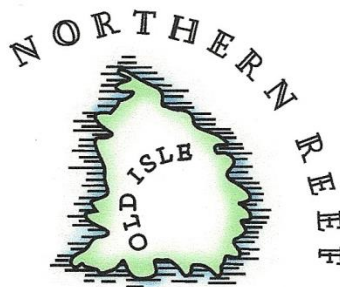
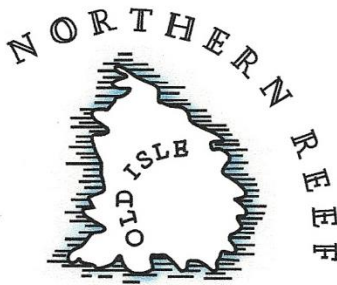
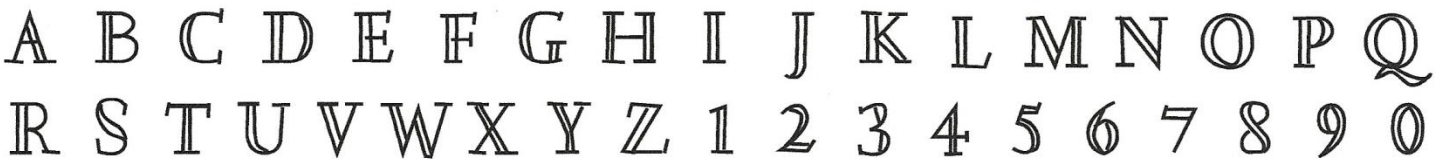


4. AROUND THE EDGE OF EACH PIECE OF LAND DRAW SHORT STRAIGHT HORIZONTAL LINES, ALSO FILL IN ANY LAKES WITH THE SAME HORIZONTAL LINES

5. MARK IN YOUR MAIN CITIES AND TOWNS EITHER DRAW SHAPES FOR THE CITIES OR LITTLE PICTURES OF GROUPS OF HOUSES, ADD THE ODD SPIRE OR CASTLE, JOIN THE TOWNS WITH ROADS. NAME YOUR TOWNS, ROADS AND RIVERS. BE CREATIVE WHEN NAMING THEM

6. NAME YOUR ISLANDS AND THE SEAS WITH NAMES WRITTEN NEATLY IN CAPITALS USING THE GUIDE BELOW OR FLOWING COPPERPLATE SCRIPT. FOR THE BEST EFFECT SPACE OUT YOUR LETTERS TO COVER THE AREA THE NAME REFERS TO, JUST LIKE A REAL MAP

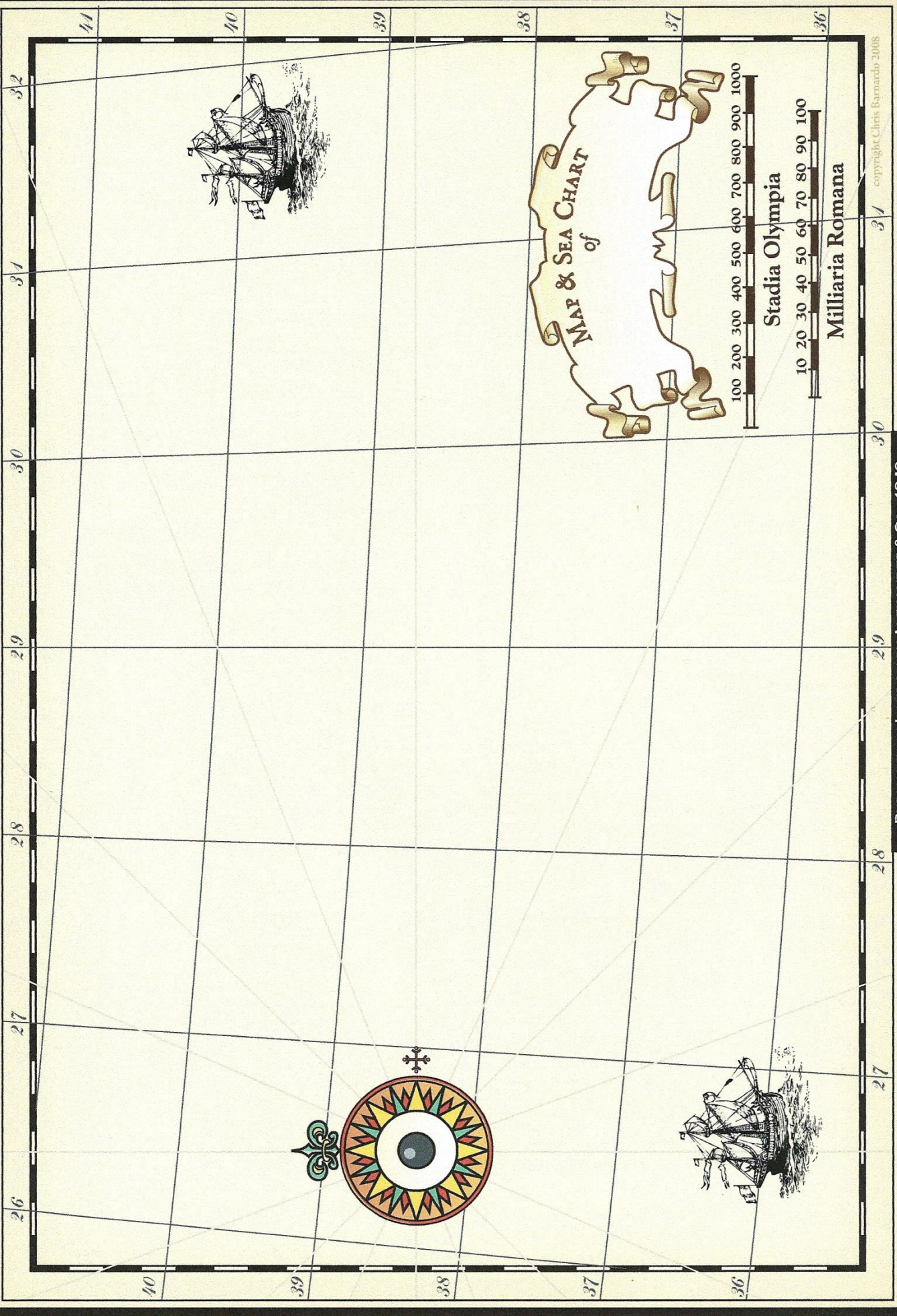
LETTERING GUIDE (NOTE WHERE THE THICK AND THIN STROKES ARE)



7. COLOUR ROUND THE EDGE OF EACH PIECE OF LAND WITH BLUE COLOURED PENCIL

8. COLOUR INSIDE EACH PIECE OF LAND WITH GREEN COLOURED PENCIL COLOUR SMALL ISLANDS IN COMPLETELY

9. DRAW SOME MONSTERS IN THE SEA AND ON THE LAND. DRAW IN CAVES, MOUNTAINS AND ANY OTHER FEATURES THAT YOU THINK WILL BE OF INTEREST TO TRAVELLERS VISITING THE ISLAND YOU DISCOVERED AND CHARTED



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DADGANDS.COM



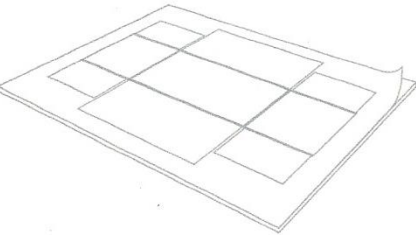
QUICK REFERENCE

SKILL LEVEL 7yrs +

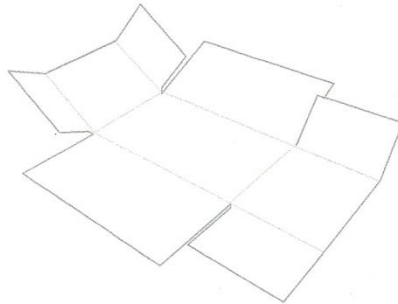
EQUIPMENT INKJET PRINTER, PRINTER PAPER, CARDBOARD (APPROX 2mm THICK), PVA (or SPRAYMOUNT), HOT MELT

TIME 20mins

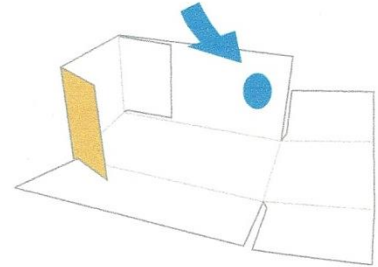
Simply make a gorgeous antique looking mailing box ready to keep safe all your treasured artifacts. This box is perfect for protecting your Dragons Egg on the long journey over land and sea from the orient. It comes with stamps from Esgaroth, the township that lived in the shadow of the Lonely Mountain, home of Smaug the Magnificent, and is inscribed with an original verse.



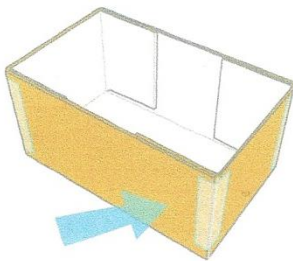
1. PRINT OUT THE BOX TRAY NET TEMPLATE AND STICK TO A PIECE OF CARDBOARD. USE LIGHTWEIGHT CARD OR CORRUGATED CARD ABOUT 2mm THICK



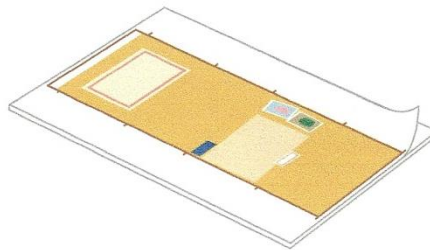
2. CAREFULLY CUT OUT WITH A CRAFT KNIFE AND RULER AND DEEP CREASE ALONG ALL THE FOLD LINES



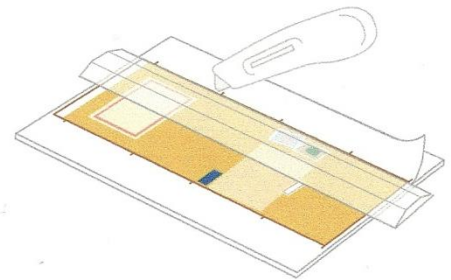
3. FOLD UP THE BOX PUTTING GLUE ON THE INSIDE OF THE TAB AREA



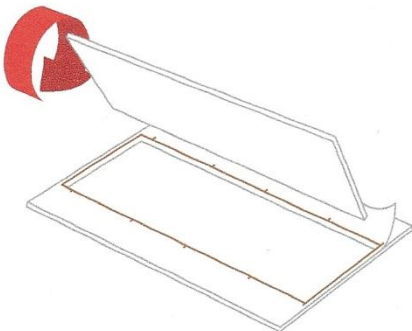
4. (OPTIONAL) IF YOU WANT, SECURE THE OUTSIDE OF EACH CORNER WITH STICKY TAPE, AS THIS WILL MAKE IT EASIER TO PUSH IN TO THE OUTER SLEEVE LATER



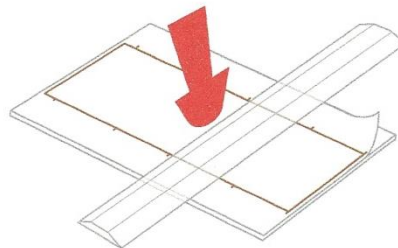
5. NOW PRINT OUT THE OUTER SLEEVE TEMPLATE PRINTABLE AND STICK TO A SHEET OF SIMILAR CARDBOARD



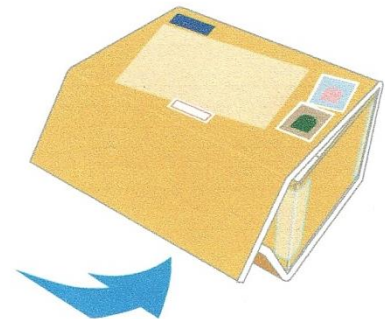
6. CAREFULLY CUT OUT THE PRINTABLE SO THAT YOU LEAVE A NEAT HOLE IN THE CARDBOARD



7. LIFT OUT THE CUTOUT AND TURN OVER AND PLACE BACK IN THE HOLE THAT YOU LEFT SO THAT IT IS UPSIDE DOWN



8. LINE A RULER UP WITH THE TICK MARKS AND USING THEM AS A GUIDE, DEEP CREASE THE BACK OF THE SLEEVE



9. USING THE BOX TRAY AS A FORMER, FOLD AND WRAP THE SLEEVE ROUND AND GLUE THE FREE SIDE OVER THE TAB

AN OLD PACKAGE OUTER SLEEVE PRINTABLE



If you should thieve
 The dragonae
 Tread quiet and slight
 When in her glow
 Though stopp'd in
 restful sleep she seems
 N'ere wake her from
 Her golden dreams
 For with deadly eye
 And hardened scale
 Her tooth will be
 Your coffin nail



SPECIMEN No. 672	Title: <i>Dragon Embryo</i>
Name: Kaptin Scarlet	
Date: Oct 15th 1897	
Code: exp. 23-/004	

DRAGON EMBRYO TEMPLATE SHEET

THESE TEMPLATES HAVE BEEN DESIGNED TO BE EASY TO USE AND ARE ALL BASED ON ROLLING OUT DIFFERENT SHAPED SAUSAGES OF OVEN BAKE CLAY SUCH AS FIMO OR SCULPY.

TO USE THE TEMPLATES, PRINT OUT THIS SHEET AND THEN ROLL OUT YOUR CLAY SO THAT WHEN YOU PLACE IT OVER THE TEMPLATE WHEN LOOKING FROM DIRECTLY ABOVE THE PIECE YOU CAN SEE A TINY BIT OF THE RED LINE ALL ROUND THE EDGE.

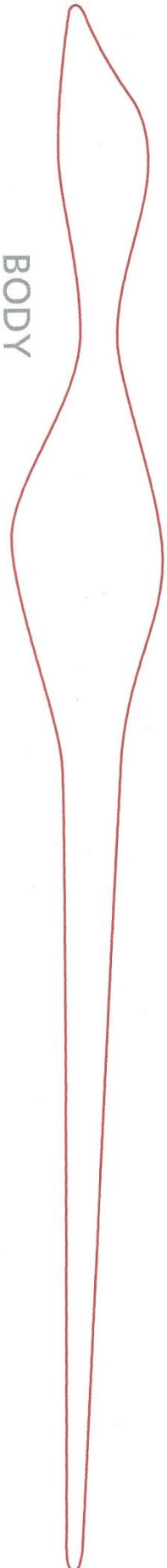
BEND FOLD AND FLATTEN THE PIECES AS DESCRIBED ON THE INSTRUCTION SHEET AND THEN JOIN THEM TO THE BODY TO MAKE YOUR DRAGON EMBRYO

WINGS



FOLD UP PATTERN (ALSO SQUASH FLAT)

BODY



CREST



MAKE FLAT ABOUT 1MM THICK

EYES

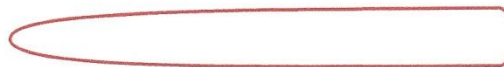
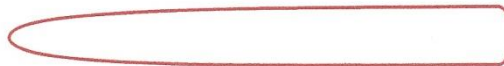


ROLL INTO LITTLE BALLS

FORELEGS



HIND LEGS



FOLD UP PATTERN



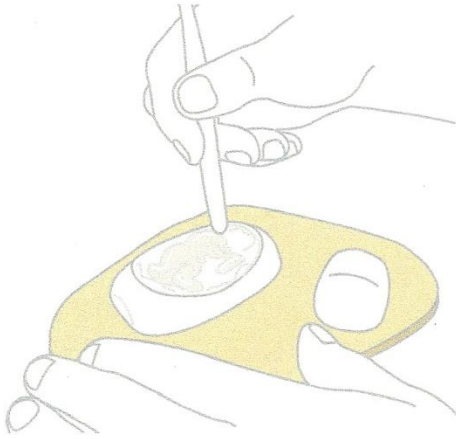
FOLD UP PATTERN



QUICK REFERENCE

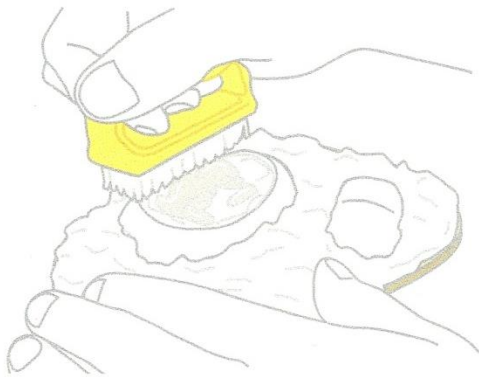
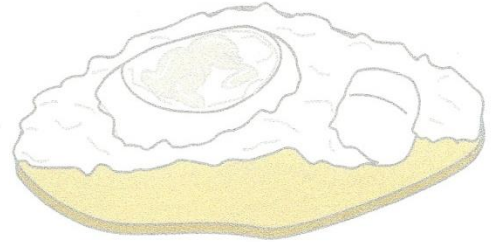
SKILL LEVEL	10yrs +
EQUIPMENT	modelling clay, stone coloured paint, scissors, plastic lids, tile grout
TIME	2 hours

FOSSILIZED dinosaur egg

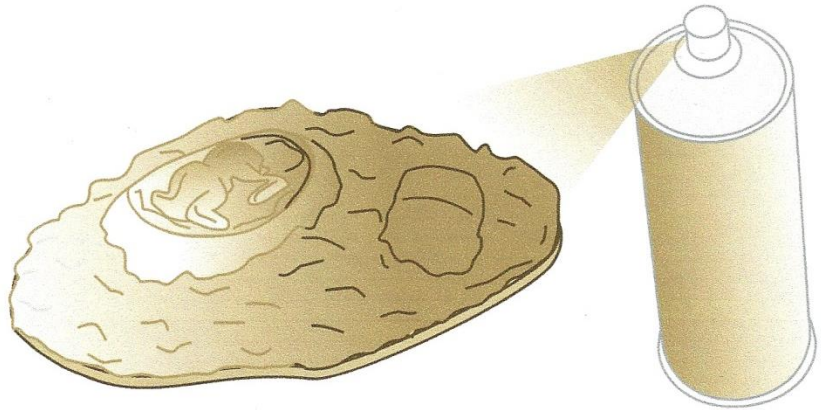


8. WHEN THE GLUE HAS SET MIX UP SOME TILE GROUT AND PACK IT INTO THE EGG ROUND THE DINOSAUR EMBRYO WITH THE ROUND END OF A DESSERT SPOON. THE GROUT IN SO THAT IT HAS A MORE OR LESS LEVEL SURFACE. DON'T WORRY ABOUT GETTING IT ON THE DINOSAUR EMBRYO, YOU WILL BE ABLE TO CLEAN THAT OFF IN A MINUTE.

9. ONE YOU HAVE FILLED THE EGG SMEAR SOME GROUT OVER THE REST OF THE CARDBOARD SO THAT IT IS ABOUT LEVEL ALL OVER. DON'T MAKE THE LAYER TOO THICK, YOU DON'T NEED A THICK LAYER AND A THINNER LAYER WILL DRY MUCH QUICKER



10. WHEN THE GROUT HAS DRIED A LITTLE BIT (SAY AFTER ABOUT 30 mins) BRUSH OVER THE INSIDE OF THE EGG WITH A SMALL SCRUBBING BRUSH OR OLD TOOTHBRUSH. PICK AWAY AT THE GROUT IF YOU LIKE USING A COCKTAIL STICK OR A SMALL SCREW DRIVER, THAT WAY YOU CAN REVEAL AS MUCH OF THE DINOSAUR AS YOU WANT



11. ONCE YOU ARE HAPPY WITH THE AMOUNT OF DINOSAUR AND EGG YOU CAN SEE, LEAVE THE MODEL TO DRY. PREFERABLY OVERNIGHT IF YOU HAVE TIME, TO MAKE SURE ALL THE WATER HAS COME OUT OF THE GROUT. WHEN IT IS DRY SPRAY OR PAINT THE MODEL WITH BRONZE (OR GREY PAINT)



12. WHETHER YOU USED GREY OR BRONZE PAINT, THE FINAL STEP IS TO DISTRESS THE FOSSIL SLIGHTLY TO MAKE IT LOOK OLD. TO DISTRESS THE FOSSIL, MIX UP SOME BLACK ACRYLIC PAINT (OR HOUSEHOLD DECORATING PAINT (LATEX OR EMULSION) WITH A BIT OF WATER TO THIN IT SLIGHTLY AND PINT ON TO THE MODEL. PAY SPECIAL ATTENTION TO MAKE SURE YOU GET THE PAINT IN ALL THE CRACKS. AT THE SAME TIME AS YOU ARE PAINTING IT ON AND BEFORE IT IS DRY, WIPE OFF THE BLACK PAINT WITH A DAMP CLOTH, SO THAT THE BLACK STAYS IN THE CRACKS BUT IS RUBBED OFF THE HIGH SPOTS AND BIG SMOOTH AREAS



ESO [(Negative #17089)](Mark Ellison) Courtesy Dept. of Library Services, American Museum of Natural History]

Cave Painting Art

Source Unit: Humans and Art [Caves of Wonder]

Inspired by and adapted from the Buffalo Art Lesson by Patty at Deep Space Sparkle.

<http://www.deepspacesparkle.com/2010/06/buffalo-painting-art-project/>



Cave Animals...

- 12" x 18" black drawing paper
- White oil pastel
- Small sponge
- Brown tempera paint (if you don't have, or don't want to use paint, this project can be done with chalk pastels and oil pastels)
- scissors and glue

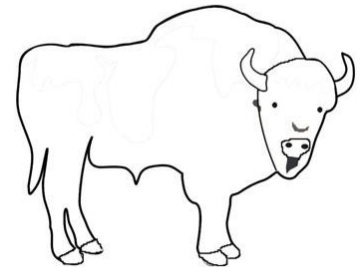
For the Background...

- 12" x 18" white drawing paper (or brown)
- Earth colored tempera paints (or pastels)
- Brushes



Step One: Drawing the Animals, ex: Bison

Demonstrate a simple drawing of an animal, ex. bison. Remember to point out the very big head and rather small legs! See the picture for a good example. Using a pencil and scratch paper, your child can make a



few preliminary sketches of the animals he would like to include in his painting. He may want to follow in the steps of the cave artists, or he

may prefer to depict animals he is familiar with, such as cats arching their backs, dogs barking or birds flying in flocks. Whichever subjects he chooses, remind him that he need not include every detail but can make his creatures from simple shapes, such as circles, triangles and rectangles. He should not worry if his animals don't look exactly like those in photographs--after all, neither do the original cave paintings.

Using a white oil pastel, have students begin at one end of the black paper and draw the eye. Then, draw one tusk, the big forehead and then the back. Make sure the shoulder goes up and up (think hunchback) and curve downwards for a small butt. Add legs and other details. Using a small sponge and some brown tempera paint (or pastels), dab the paint around the shoulder and head area to fill in the hair.

Step Two: Cutting out the Animals, ex. Bison



After the paint dries, or once you've filled in with pastels, cut along the white line of the bison. Some kids made smaller bison and had extra room on their black paper for another animal. Option: They can draw and paint as many as they would like in different sizes and layer them, as was done in the caves.

Step Three: Painting the Background

Using a palette of earth colors (encourage mixing here), have students create their cave walls. Option, they can make a line across the length of the page as a horizon. The sky will be above this line and the earth will be below, then students can make their own landscape. Some may use browns, oranges and yellows (cave wall colors) while others may use traditional blues and greens. Whatever choice they make is fine. After the paint dries, glue on the bison.

Using a palette of earth colors (encourage mixing here), have students create their cave walls. Option, they can make a line across the length of the page as a horizon. The sky will be above this line and the earth will be below, then students can make their own landscape. Some may use browns, oranges and yellows (cave wall colors) while others may use traditional blues and greens. Whatever choice they make is fine. After the paint dries, glue on the bison.

Have students "sign" their work by cutting out a small handprint on cardstock, see sample sheet, and using a sponge dab paint around it, or rub chalk around the outer edges, just like an ancient artist would.



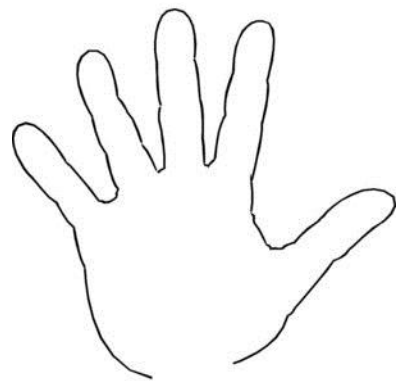
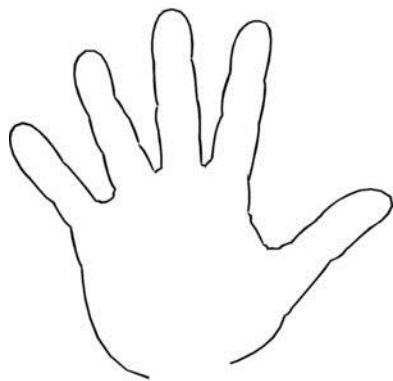
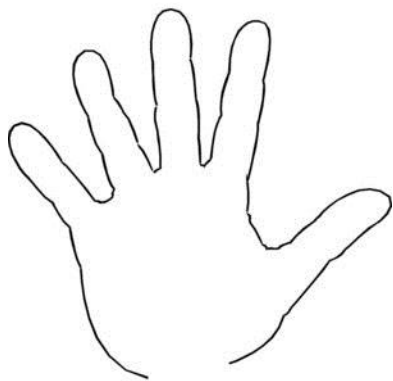
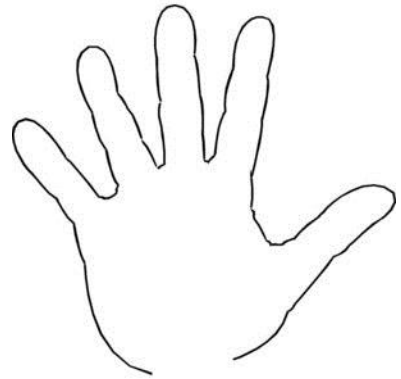
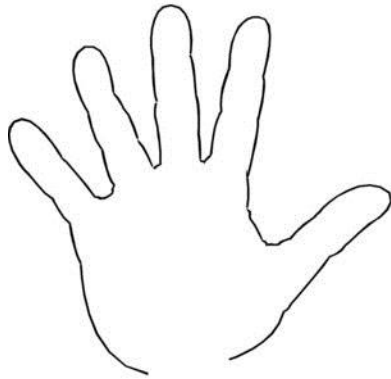
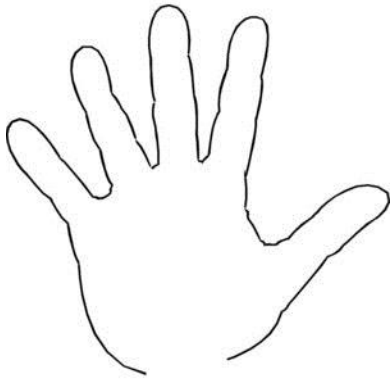
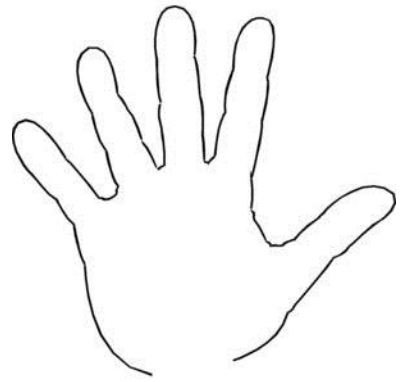
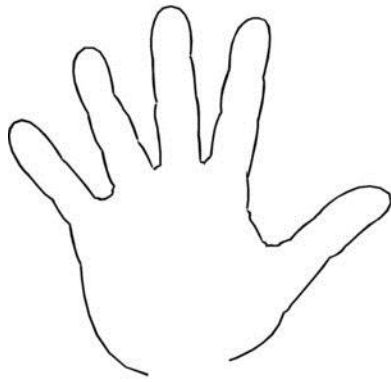
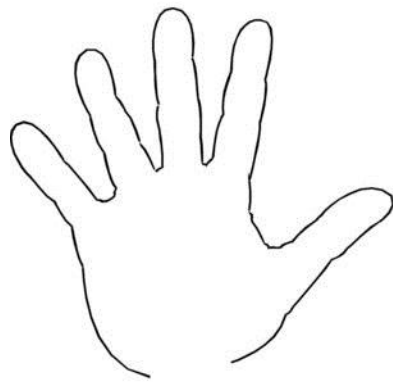
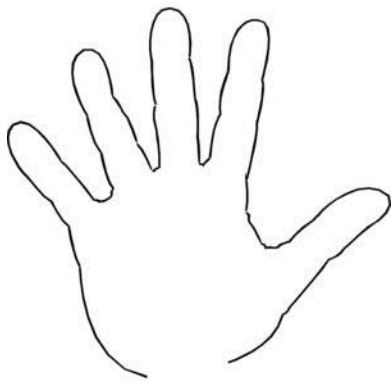
Variations:

- If you don't have time for students to paint or color a whole sheet for their background, use brown drawing/construction paper and have students use pastels in earth tones to shade it so it looks like a cave wall.
- Or, help your students prepare the surface of a paper bag or a sheet of brown paper so that it has a rough and worn appearance, like that of a cave wall. He should crinkle the paper, spray it with water in the sink (don't soak), then let it dry completely (you can help him use a hair dryer to speed the drying time). To frame the finished drawing, mount it on a piece of black construction paper using glue or rubber cement.



- If your students really take to this project, they may want to try creating an even more authentic cave painting, using another sheet or a large flat stone for his canvas and, with your help, natural materials (soil, leaves, dandelions, a charred stick) for drawing.





Packing our Bags

Source Unit: *eXpedition: Deep Blue Sea [Preparation is Key]*

Old suitcases often tell a story of where they have been and a carry-on is carried everywhere!

Have the students think about what they would need to take with them on our expedition. Have them think about what items would be most important to take if they had just one small suitcase worth of space to bring whatever they need. What would they bring and why? Have them consider where they are travelling to and how long the expedition is going to take. Will the distance and location affect what they choose? Write sample ideas on the board and have students come up with their own creative lists.

Now that they have their packing list ready it's time to get their bags packed! Have students make a carry-on bag for their eXpedition, inc. adventures. **(This can be done individually, in small groups, or as a class depending on resources.)**

These suitcases also serve as great places to keep track of their packing list, travel passes, passports, maps, travel tip booklets, and other tools for future eXpedition, inc. destinations.

Use whatever boxes you have available to get the size you want. Simply make rectangles with rounded corners and hot-glue a gusset all around.

Use small hinges (pack of 4 for just under \$2) for the lids and some sort of hasps (less than \$2) to keep them closed.

Note: if you are going to try this project, it is recommended you do **NOT** hot-glue the hardware on.

Try a slower-drying, stronger glue, or use paper fasteners (brads) or something similar to attach them securely for longer durability.



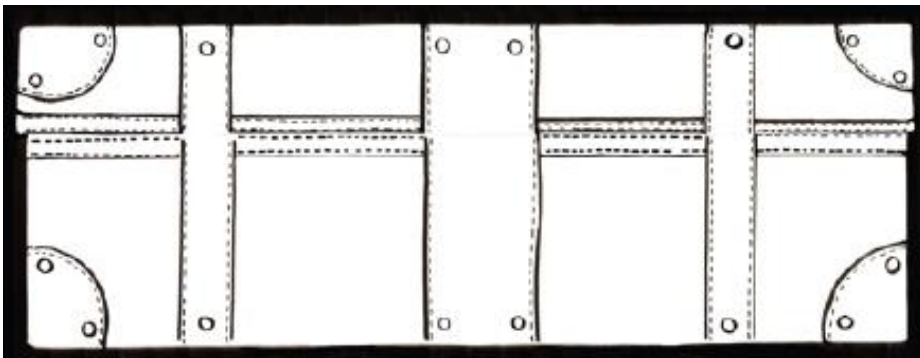
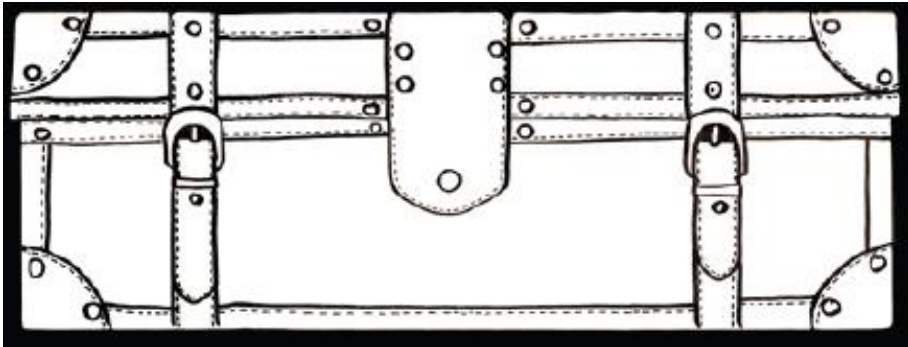
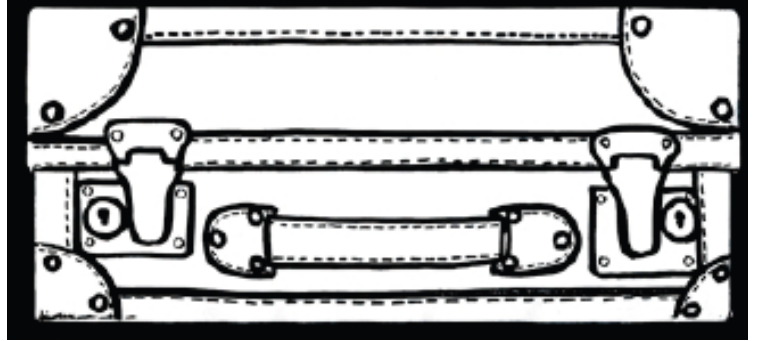
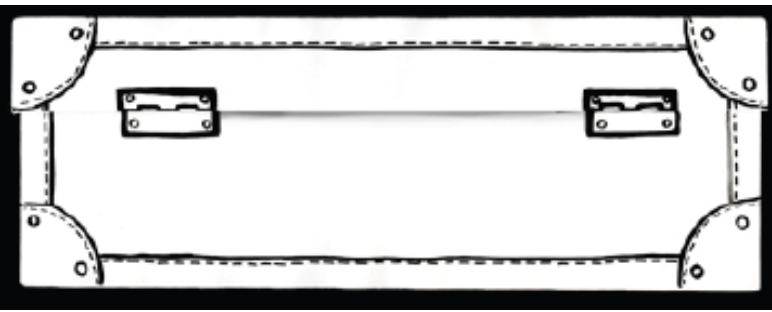
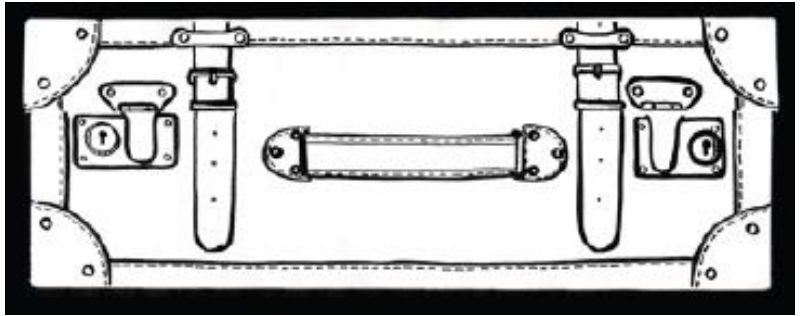
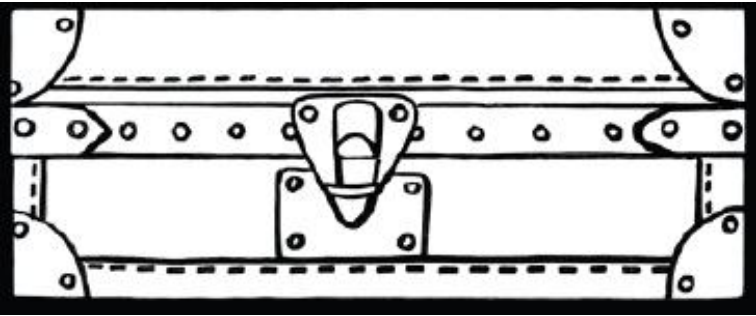
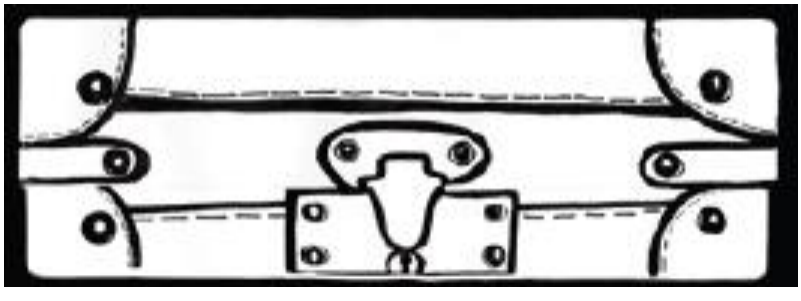
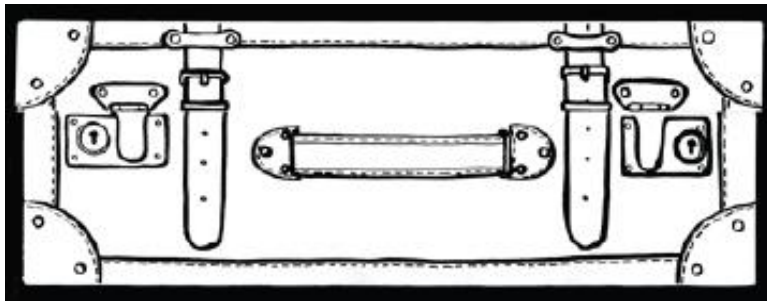
The handle is simply a loop of cardboard that slides in and out for carrying and storage, respectively.

Print out flags or images of different countries, country and city name banners, vintage luggage labels, globes and more. vintage travel stickers, airline tags, etc and use glue to make them adhesive. As you plan your class expedition, add stickers from all the places you go and all the places you pass on your way.

Option: Based on old suitcases (and the included image guide is an excellent reference) have students add the desired "seams" and "hardware" on the boxes so that they look like small suitcases.

Students can sketch out the lines with a pencil and ruler. ***Make sure students measure the distances and make things symmetrical, but don't be afraid of small irregularities, they provide the necessary charm!***





Mini Version: Pack Lightly!

Materials:

- Matchboxes
- Brown paper, ex. shipping paper
- Darker brown cardstock
- A print of some stickers
- Brown/black pencils
- Scissors
- Glue
- A gold marker



Cut 2 pieces of brown paper. One big enough to wrap around the outside of the box with some overhang. One big enough to cover the bottom and sides of the inside of the box.



Cut 6 circles of brown card approx. 12mm diameter. *Just have students trace around the bottom of a marker. They don't have to be exact, as long as they're not too big.*



Cut 3 strips of brown card approx 4mm wide. 2 long enough to wrap around the box. The other shorter for the handle. Cut points on the ends.



Glue the paper to the outside of the box. Trim the overhang closely to the edge of the box. Then push the ends inside the box and glue them securely.

Glue the other piece of paper to the bottom of the inside drawer of the box, then fold the edges up and glue them to the sides. Trim the corners to make them fit neatly.



Cut the 6 circles into pieces. Cut 4 of them in half and 2 of them into quarters.

Use the pencils to darken the edges of the box and to give it some shading. May be done before or after you stick all the bits on.

Fold each semi-circle in half and glue one to each corner of the outside of the box.



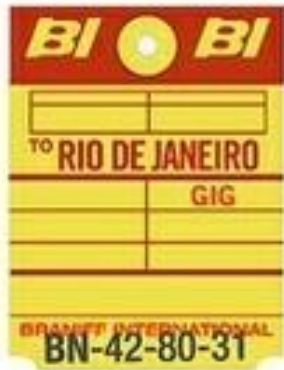
Glue the quarter circles to the ends of the inside drawer of the box.

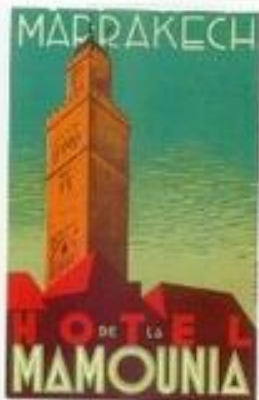
Wrap the long strips around the box and glue them down with the pointy ends both on the top like straps.

Curl the handle, fold little bits of the ends back the other way and stick to the top like a handle. Trim this shorter as needed once you know how much space you have between the straps. Shade these bits with the pencils as well.

Cut out the stickers you want and stick them onto the sides.

Finally, add some metal details with the gold pen, like buckles and rivets, and put some dots on the bottom as well, as most suitcases have some little round metal/plastic feet.





Flowing Fields of Salt: Watercolor Painting with Salt and Glue

Source Unit: eXpedition: Deep Blue Sea [We're Go for Launch!]

Materials

- watercolor paper
- watercolor paints (pan, tube, or liquid watercolor paints)
- paint brushes
- Elmers Clear or Blue School Glue Gel
- salt
- (option) circle punch: 1 inch or longer

Have students create art inspired by the salt harvesting fields of San Francisco Bay and the play of salt water and sunshine along the seashore. The white starbursts seen throughout the paintings are pockets of salt on the liquid watercolors.

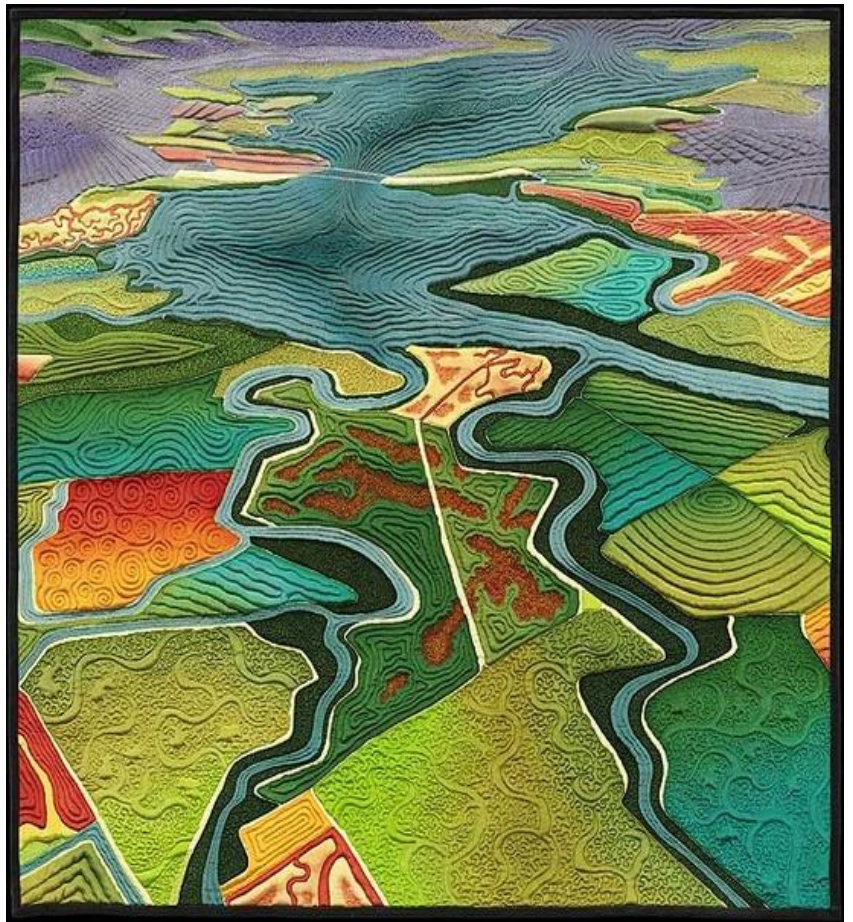
This art is made using watercolor paint, glue and salt, and involves squirting, painting and sprinkling with the kind of freedom that kids love.

Adding glue, which acts as a resist, creates wonderful texture.

Instructions

If you are unable to track down Elmer's Blue School Gel locally, you can use the clear one, either way, wonderful textures are created. Whether you use pan, tube, or liquid watercolor paints, remember to encourage the students to vary the intensity of the color for more interesting results.

1. Have students drizzle and squirt some glue onto a sheet of watercolor paper. Allow to dry completely (this may need to be overnight).



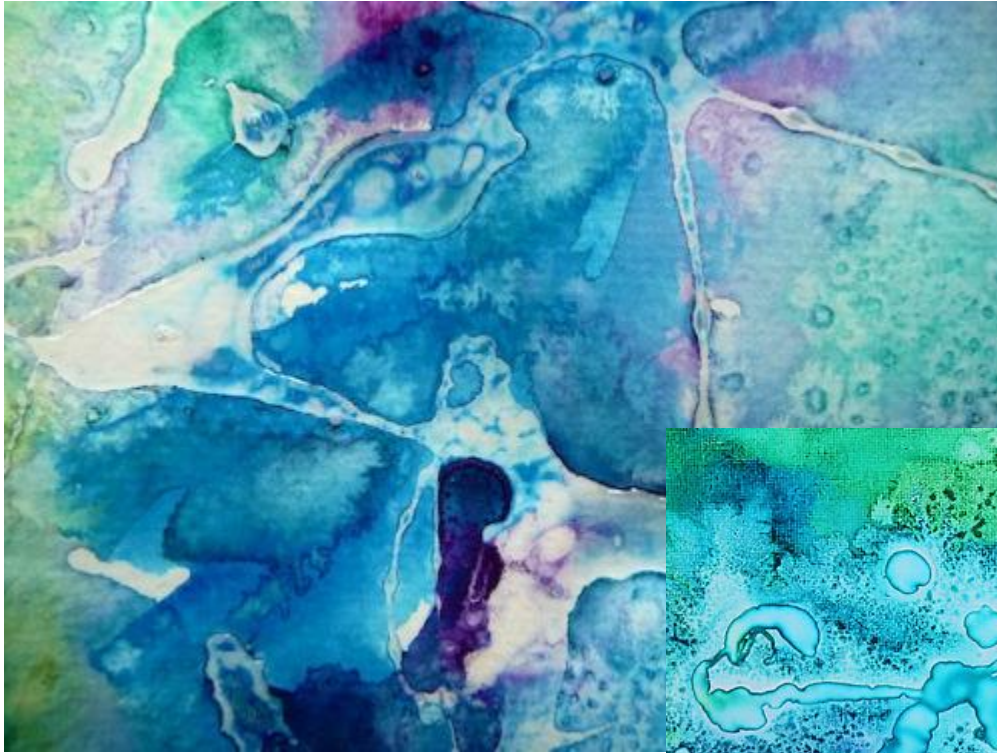
Title: Fields of Salt, Linda Gass Artist Statement: Although the landscape in this artwork may look like farm fields, it is actually salt ponds used for industrial salt production. These ponds used to be essential wetlands of San Francisco Bay. Copyright ©2007 Linda Gass. Photograph by Don Tuttle



2. Paint over the dried glue with watercolor paints. Sprinkle salt on sections of the painting while it is still wet. Once it dries, you'll notice how the salt absorbs the surrounding water and pushes the pigment away, leaving behind a white, speckled effect.



1. Once the paint has dried, use a cloth or dry sponge to gently remove the salt. Notice all the great textures that have been created.
2. Extension: Isolating small areas by cutting out shapes with a punch, opens up all sorts of artistic possibilities and allows students to piece it all together in new ways.



Portholes: Windows to the Deep

Unit: eXpedition: Deep Blue Sea [Diving Deeper: Midnight Zone]

You might wish to introduce this section with a book such as *Flotsam* by David Weisner, *The Deep: The Extraordinary Creatures of the Abyss* by Claire Nouvian, or *Rainbow Fish Discovers the Deep Sea* by Marcus Pfister.

As we sink down, peering through our portholes at the bottom of the sea who or what might be looking back? Have you seen only suckers as the giant squid tries to take over our ship? The giant eye of a whale? Sunken ships and vast treasure? The curious eyes of a passing mermaid? Blue lights dancing from bioluminescence? A lost city under the sea? What else could there be?

One scientist described what she saw this way. What she saw in the darkness rivaled Van Gogh’s *Starry Night*—plumes and blossoms and flourishes of brilliance. “There were explosions of light all around, and sparks and swirls and great chains of what looked like Japanese lanterns,” she remembers. Light

popped, smoked and splintered: “I was enveloped. Everything was glowing. I couldn’t distinguish one light from another. It was just a variety of things making light, different shapes, different kinetics, mostly blue, and just so much of it.” Sometimes, the mystery animals outside were so bright that Widder swore the diving suit was releasing arcs of



electricity into the surrounding water. Once, “the whole suit lit up.” What she now believes was a 20-foot siphonophore—a kind of jellyfish colony—was passing overhead, light cascading from one end to the other. “I could read every single dial and gauge inside the suit by its light,” Widder remembers. “It was breathtaking.” It went on glowing for 45 seconds.

Have students use new art techniques and hair gel to make their own amazing 3-dimensional artwork where their image appears to be under water! Kids go crazy for this technique as it is quite fun to squish around!

Materials:

- Cheap **clear** or very light blue hair gel (Clear or light blue works best, it will make whatever image they place behind it seem as though it's floating in water!)
- Zipper-seal sandwich or other appropriate sized bags (needs to fit inside porthole opening)
- Double sided tape, craft glue, or flat glue dots
- Glue
- Scissors
- Art materials (ex. watercolors, construction paper, colored pencils, pastels, etc.)
- Fine Glitter

Have students use art materials to create a multimedia or single medium artwork demonstrating their vision of what they might see in the deep blue sea if they looked out a porthole.

Tip: Visually write the instructions out on the white board using symbols and have the students try to solve or decode what the next step is. A student gets to erase a step as the group completes them. This technique can help keep everyone engaged and at the same pace.

Variation: What might a fish-eye-view of you through a porthole look like?



How to make the “water”

Have students squeeze a little hair gel into their zipper seal bag, approximately a teaspoon or so for a very small bag (make sure to use a bag without a gusset down the middle because it will show through the gel). Only add enough to cover the inside of the bag. Too much gel might cause the bag to "pop" later on. Also, too much hair gel will make your artwork too thick and will make it difficult to glue your frame to the rest of the card

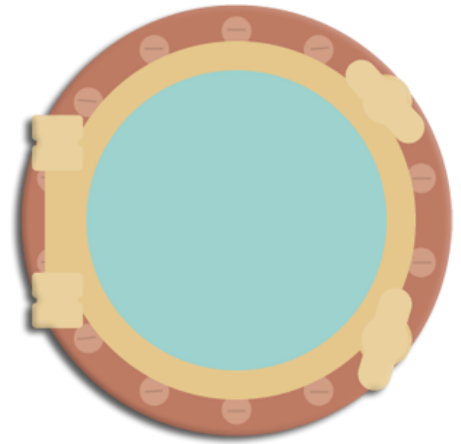
Option: Add a little bit of small glitter for sparkle.



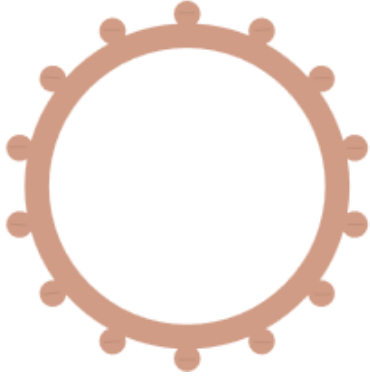
Press excess air out of the bag, close it and spread the gel evenly over the entire inside of the bag. Be sure to remove ALL of the excess air from the bag before you zip it closed. Don't try to avoid air bubbles - they look pretty and they're what makes it look like water!

Make a porthole:

1. Paper: Have students use construction or craft paper, measure, and cut out thick circles to go around their artwork. This can be put over a rectangular sheet of construction paper or cardstock with the same sized hole cut out of it as the porthole. This will make it easier to attach the bag. Either way, make it large enough to leave about a 3/4" of an inch all around your image, or the part of the image you want to show.



2. Add screws and metal work



3. Add rivets and “brass” details with additional paper shapes in another color, ex. Add rivets to the bottom of the plate with a marker pen. Just draw small circles at intervals around your porthole.



4. To create weathering, shading, fine details, etc. have students use a marker pen, and/or or oil pastel.

Putting it all together:

Turn your porthole around and add double-sided tape or other adhesive around the back of your porthole opening. Adhere your gel bag over the opening. The gel bag should be attached securely so that none of edges show around your frame.



Adhere your scene behind the window so it faces out through the porthole. Make sure to place the image in the center and check that it lines up when covered. This is a wonderful touch and feel art technique. No one can resist playing with it for a bit!

Samples of Porthole Art



Image Credit: Jasmine Ann Becket-Griffith. <http://www.ebsqart.com/Artist/Jasmine-Ann-Becket-Griffith/56/Art-Portfolio/Portholes-to-Fantasy-5-ORIGINAL-PAINTING/677034/>. All Rights Reserved. Copyright 2011.

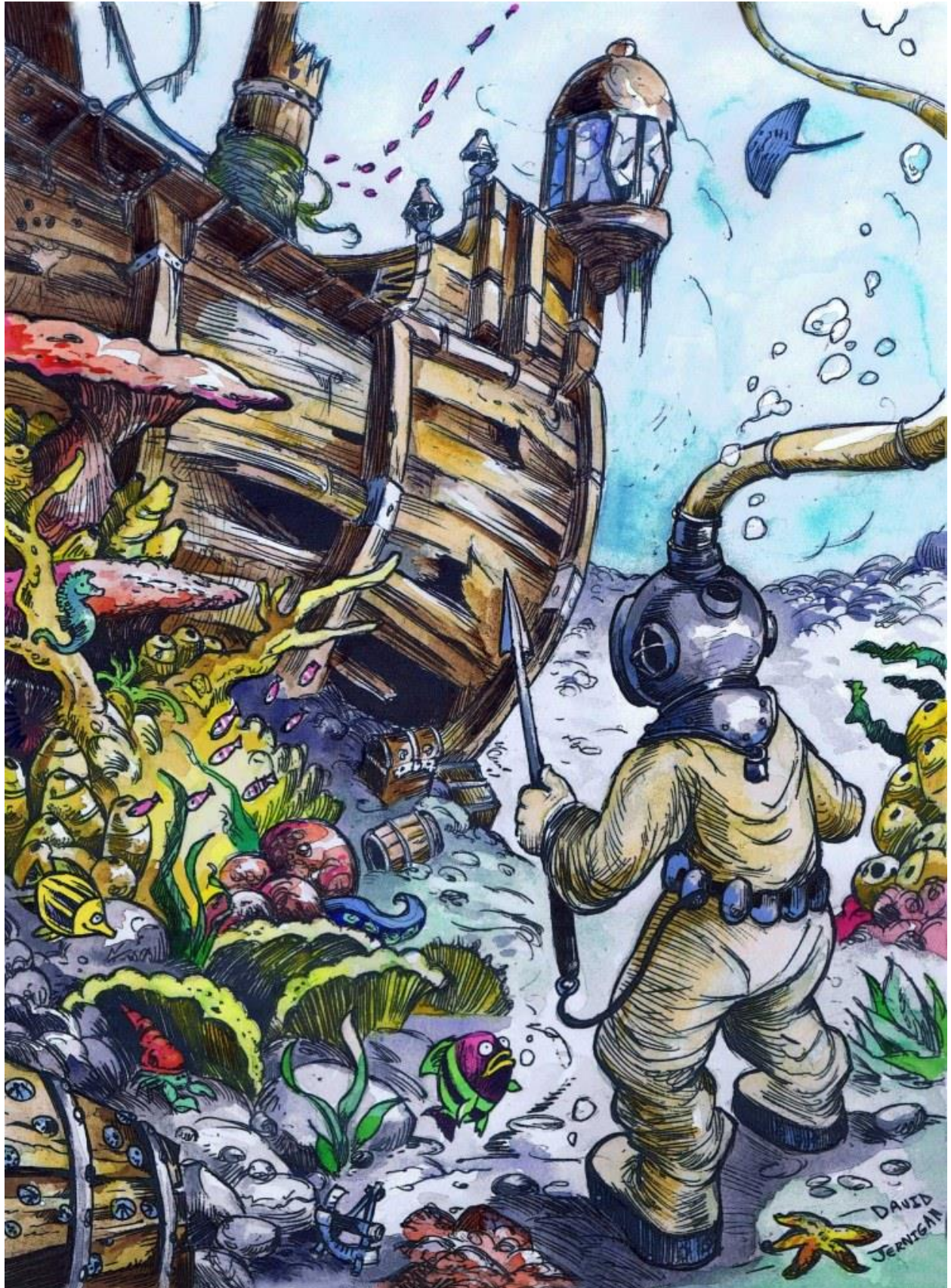


Image Credit: Dave Jernigan. Copyright 2011. <http://sketcharound.wordpress.com/category/under-the-sea/>



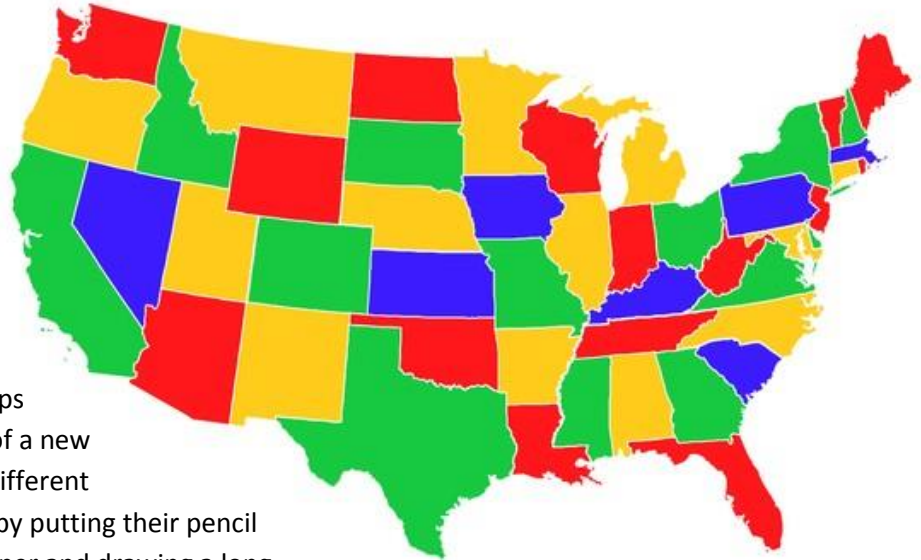
Image Credit: Dave Jernigan. Copyright 2011. <http://sketcharound.wordpress.com/category/under-the-sea/>

The Mathematics behind the Maps: The Four Color Theorem

Source Unit: *The Magnificent Seven*

Materials

- Pencil, paper and coloring tools
- String
- Two or more [preferably four if you can find them] colors of marking pieces, such as squares of construction paper, unifix cubes, or poker chips



1. Have students draw a map of a new country or continent (with different states/regions/or counties) by putting their pencil down on a clean sheet of paper and drawing a long curving line that goes anywhere on the page. The pencil cannot stop or be lifted off the page until it meets the point at which it started. The pencil line can cross itself any number of times and at any point.

Challenge the students to color the map using the fewest colors possible with these two rules:

- Regions that only touch at a vertex or point may be the same color.
 - Regions that share a side (or portion of a side) **must** be different colors.
2. Have the students work together and experiment with coloring the maps that they have made. [Note: They should all be two-colorable.] If they find one that is not, check it together very carefully to see that it has been made properly. Be sure that students understand that drawing a map that is so complex it is hard to verify whether it can be two-colored or not is not the same as drawing a map that *cannot* be two-colored.
 3. Then, have students use a large loop of string to create maps and color them. Option: Instead of coloring the regions, students can use colored marking pieces to mark the colors that they would use.)
 4. Then, have students try to twist and cross the loop of string so that the resulting "map" will not be two-colorable. What is the relationship between the loop of string and the way that the students originally drew maps on their paper?
 5. Have students do the same thing using *two* loops of string, and allow the loops to overlap in any way that they like.

Discussion

1. They can't make a map that isn't two colorable! (But why?) Discuss what happens at each step and why the map remains two colorable.
2. Invite the students to talk about what it means to be certain of something. What is the difference between *doubting* that something is true and *knowing* it is false?
3. What makes them certain that they can always make a map that they can color with two colors using this method? What makes them not so sure that this will always work?
4. At the foundation of this activity is the mathematic proof technique called induction. The idea behind induction is to begin with the simplest possible case (the closed loop that forms a circle) and build up incrementally to more and more complex cases. If you can explain why every "map" that you build up from that simple loop of string is always 2-colorable, then you have completed your proof.

The State of Maps Today

Now that they've tested a few maps, how many different colors do students think you need to have available if you want to color a map so that countries or states that share a boundary line are not colored the same color? A deceptively simple mathematical problem lurks within the brightly colored patchwork of states in the United States. It's the sort of problem that might worry frugal mapmakers, or teachers, who insist on painting their maps with as few colors as possible.

Give students the blank printout of the United States. Have them color the states with as **few** colors as possible, using the same rules that applied to their earlier maps.

- Regions that only touch at a vertex or point may be the same color.
- Regions that share a side (or portion of a side) must be different colors.

Are four colors always enough to fill in every conceivable map that can be drawn on a flat piece of paper so that no countries, states, or regions sharing a common boundary are the same color? For a very large map (like the map of the US states students just did), it would literally take the fastest computers imaginable thousands, if not millions of years to check out all the possibilities!

Francis Guthrie, a 21-year-old mathematics student at University College in London, was mapping the counties of England in 1852 when he noticed that he only needed four colors for the map. He asked his younger brother, Frederick Guthrie, if this was true for any map. Frederick

FYI

In the language of Mathematical Map Coloring, a map is not much different from the maps in your atlas. The areas which would be countries, states, counties, etc., on a political map are called regions. The lines that separate one region from another are called boundaries. Every region in a map is a closed curve because if it wasn't, the colors would leak out of the lines.

When a map is colored, the number of colors used and their arrangement relative to one another is called a coloring of that map. A coloring that uses two colors is called a 2-coloring; if it uses 3 colors, it is called a 3-coloring, and so forth. Following the same pattern, a map that can be colored with two colors is called two-colorable. A short-cut way mathematicians use of expressing this is by using the variable n , and saying that a map that is n -colorable is a map that can be colored with n colors. The number that you will use to replace the n , will, of course depend on the map you have colored and how you have colored it.

took the problem to his professor, Augustus de Morgan.

In 1878 Arthur Cayley presented this problem to the London Mathematical Society. He and various others tried to prove it over the next century. In 1976 Wolfgang Haker and Kenneth Appel of the University of Illinois proved the theorem using a computer. It took them four years to simply write the computer program for the Cray computer, which took 1,200 hours to check 1476 configurations. Some mathematicians are troubled by the proof by computer. They feel that a theorem so easy to understand should be able to be proved by hand. Anyone who can prove the theorem without the computer may win the Fields Medal, the math equivalent of the Nobel Peace Prize

Notes on Mathematic Map Coloring Strategies

During this project students will typically discover a variety of interesting strategies for finding a coloring of a map that uses a small number of colors on their own. Some of these are described below. It is important to give them a chance to discover these techniques on their own and then talk about what it is they're doing and how these strategies can be applied in other areas of mathematics [all of this relates to graph theory, planes, vertices, etc] and other subjects.

The Polka Dot Strategy: A Greedy Algorithm

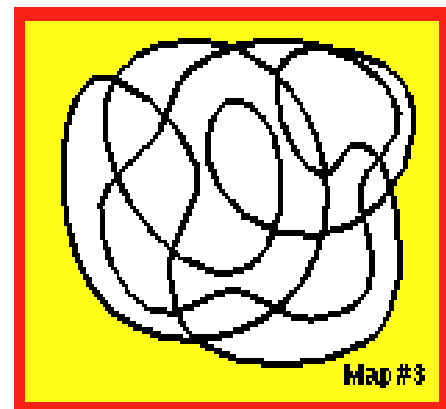
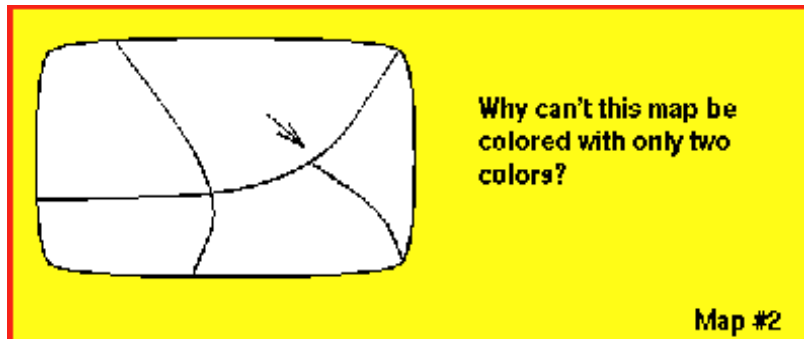
One of the strategies they may discover is the *Polka Dot Strategy* [also known as a Greedy Algorithm] of using one color to exhaustion before taking up another one.

Greedy Algorithms are one of the most basic and general algorithm strategies used in math. An algorithm is a step-by-step recipe for solving a problem. A greedy algorithm might also be called an algorithm that gobbles up all of its favorites first. The idea behind a greedy algorithm is to perform a

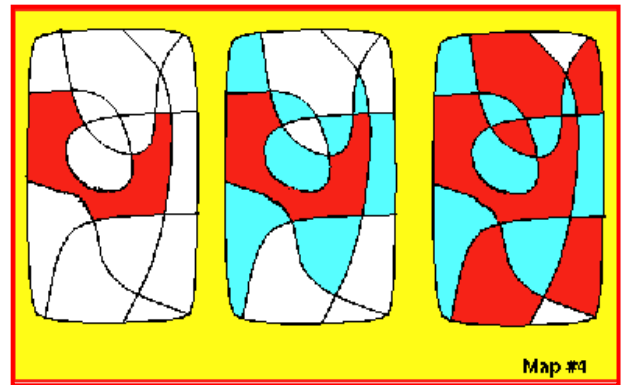
single procedure or step over and over again until it can't be done any more and see what kind of results you get. It may not completely solve the problem, or, if it produces a solution, it may not be the very best one, but it is one way of approaching the problem and sometimes yields very good (or even the best possible) results.

Some children will be able to explain why Map #2 cannot be colored with two colors. At the juncture indicated, three regions meet, each of which borders the other two, so they must all have different colors. Such an explanation is a deduction, part of the idea of proof, which is at the heart of mathematics. Surprisingly, Map #3 can be colored with two colors.

Chain of Logical Deductions



Some children may discover a method for finding a 2-coloring (if the map can be 2-colored) by following a "chain of logical deductions" ex. in Map #4. In the leftmost map, one region has been colored *red*. If only red and blue are the only colors you want to use to color the map, all of the regions which border the red must be colored *blue*. In turn, the regions bordering the blue must all be colored *red*. As we continue, we will either succeed in 2-coloring the entire map, or get stuck. If we get stuck, we know that a 2-coloring is impossible, since we only did what we were logically forced to do up to that point.

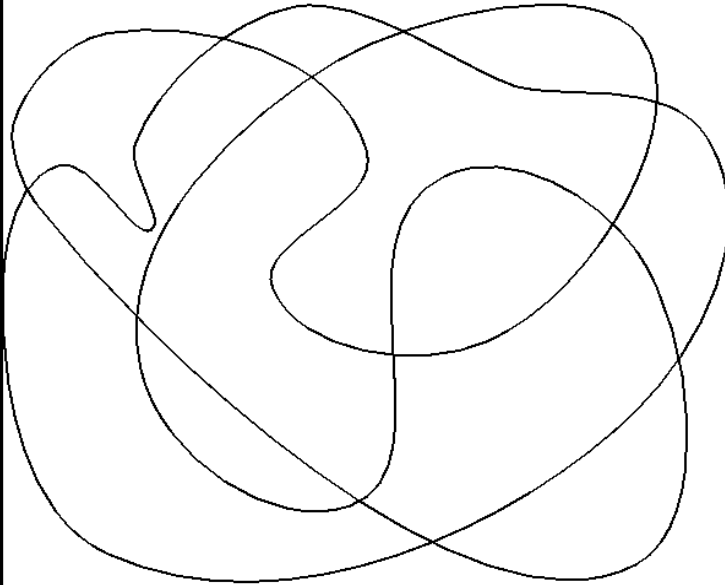


Movable Pieces

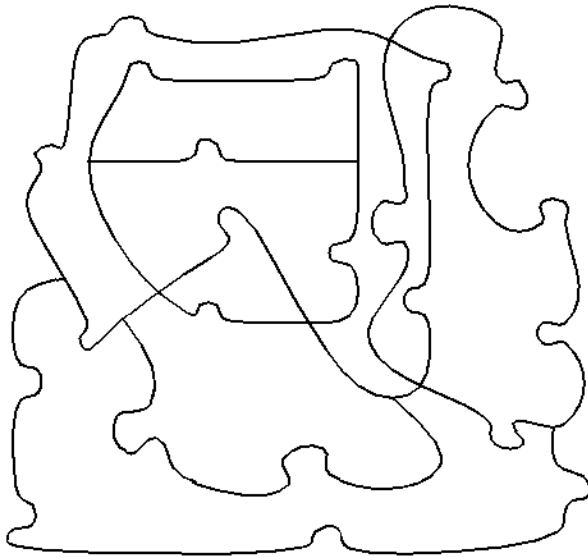
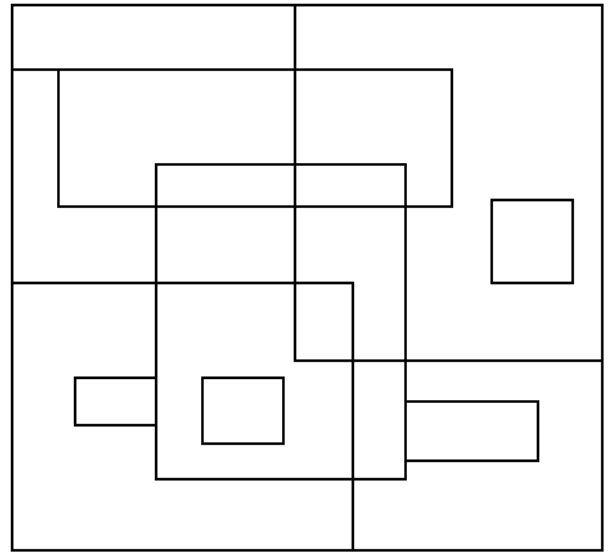
Have students work with colored marking pieces, ex. poker chips, to represent the colors assigned to the regions rather than coloring and coloring for more complex maps, ex. The US States Map. Using poker chips, is a way of using and showing the concept of a *variable*, something you can change. The region is the *variable* that is assigned the *value*, which in this case is a color.



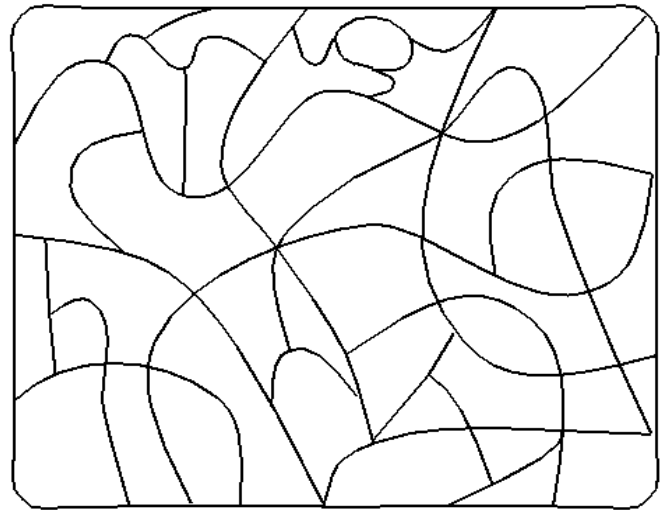
Swirltown



Boxville



Bumpington

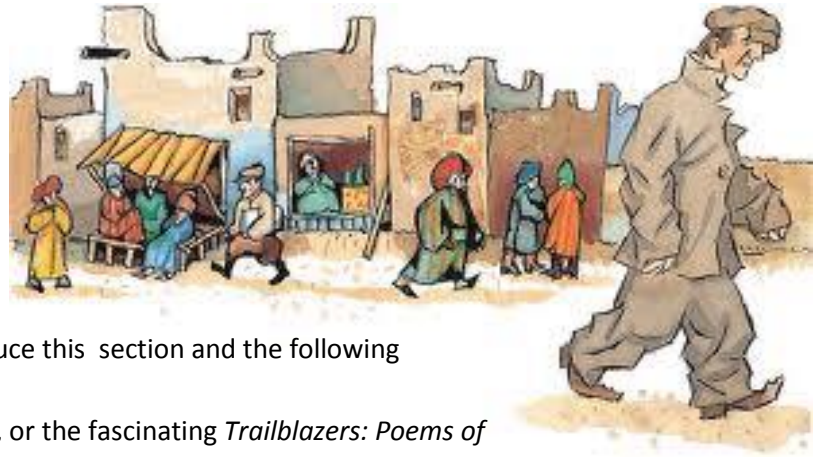


Popdale



The Lands We Wander...

Source Unit: The Magnificent Seven

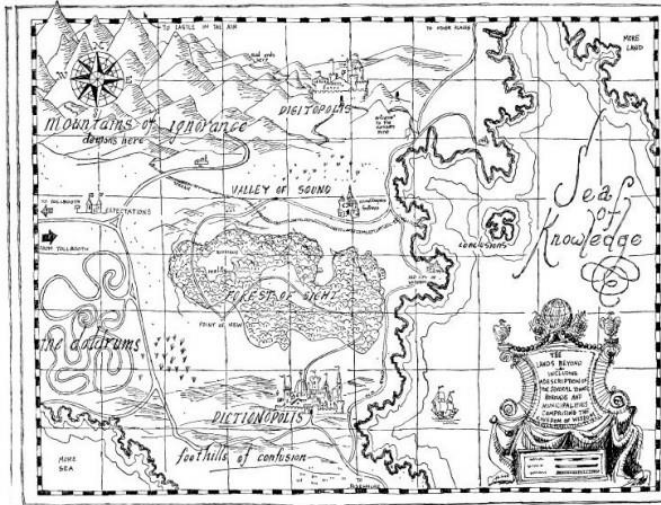


There are many many excellent books to introduce this section and the following project such as *How I Learned Geography* by Uri Shulevitz or *Follow that Map* by Scot Ritchie, or the fascinating *Trailblazers: Poems of Exploration* by Bobbi Katz, illustrated by Carin Berger (Greenwillow).

“Imagine an earlier time...there are no maps. The globe is blank. What lies behind the mountain, beyond the sea, beyond earth's atmosphere? Who will risk life itself to find out?” Maps are about far more than getting from point A to Z and they have come in a variety of forms throughout history. Maps are used by everyone from geographers to travelers to hikers to airline pilots. There are treasure maps, maps to the human genome, patchwork quilt maps held a series of hidden clues that guided slaves [following secret signs sewn into the quilt patterns] along the Underground Railroad to Canada. People have been making maps for over 4,000 years, and they've come a long way. We used to rely on explorers to visit faraway places before a map could be made. We still have explorers that travel the Earth (and beyond) to discover and map new places, but now we can also make and update maps with information sent from satellites in space. Even our favorite tool for getting her to there, GPS, is all based on maps.

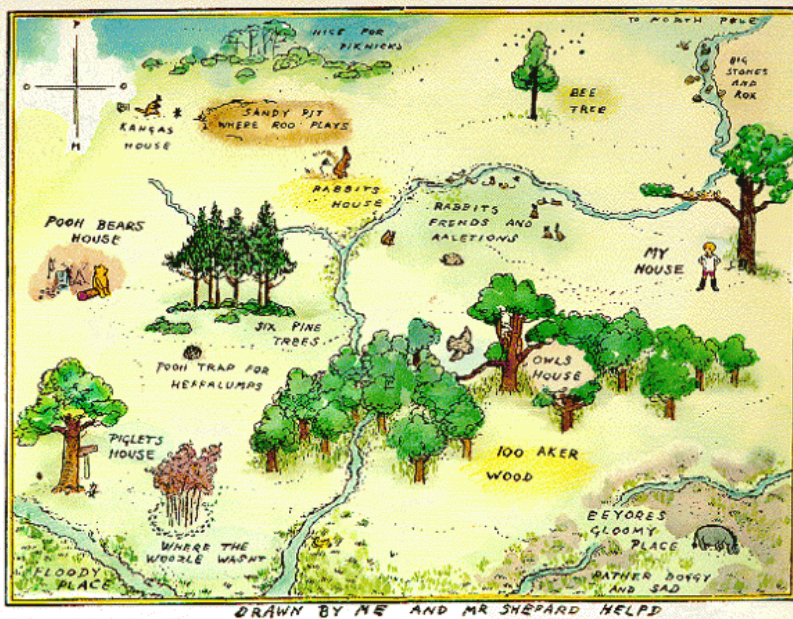
The science and art of mapmaking is called cartography. From cave paintings and ancient European maps to new maps of the 21st century, people have created and used maps to help define, explain, and navigate their way across the planet and beyond. No matter what content is shown by maps, they can transport us places far away or help us explore the areas near our homes.

Maps can help children understand and explore both their everyday environment and faraway places, even ones that only exist in the mind of their creator. Stories do a great job of getting your imagination to wander, they depict great mythical lands that pour out life, and bring imaginable lands to existence, but it's maps that actually make them real locations. A good map makes kids feel as if they can actually venture to that land one day. Some excellent examples of imagination and maps are often shown in literature, in books like *The Phantom Tollbooth*.



The map from *The Phantom Tollbooth* is a perfect example of where hand-drawn aesthetics work best in maps—across a small area mapped specifically for visitors, as the exaggerated landmarks are given weight over exacting spatial accuracy. In this way the unfamiliar can be easily spotted and identified. It's a style commonly seen in attraction maps, like Anika Mottershaw's Map of London or theme-park maps, like those of Walt Disney World, <http://disneyworld.disney.go.com/maps/>.

A.A. Milne's *Winnie the Pooh*,



The key difference between a map like this one and the one from *The Phantom Tollbooth* is purpose. While Feiffer's map is intended for exploration, Christopher Robin-E.H. Shepard's map is a documentation of a known land. In an imaginary world, what's beyond the borders doesn't matter so much. Here the only indication of the world beyond is the "To North Pole" note, an obvious sort of landmark for a child's map. A map of an imaginary world is not unlike early maps, such as Hecataeus' map of the world, drawn in approximately 500 BC, with its amorphous borders of "ocean." Both Hecataeus and Christopher Robin are making the same point—sure there's probably other stuff, but this is what's really important.

Other fine examples are found in *The Chronicles of Narnia* by C.S. Lewis, *Earthsea* by Ursula K. LeGuin, *The Hobbit* [Drawn more or less to scale, Tolkien's maps show locations in relation to each other with only sparse detail—only what you absolutely need to know to get where you're going, no hints of what else is out there Only the information you require, all of the in-betweens omitted. **Discuss with students, when else do we use maps like this?** Possible answer: It's the sort of map you might draw on a napkin for a friend from out of town who isn't sure where she's going. Maps are also found in *The Princess Bride*, and L. Frank Baum's *The Wizard of Oz* [a great example of a political map—it's easy to imagine it as a pulldown over the chalkboards of Oz classrooms]—all of which feature engaging maps that serve as gateways to imaginary lands. These maps say YOU ARE HERE, in another world. Now, while many authors draw many maps, *The Hobbit* contains many, many maps and all told, Baum drew forty individual maps of Oz to accompany his novel, some books don't include maps, and it would

be quite helpful if they did. **Discuss with students the purposes of maps in books.** Possible answers: Maps help readers remember people, events, and locations, etc.

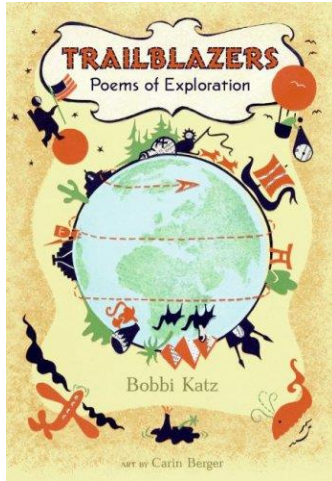
So what do some readers do when they wish they had a map? For example, a notable map omission from recent literature: *The Hunger Games* didn't include a map of Panem! **Ask students, what's a map desiring reader to do when there isn't one?** Create one themselves. Assortments of reader-drawn maps have popped up related to *The Hunger Games*. One of the best belongs to Livejournal user "aimmyarrowshigh," who describes the process she used to determine national borders and each district's location. The result is a spectacular map that would make any cartographer proud. Go to the following link to show students the final result, <http://img8.imageshack.us/img8/4070/panemmap.png> and here to read about her process, <http://aimmyarrowshigh.livejournal.com/32461.html>.

Creation of a Continent

Source Unit: *The Magnificent Seven*

Inspired by a project by Diane Fitzgerald, All Rights Reserved.

http://teachers.bvsd.org/diane_fitzgerald/library/new%20continent%20project.pdf. 19 April 2012.

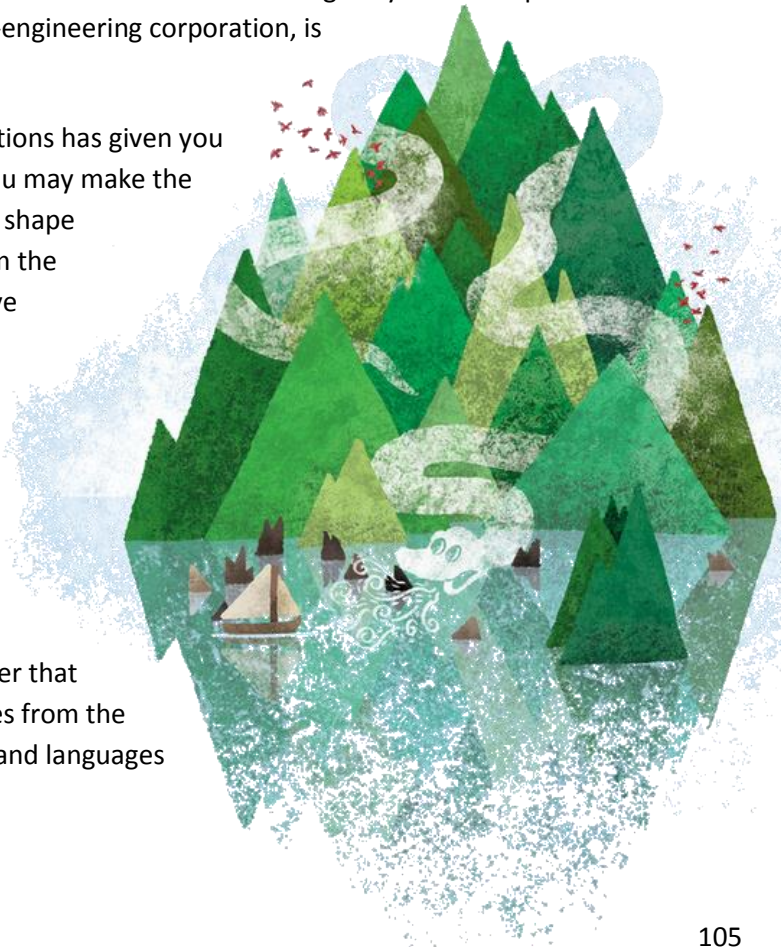


Once students have seen and discussed multiple examples of imaginary maps [a large image gallery of fantasy maps is available at <http://www.woodge.com/books/fmaps.html>] and explored related literature, such as *Trailblazers: Poems of Exploration* by Bobbi Katz, illustrated by Carin Berger (Greenwillow) they are ready to be divided into groups for the following project.

Sample Task Narrative: The year is 2050. Terra-forming and new advances in geo-engineering have made it possible to drastically change the face of the earth for the better. In particular, human beings have decided to solve the problem of limited land by raising a new continent in the middle of the ocean! We already have 7 continents, and they are

great. But what you have the opportunity to do is to create something truly spectacular!! Your job, as leader of the world's foremost geo-engineering corporation, is to design and create this new continent.

Your board of directors and the United Nations has given you almost unlimited leeway in this project. You may make the continent wherever you wish, in whatever shape you wish, as long as you allow settlers from the other continents to settle there. Will it have islands? Snowy mountains? Huge rivers? Jungles? Vast deserts? That is up to you. You also have complete control over politics in the new continent. You may decide to allow several different countries to occupy your land, or you may create one enormous empire. You may allow a dictatorship, a democracy, even a monarchy. It's up to you. Remember that your new land will be inhabited by refugees from the other continents, but whole new cultures and languages may arise, too.



Variations: Instead of a new continent, have students create an imaginary map for one of their favorite books or ask them, "Imagine an earlier time...there are no maps. The globe is blank. What lies behind the mountain, beyond the sea, beyond earth's atmosphere? Who will risk life itself to find out?" and have them re-imagine our globe.

Image Credit: Mysterious Island by [David Creighton-Pester](http://society6.com/product/Mysterious-Island_Print).
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The Point:

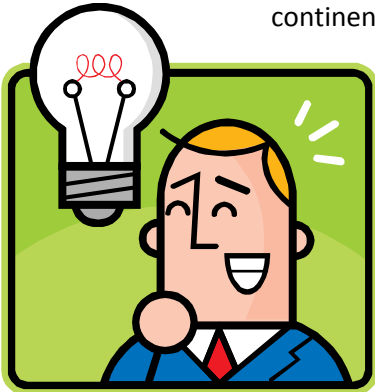
The point of this project is to demonstrate students' knowledge of:

- Types of maps
- Elements of a map
- Logical placement of landforms
- Use of graphs, diagrams, and tables
- Types of political and economic systems
- Application of the five themes of geography

For this project: Students must create a display with the following things:

Two Maps:

1. A physical map, labeled with at least 15 major landforms/bodies of water (plains, seas, mountains). They must be logically placed.
2. A political map, showing the countries and capital cities on their continent, color coded.
3. A model of the continent, ex. made from clay, with a topo map of their continent. [They may later be assigned to give their topo map to another group, and that other group will try to recreate their continent using clay or other materials.]



Tip to give students: To save yourself time, create one outline map and copy it, so you don't have to do everything repeatedly, physical, political, and topographical maps can all be based on the same outline. If possible, it is a good idea to make a photocopy of each map or use carbon paper to make multiple copies. The original map should be left as untouched as possible while the photocopy is a working copy that may be cut up if necessary.

Note: Each map should have a legend, a compass rose, and a scale indicator.

Also have students include, one graph, diagram, or table in their project. Students can compare population of the major cities, or how population will grow over time, or show which countries have the largest population. They could show percentage of land used for different purposes like mining, farming, or grazing. They could also show the various elevation differences on the continent. They can choose whatever format fits their purpose – bar graph, circle graph, line graph, or table.

Students will need to create a written narrative, describing their continent using the following five themes of geography. Discuss the following five elements with students.

1. **Location.** Give your continent's latitude and longitude (absolute location) and its relative location. What other continents is it near? What ocean is it in, and part of the world? Ex. Concordia's absolute location is 40°N, 40°W, in the middle of the Atlantic Ocean. It is exactly halfway between North America and Europe, and south of Greenland. (relative location)
2. **Place.** This includes both human and physical (natural) characteristics. What is the land like? What is the climate? What is the shape of the land and what are the major types of vegetation? Is it urban or rural? What are the man-made features of this place? Any famous landmarks?
3. **Human-environment interaction.** This includes how people depend, adapt and modify (change) the environment. How do people use the land or protect the land here? Do they mine, or farm? Have you built dams, or planted forests? Are there any environmental problems to solve?
4. **Movement.** How do people, goods and services and ideas move from one place to another? Do people come and go here, or is it isolated from the outside world? Where do most of your immigrants come from? Do people migrate from one region to another? What are your trade routes between towns and countries? Are there roads, railroads, airports, or some other form of transportation? How do people get where they need to go?
5. **Region.** Describe the formal and functional regions in your continent. Describe the vernacular. What languages are spoken there? Are there other names for different regions? Do particular cultures tend to congregate in certain areas? Are there particular areas that are dedicated to one industry, like farming or fishing? Is the continent divided into countries, or states? Are there major rivers or bays that tie certain areas together?

Extension: You may also assign students to create a flag, money, and postage stamps. When they're done researching, have students create a travel brochure with hand-drawn pictures and any details a tourist might want to know before visiting. (Have samples of real brochures for students to use as a guide.)

CREATE YOUR OWN COUNTRY

Country Name

Size

Population (number of people who live there)

Language(s) spoken

Favorite sport(s)

Seasons and weather

Food(s) the country is famous for

Popular pastimes

Famous tourist attractions

Modes of transportation (or how they get around)

Popular pets

Types of wild animals

Common jobs

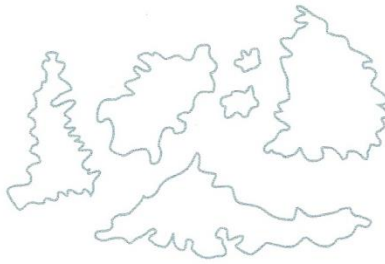


QUICK REFERENCE	
SKILL LEVEL	6 yrs +
EQUIPMENT	THIN BLACK PEN, BLUE AND GREEN COLOURED PENCILS
TIME	1 hour

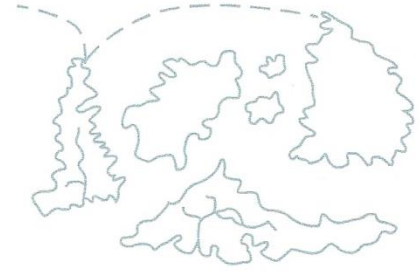
SPECIMEN No. 72	Title: <i>draw your own Antique Map</i>
Name / Name: Kaptin Scarlet	
Date: Oct 15th 1897	
Code: exp: 25-/004	



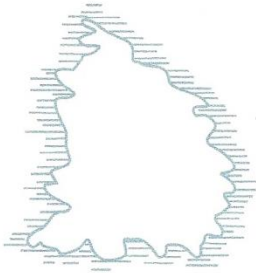
1. PRINT OUT THE BLANK MAP TEMPLATE. CAREFULLY CUT IT OUT TO REMOVE THE WHITE EDGE IF YOU WANT



2. DESIGN AND DRAW YOUR ISLANDS OR COUNTRY. USE A WIGGLY LINE AND MAKE LOTS OF LITTLE ISLANDS NEAR THE MAIN ONE. REMEMBER TO DRAW COVES, BAYS AND RIVER INLETS



3. DRAW IN THE RIVERS AND SEA ROUTES LINKING SOME OF THE SMALLER ISLANDS WITH THE MAIN ONE. USE A DASHED LINE FOR THE SEA ROUTES



4. AROUND THE EDGE OF EACH PIECE OF LAND DRAW SHORT STRAIGHT HORIZONTAL LINES, ALSO FILL IN ANY LAKES WITH THE SAME HORIZONTAL LINES

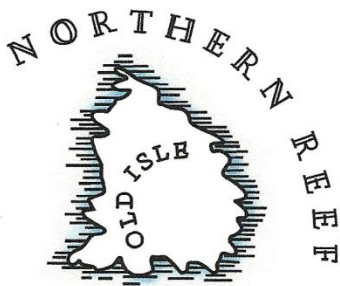
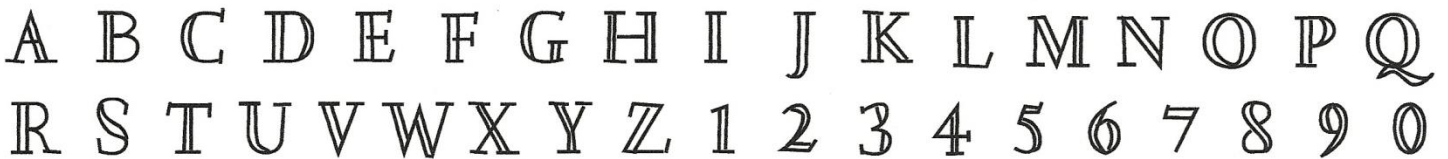


5. MARK IN YOUR MAIN CITIES AND TOWNS EITHER DRAW SHAPES FOR THE CITIES OR LITTLE PICTURES OF GROUPS OF HOUSES, ADD THE ODD SPIRE OR CASTLE, JOIN THE TOWNS WITH ROADS. NAME YOUR TOWNS, ROADS AND RIVERS. BE CREATIVE WHEN NAMING THEM

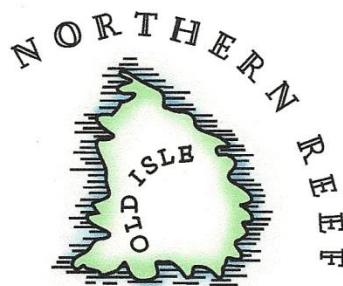


6. NAME YOUR ISLANDS AND THE SEAS WITH NAMES WRITTEN NEATLY IN CAPITALS USING THE GUIDE BELOW OR FLOWING COPPERPLATE SCRIPT. FOR THE BEST EFFECT SPACE OUT YOUR LETTERS TO COVER THE AREA THE NAME REFERS TO, JUST LIKE A REAL MAP

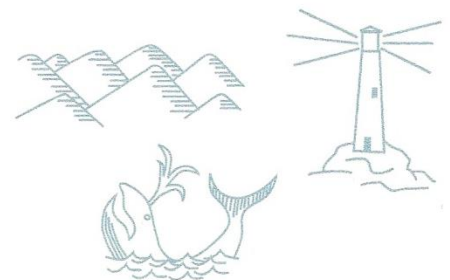
LETTERING GUIDE (NOTE WHERE THE THICK AND THIN STROKES ARE)



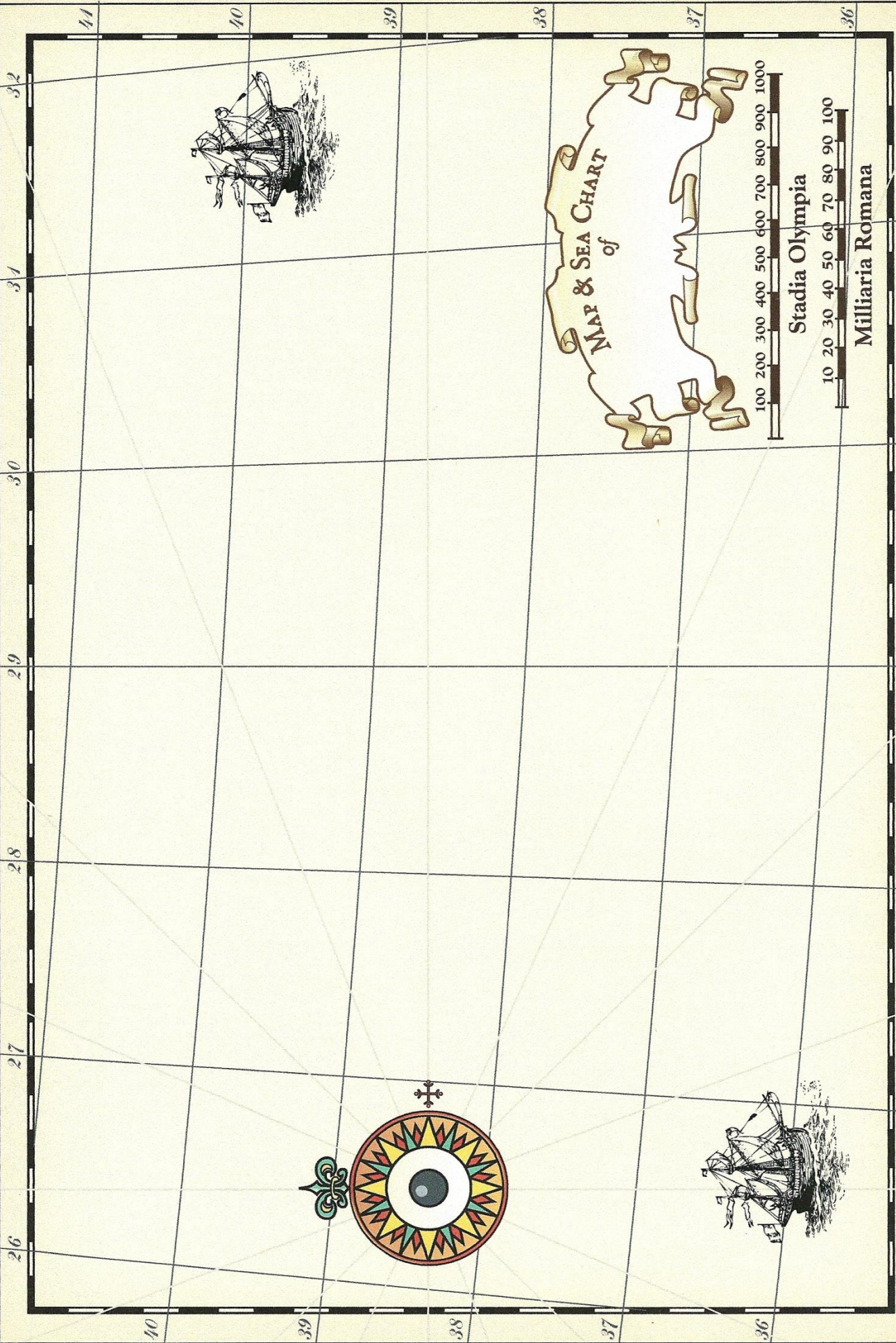
7. COLOUR ROUND THE EDGE OF EACH PIECE OF LAND WITH BLUE COLOURED PENCIL



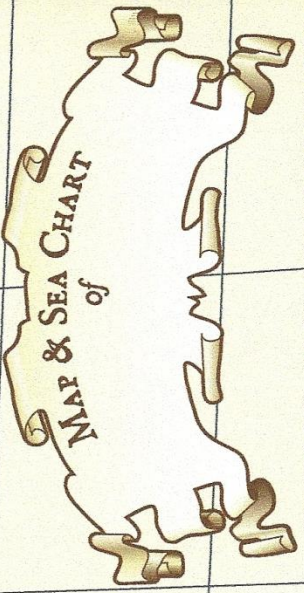
8. COLOUR INSIDE EACH PIECE OF LAND WITH GREEN COLOURED PENCIL COLOUR SMALL ISLANDS IN COMPLETELY



9. DRAW SOME MONSTERS IN THE SEA AND ON THE LAND. DRAW IN CAVES, MOUNTAINS AND ANY OTHER FEATURES THAT YOU THINK WILL BE OF INTEREST TO TRAVELLERS VISITING THE ISLAND YOU DISCOVERED AND CHARTED



MAP & SEA CHART
of



100 200 300 400 500 600 700 800 900 1000

Stadia Olympica

10 20 30 40 50 60 70 80 90 100

Milliaria Romana

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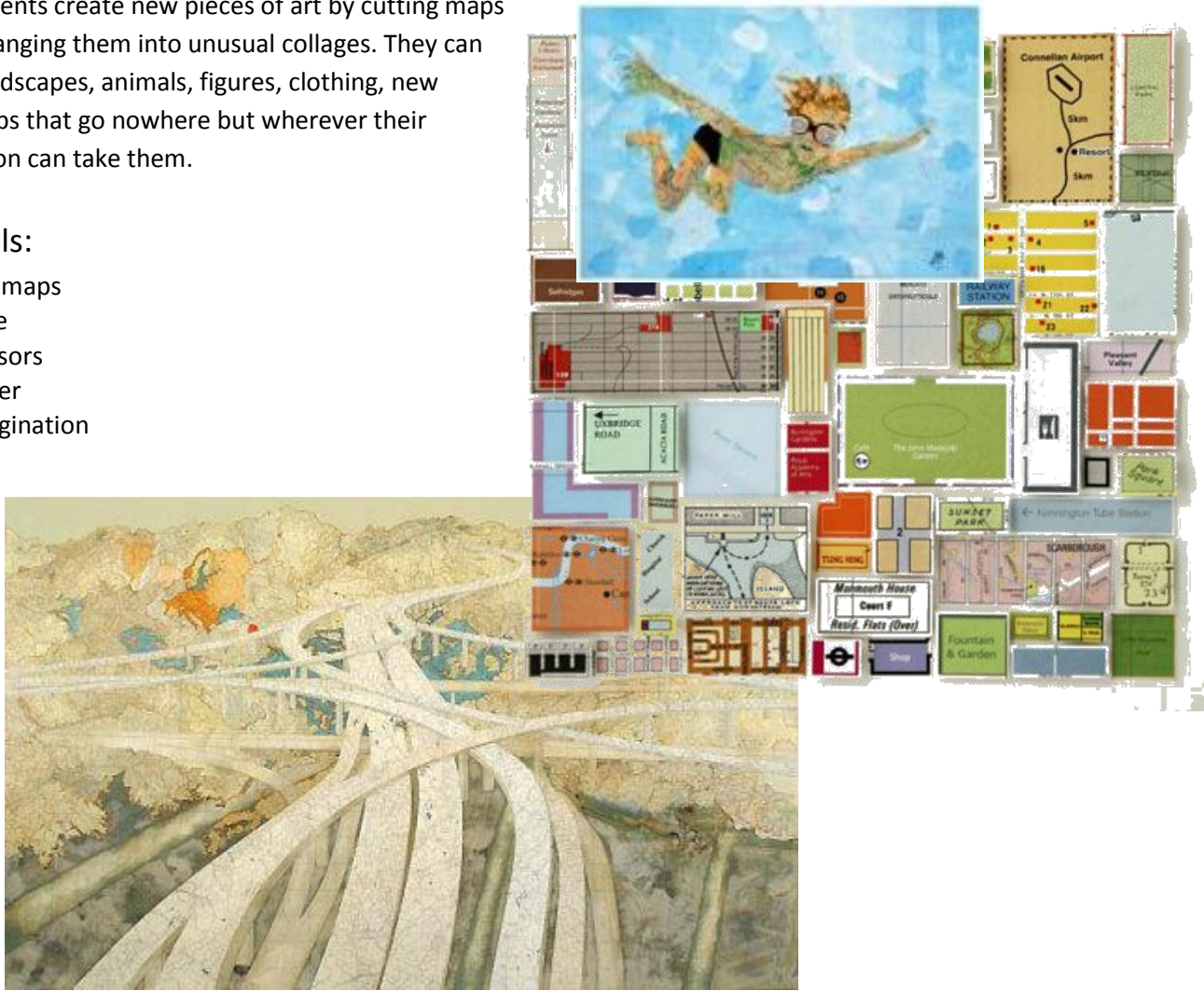
You are Here...

Source Unit: *The Magnificent Seven*

Every day millions of people use maps to take them places. Mapmaking fulfills one of our most ancient and deep seated desires: understanding the world around us and our place in it. But what about maps as a work of art? Maps can be simple tools, comfortable and unremarkable in their familiar form. Or they can lead to different destinations and show another kind of uncharted realm: the imagination, mapping out their creators' willingness to venture beyond the boundaries of geography or convention. Have students create new pieces of art by cutting maps and rearranging them into unusual collages. They can create landscapes, animals, figures, clothing, new cities, maps that go nowhere but wherever their imagination can take them.

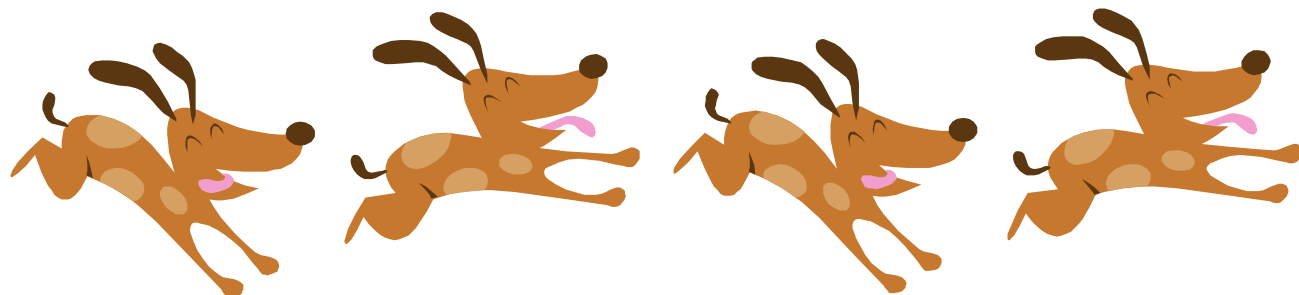
Materials:

- Old maps
- Glue
- Scissors
- Paper
- Imagination



Doggone Genetics

Source Unit: Diving into the Gene Pool



Participants create and decode a “DNA recipe” for man’s best friend to observe how variations in DNA lead to the inheritance of different traits. Strips of paper (representing DNA) are randomly selected and used to assemble a DNA molecule. Participants read the DNA recipe to create a drawing of their pet, and compare it with others in the group to note similarities and differences. *This activity is for non-commercial educational purposes only, Copyright 2008, University of Utah. Genetic Science Learning Center, University of Utah, <http://learn.genetics.utah.edu> Permission granted for classroom use. All rights reserved.*

What Students Should Learn:

- Every organism inherits a unique combination of traits.
- DNA is a set of instructions that specifies the traits of an organism.
- Information in the DNA molecule is divided into segments (called genes).
- Variations in the DNA lead to the inheritance of different traits.

Materials:

- Copies of participant pages
- drawing paper
- crayons or colored pencils
- tape
- envelopes
- colored printer paper in 4 different colors .

“Dog DNA” envelopes:

1. To prepare 14 envelopes, make four copies each of DNA Strips A, B, C, and D on colored paper. Choose one color for each type of DNA Strip. For example:
 DNA Strips A 4 copies on Blue
 DNA Strips B 4 copies on Green
 DNA Strips C 4 copies on Yellow
 DNA Strips D 4 copies on Red
 2. Cut out the DNA strips on each page (a paper-cutter works well).
 3. Place two DNA strips of each color into an envelope. The envelope should contain eight DNA strips total (four different colors).
 4. Repeat step three until you have assembled 14 (or however many you need) “Dog DNA” envelopes.
- Note: Eight is the minimum number of DNA strips per envelope that you need to carry out the activity. Adding more DNA strips of each color increases the variety of possibilities for each trait.
5. Make enough copies of the Dog Body Parts pages for each student or group to have a set to view and use as they work.

Instructions:

A set of instructions called DNA makes a “recipe” for traits in all organisms. Just as a recipe is used to cook a meal or a blueprint is used to build a home, DNA contains instructions that specify an organism’s traits. Information in a DNA strand is grouped into small segments. Each segment is made of even smaller units (like recipes are made of words, and words are made of letters). Differences in the DNA “alphabet” are what make differences in traits (just like a different sequence of letters makes different words, and a different recipe).

Tell students, have students read the following the directions below to create a DNA recipe for a dog. Using the Dog Traits Key, they will read their DNA recipe and make a drawing of their dog showing all of its traits. *You may want to show a completed DNA “recipe” and point out the different segments (representing genes) as well as the 4 symbols (representing the 4 chemical bases A, C, G and T) that make up the DNA alphabet in this activity.*



Review the instructions. You may want to demonstrate how to use the *Dog Traits Key*. Read the DNA recipe and identify the first trait.

Remind participants to leave the DNA strips they choose out of the envelope and tape them together *in order*. The resulting long strand will be their DNA recipe. Have participants work individually or in pairs to complete the activity. When participants have finished, have them post their dog drawings on the wall along with the DNA recipe for their dog.

Student Directions:

1. Make sure you have an envelope containing “Dog DNA”.
2. Determine the first trait of your dog (body shape) by randomly picking a piece of dog DNA out of the envelope.
3. Look at the symbols on the DNA strip you have chosen. Match the pattern to one you see on the Dog Traits Key for body shape.
4. Circle the picture for body shape that matches the DNA piece that you picked.
5. Set the piece of DNA aside and repeat steps 1-4 for the next trait on the key.
6. After circling the matching picture, tape the second piece of DNA to the first to make one long strand. This will become the DNA recipe for your entire dog.
7. Repeat these steps for each of the traits listed on the Dog Traits Key. (Body Shape, Head Shape, Ears, Legs, Eyes, Tail, Coat Color, Hair).
8. When you have finished, draw your dog with all of its traits (the traits you have circled on the Dog Traits Key) on a separate piece of paper.
9. Hang up the picture of your dog along with its DNA recipe (the DNA pieces you chose attached in a long strand).

Is your dog different from or the same as others in the class?

Discussion

Are any two dogs alike? Point out that every dog shares some traits in common with others, but each has an overall combination of traits that is unique.

Explain that variations in each DNA strand (the sequence of symbols) led to the inheritance of different traits.

Information in a DNA strand (or molecule) is grouped into small segments called genes (represented here by colored DNA strips).



A single DNA strand is often referred to as a chromosome. In this example, the dog had one chromosome containing 8 genes. (Humans have 23 pairs of chromosomes containing over 22,000 genes!)

The DNA molecule contains a sequence of four chemical bases (represented here by four symbols). Each base is referred to by the first letter of its name: Adenine (A), Cytosine (C), Guanine (G) and Thymine (T). The sequence of these chemical bases encodes a detailed set of instructions for building an organism's traits. (The human genome contains approximately 3 billion pairs or bases!)

Participants are asked to assemble their DNA strips in the order they were drawn. This is because all individuals of a species have the same genes in the same order along their chromosomes. (This is what allows researchers to "map" the location of a gene to a specific place on a chromosome.) It is the small sequence variations within each gene that lead to differences in traits.

There is usually a limited number of sequence variations for a gene. That is, a gene usually comes in a few different forms or flavors (called "alleles"). There was a possibility of four different flavors or alleles for each of the dog genes in this activity.

In this activity, a single gene determined each dog trait. More often a trait is influenced by more than one gene as well as environmental factors.

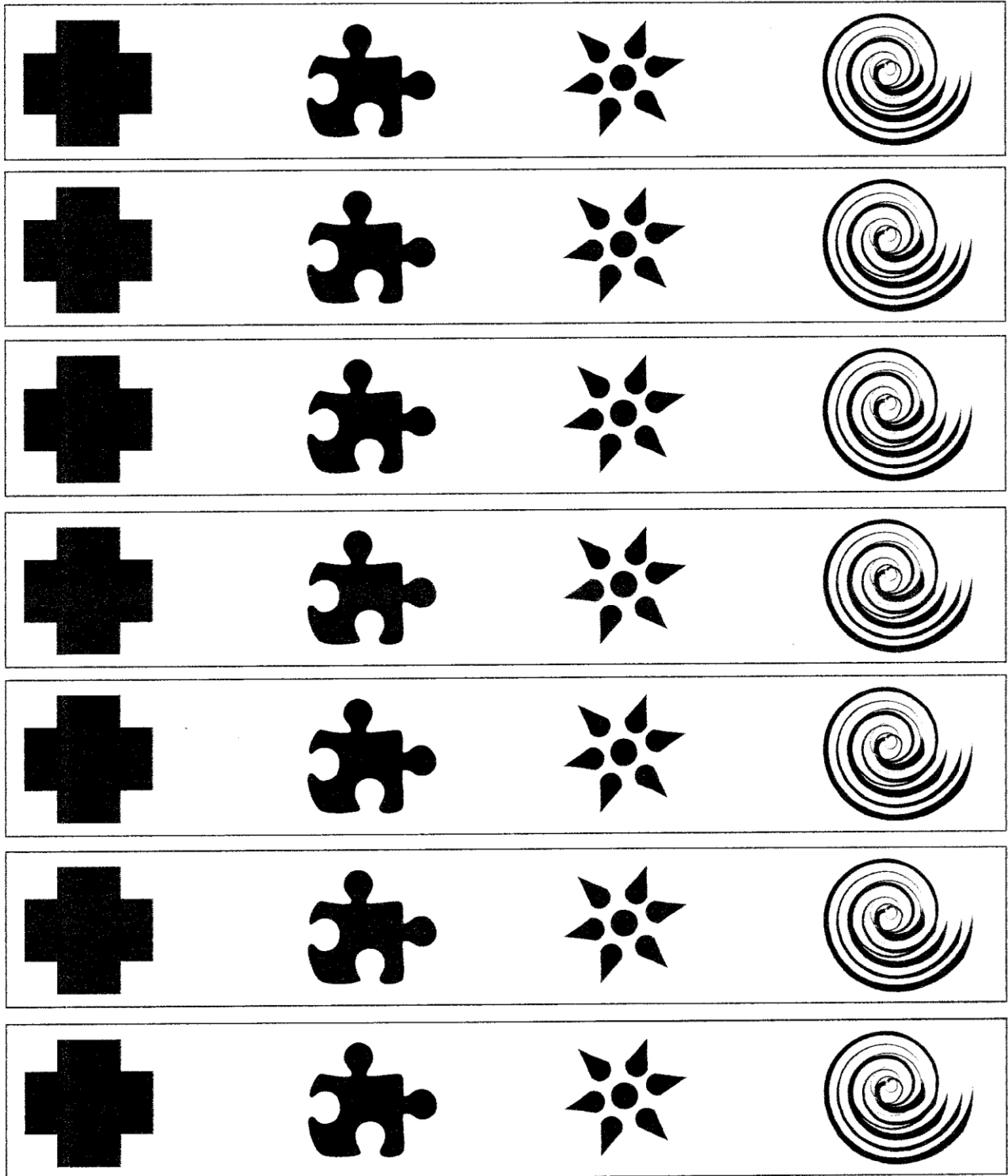
Extension:

As a group, make a "map" of the dog genome. Compare the different DNA recipes hanging up in the room. Point out that the gene for body shape is always at the top of the DNA molecule (or chromosome), the gene for head shape is always second, and so on. Draw a representation of a chromosome having 8 segments. Have participants come up with a creative name for each gene. Label the segments with the gene names, and specify the trait they encode. Point out that although each dog looks differently (has a different combination of traits), it is still possible to make a general map of the dog genome.

Option: Show participants a completed map of the human genome (e.g., the Human Genome Landmarks Poster or its web companion) and discuss how researchers have mapped the 22,000 plus genes to particular locations on the 23 pairs of human chromosomes. To order a free copy of this poster or view it online, check out the web site developed by the U.S. Department of Energy's Human Genome Management Information System (HGMIS).

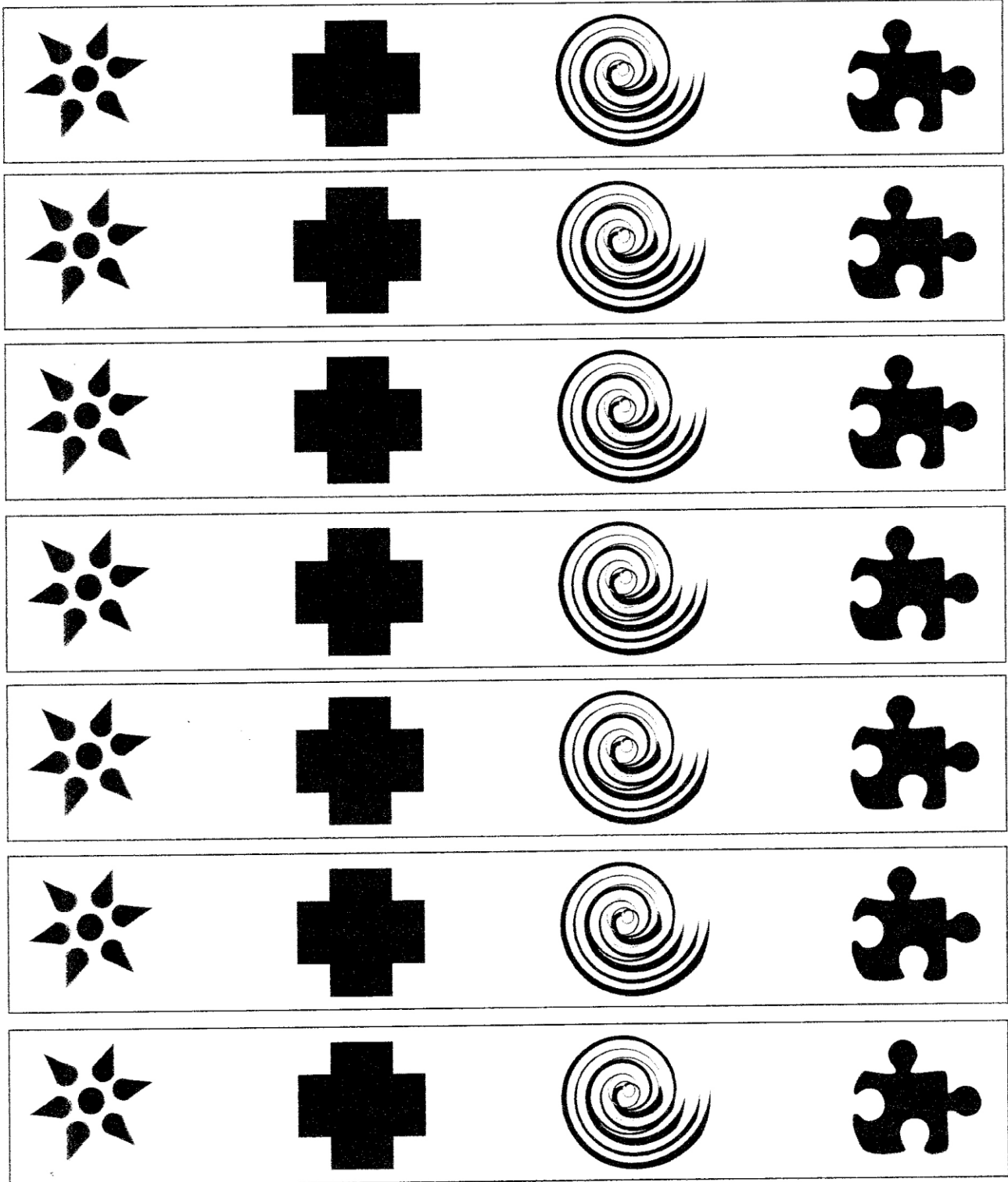
A Recipe for Traits

DNA Strips B

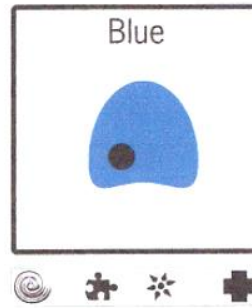
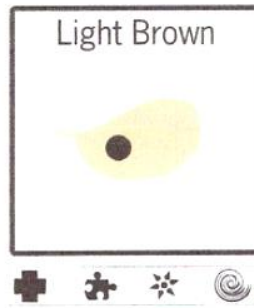
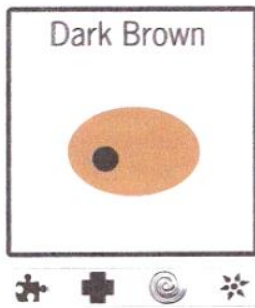


A Recipe for Traits

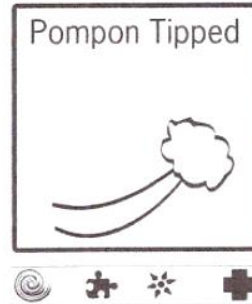
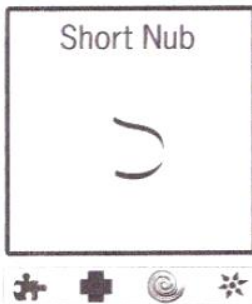
DNA Strips D



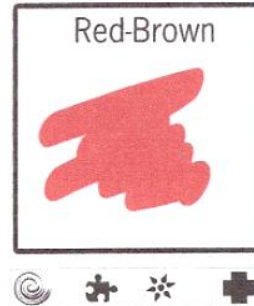
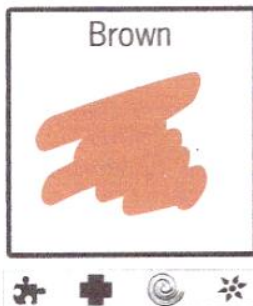
Eyes



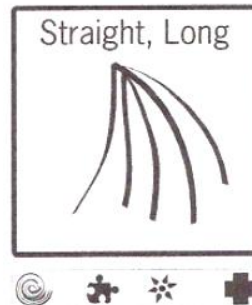
Tail



Coat Color



Hair



Shoe Fabrication

Source Unit: Heart & Sole

The initial step in actual shoe fabrication involves the construction of the 'last. The last is a model of the foot, or more importantly, a model of the inside of the shoe. This form is used to shape the shoe, usually by stretching the leather over it. Last were made of different materials throughout history. Clay was known to be used during the Roman period. Iron lasts are also mentioned in some sources, and most commonly wood.

The last is what gives a shoe its shape (and the individual his desired fit). It is the form over which the upper is pulled and molded over during manufacture . You may have seen Keen shoes.

They're big and wide and comfy and funny looking. Martin Keen, who started it apparently started out with a block of wood and whittled his own last, with that crazy wide toe area.



The last is very important in making your shoe comfortable or not. At the beginning of the design process, the manufacturer sends his specifications to the model maker, who then constructs a three-dimensional wooden model: the last. In shaping the last, the experienced designer is guided by six measurements.

- Ball Girth
- Waist Girth
- Instep Girth
- Long Heel Girth
- Short Heel Girth
- Stick Length (Overall heel-toe measurement on the last)

Most model shops contain tables that list the approximate values of these measurements for each shoe size. The model maker shapes, files, sands, and smooths until these measurements match and the product subjectively reflects the right appearance.

The first step in building a last is creating a pattern, by tracing the foot.

Materials:

- Pencils
- White Cardstock or posterboard

Below are some pictures and explanations of this process.

First step in making a pattern in which to guide your last making efforts is to have students work in partners to trace the profile of their foot.

Place the poster board on a vertical surface, like the floor, and have the student place their bare right foot against it and stand straight up (having all students trace the same foot will be helpful later) . The toe of the profile view will have to be adjusted to the shape of the desired shoe, ex. pointy, round, boxy, etc.

The first tracing around the outside of the foot should be done with the pencil held straight up and down. Have the partner who is tracing trace the foot again with the pencil angled to reach as far under the foot as possible.

After the tracing is complete, before removing their foot some reference marks need to be made. One should be made at the center of the heel, one at the ball of the foot, and one between the big and second toe.

Later, the tracings will be used to generate a pattern based on the desired shape of their shoe. Below is an example of how the shoes shape around the toes when creating the pattern.



it is of interest to examine foot sizes of people. More specifically, a statistical study can be conducted to study foot sizes of students in the class. This information can be very important to a shoe manufacturer. Information obtained from these types of investigations can help companies determine what sizes of shoes they should manufacture for students.

Ask students to write some questions that they would be interested in investigating about students' foot lengths. Some possible questions might be:

1. What is the mean (representative) foot size of the class? What is the median (typical) foot size of the class? What is the shortest foot size in the class? What is the longest foot size in the class?
2. Are there differences in foot sizes for boys and girls? If so, what are the differences?
3. Are foot sizes related to any other variables? (ex. age)

Have Students Design and Implement a Plan to Collect the Data:

In the data collection phase ask students what kind of measurements should be made? Make sure that students talk about how to make the measurements accurately and with precision. Ask the class who should measure the students' feet. More than one person might be helpful in the data collection phase, or all students can report individually after measuring their patterns. It might be a good idea for one person to record their foot sizes and gender. Before collecting data ask students to decide which foot should be measured? This will be affected if not all students made patterns of the same foot. Also tell students to round measurements to the nearest centimeter. This way a protocol for measurements can be developed and it will ensure consistency from measurement to measurement.

Measure all students and record their foot sizes (in cm) and gender in a data table. **Ask the students to explain why this is an observational study and not an experimental study.** Guide students to see that their data values are recorded from direct observation and measurements. Nothing has been done deliberately to the students in order to collect data.

Different statistical tools are used for analysis of different questions. For example, the class can calculate the mean and spread from the collected data. A graph can be constructed from the same data set. The same analyses can be repeated separately for the boys and girls in class. Ask students to suggest graphs that might be useful to compare the foot length data distributions for boys and girls. Can other factors, ex. age, be added in?

Discussion/Discovery Points:

- What is the mean foot size? What is the median foot size? What are the shortest and longest foot sizes? Give two numbers that cover the middle 50% of the distribution of the foot sizes. What is the range of the most common foot sizes?
- What is the mean foot size for boys? What is the median foot size for boys? What are the shortest and longest foot sizes for boys? Give two numbers that cover the middle 50% of the distribution of the foot sizes of the boys. What is the range of the most common foot sizes for boys?
- What is the mean foot size for girls? What is the typical foot size for girls? What are the shortest and longest foot sizes for girls? Give two numbers that cover the middle 50% of the distribution of the foot sizes of the girls. What is the range of the most common foot sizes for girls?
- Using appropriate technology (graphing calculator, Excel, statistical software) construct a comparative graph or plot. Do boys or girls generally have bigger feet? Is there any outlier either of boys or girls?
- **How would information such as this help a shoe manufacturer?**

Encourage students to use make sure they print their words, use different colors to add visual impact, and incorporate symbols and images to further spur creative thinking.

Sketchy

Source Unit: Heart & Sole

Making a shoe design is both an aesthetic and technical challenge. Designing an appealing shoe (boot, high heel, sandal, or whatever type) will be important from a marketing standpoint and from a storytelling standpoint as well. You want to be able to design a shoe that other people will want to buy. Have students search and use their Mind Map and other sources for inspiration, and do some sketches and incorporate color swatches.

Have students look for fabrics, memories, textures, colors, objects or people who inspire them to create a new piece of clothing. Search online or in magazines for current or retro trends that they might want to incorporate into their designs. Ex: If a student wanted to create a collection of racecar shoes, they may spend a lot of time looking at rare sports car magazines for inspiration of colors or shapes to incorporate into their prototype shoe. Encourage students to use a variety of materials, explore many options and ideas before settling on one idea.

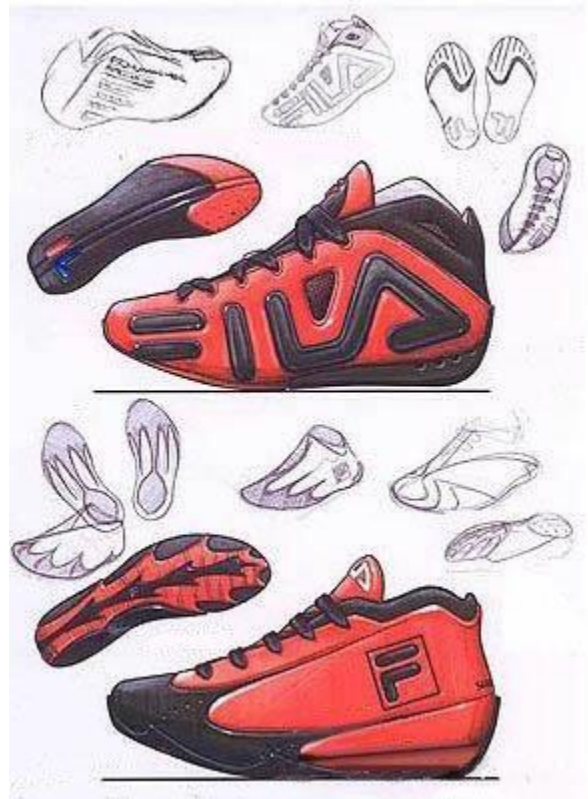
The word “prototype” comes from the Greek, *protos* meaning “first” and *typos* meaning

“impression.” Like many words, its

meaning has changed over time, so that a single finished product can be preceded by a number of “first impressions.” And while we’re often told the importance of making a great first impression, not all prototypes need to be great; some need only be adequate for a specific task. (Of course before committing to production, they might want at least *one* great first impression.)

Have students consider the following while creating their designs:

Form: Appearance, including overall shape, surface texture, and color.



Fit: The ability to comfortably serve its purpose and fits their measurements they've taken. Not many people want to wear a shoe that doesn't fit!

Function: The ability to withstand various kinds of stress under varying conditions, such as rain, snow, mud, long wear. How long will it last? Is it made of durable materials (rubber, canvas), or ones that will have to be treated carefully (lace, silk, velvet).

Manufacturability: The ability to be made using standard high volume production methods or will each pair have to be hand-made? **What will that do to the price?** Is it going to be too expensive to make?

Viability: The ability to appeal to the market. Will very many people want to wear their shoe? How will they make sure? That's why companies do surveys and send out sample products, to get an idea of how well they'll sell and responses and feedback on what changes might need to be made.

Make a portfolio: Have students keep their designs and inspirations in a folder or notebook for future inspiration and reference when they'll need to create their final layout and full color rendering. Encourage them to consider carrying a sketchbook with them, so that they can take down ideas whenever they strike.

Add color! A lot of the success of their design can depend on what colors they use. Have students think about the shoes intended purpose (is it a street shoe, a western boot, an athletic shoe, a formal or party shoe?), the story they're trying to tell, and how they imagine someone wearing it. Then have them choose their colors accordingly. Encourage students to try to blend unexpected color combinations to add an element of surprise to their design.

Creating 3D Models

Source Unit: Heart & Sole

Students create a 3D copy of their design using ONLY masking tape.

Materials:

- Masking Tape
- Newspaper
- Cardboard
- Other support and construction materials as available, ex. putty, styrofoam, clay or



- other materials
- Measuring devices
- Previously created shoe designs.
- Student patterns and foot measurements
- Scissors

Ask students to recreate their design using only masking tape around their paper and tape last and keeping their measurements and foot pattern in mind. The model needs to be to accurate scale.

The goal is to duplicate every detail paying close attention to the planes that create the structure of the shoe, as well as texture, weight, and scale. This is a fun project to start the semester. It emphasizes problem-solving skills using a relatively forgiving medium. It asks students to examine the qualities, limitations, and advantages of the given material.

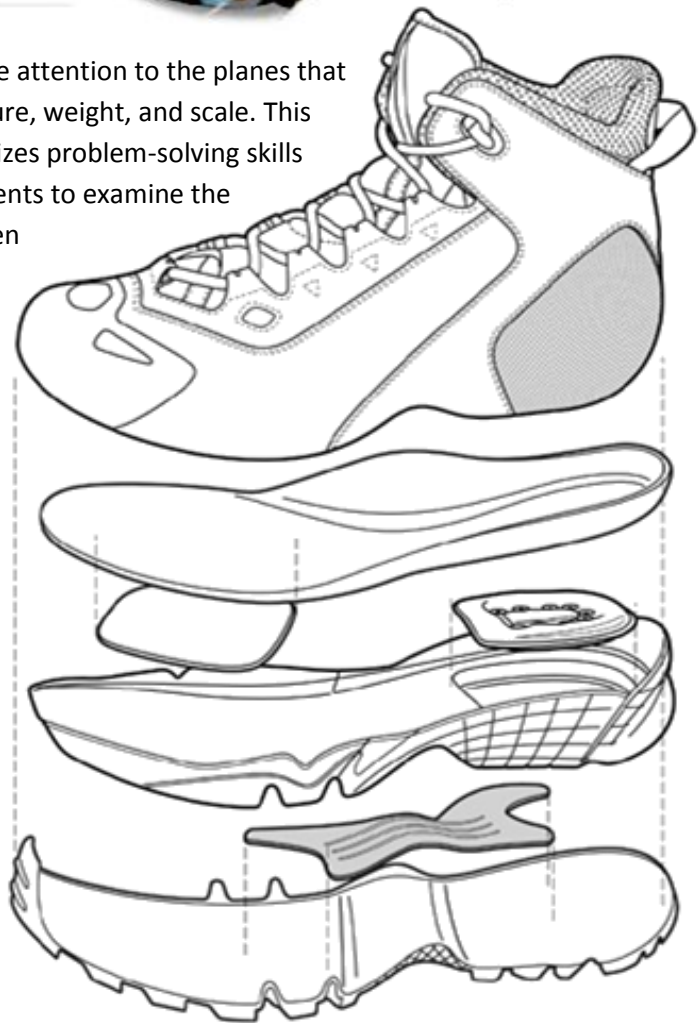
Option: Allow students to use duct tape (it comes in a variety of colors), or colored masking tape if you wish. Though keep in mind the cost is greater as masking tape can be purchased for about 25% of the price of duct tape. And, if they mess it up at the very end, duct tape is very very sticky!

Challenge: Can students find a way to light their shoes up? LED lights.

Selling Soles

Source Unit: Heart & Sole

When the big Chinese factory asks for your design prototype, is it really possible to just send them a cute mock-up of a shoe? Factories obviously aren't used to



The Anatomy of a Nike trainer' ... simple vector outlines stroke and no fill color works really well for this heavily-diagrammatic illustrative exploded diagram design- simple, clean cut and crisp.

getting masking tape shoes. For their final product have students put together a "tech pack" storyboard layout of their shoe that shows each component of the upper and what it is made of. They'll need to create sketches of different perspectives of their shoe. Ex. what does the sole look like? The back. The top?

Have them include full color technical drawings (from multiple perspectives if possible), color swatches, materials listing, measurements, purpose, and layouts. How much do they want to charge for their shoe? How much do they think it will cost to make it? Their tech pack should include all the materials that will be used for each part of the shoe, the colors of your design and all your measurements for each shoe component. The technical pack is what the "factory" will require before they would produce a prototype or "pullover" based on students' shoe design.

Also, have students include their inspirations and tell the story of their shoe and what story they want it to tell. Where did their inspiration come from?



For real shoes: The design is now sent to the pattern maker, who measures the exact shapes of the various pieces of material comprising the shoe upper. This process begins with the sewing on of a 'skin,' or tightly fitting layer of material, which is sliced off according to the way the shoe will be made. He then makes precise drawings of these parts, including a little more space to accommodate seams. His drawings are sent to the manufacturer for use in cutting dies for the finished product.

Shoe design is a very precise and complicated process. It is also paramount to the overall health of the end user. The shoes will be used under a broad variety of conditions, by an infinite variation of body types. Who would have thought such a great responsibility would fall on the shabby and smelly old sneaker?



Tying it All Together

Source Unit: Heart Strings

Now that we have a tale to tell that's really swell, it's time to put on a show! We need some actors! And you know who we're going to use to string our stories along? Marionettes!

The art of making a marionette is almost a lost art. But it is a very old art that has survived and students can partake of it by making a marionette out of simple around the house materials like newspaper, tape and string. In this tutorial from StormtheCastle (<http://www.stormthecastle.com/how-to-make-a/how-to-make-a-marionette.htm> All Rights Reserved.) we'll show you how to make a nice little marionette.

For inspiration have students look at galleries of marionettes, such as those made by the Ruzicka brothers in the Czech Republic at http://www.marionetisti.cz/marrionettes/mar_1_en.html.

As we know, a marionette is a puppet that is controlled by strings. This is a picture of the marionette made in this tutorial. It is a



practice, bring a character like this to life.

knight, but this method can be used to make any kind of

marionette. Students can either do a simple stringing on this marionette, just a three string setup which is easy for beginners to control, or the more complex one that follows this tutorial which gives more control and more realistic motion. In the simple, three-string, variation one string goes to the head and one string goes to each of the arms. There are lots of different ways to string up a marionette and directions for a more effective and more expressive eleven string set up follow these instructions.

This picture gives you a good idea of how the marionette is made. It's simply constructed of rolled up strips of newspaper then wrapped in masking tape. Making a humanoid character is a great way to start out with marionettes. Students can, just with a little bit of



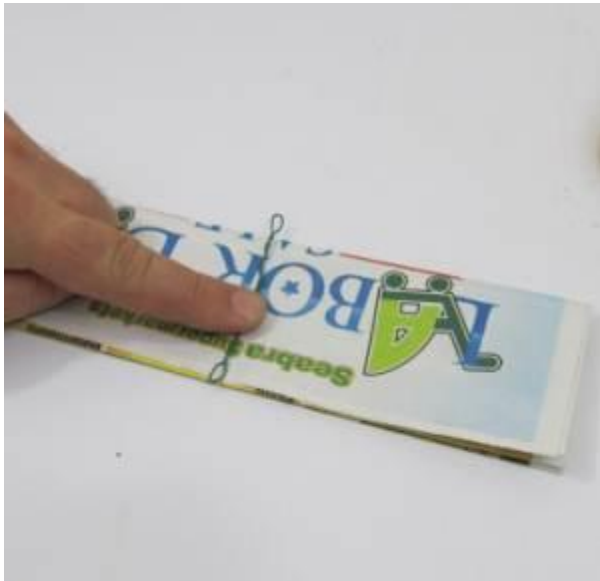
But, as they are working more with them have them keep in mind that they can create all kinds of different characters and creatures.

Let's Build the Marionette

This picture shows the basic segment of the marionette. This is the upper thigh. It is simply rolled up newspaper with a wire in the middle. In the case of this particular image, the body part is also coated it with paper mâché which is optional.



Students can create a segment like this by forming a piece of wire so it has loops on each end then putting it on a strip of newspaper. (This is actually several strips of newspaper). Then you roll up the newspaper and tape it so it holds its cylindrical shape.



Simple as that! You can make two upper legs, two lower legs, two upper arms and two lower arms.

After that you crumple newspaper and wrap it in tape to make the head and the torso.

Now that each limb segment has a wire in it you can assemble these limbs together with a small piece of wire or even twist tie. It should be nice and loose so the various segments move freely.



Here is a large picture to show you where the various joints are. The red dots are the connected joints. And there is one more extra loop on the top of the head so you can run a string to that.

There are a lot of options you can do with this. For instance, in the sample image the marionette has hands that are jointed to the forearms. But students could make their marionette a little simpler by just making the hands part of the forearms as is shown in the example with the feet and lower legs.



Pulling Strings

Once you have painted your marionette and make any accessories like the sword then you can string it up. You do this by creating a cross of wood (large craft sticks or small dowel rods would work well). One string goes to the head and one string goes to each of the wrists.

When you string up the marionette you have to get the string lengths about right so the head is upright and the arms are by the figures side. So adjust and cut the strings accordingly before you attach secure them to the wooden cross you made.



This picture shows a dragon marionette during a performance.

String Theory: Advanced Marionettes

<http://www.stormthecastle.com/how-to-make-a-marionette/advanced-marionette-making-techniques.htm>

Here are some techniques and tricks for making better marionettes. There are a wide variety of materials you can use in order to get great looking marionettes.

One of the best things you can do to improve your marionettes is to do a more robust and expressive stringing system. A standard way to do this is with a two-hand and eleven string method. The art of the marionette is all about controlling the figures in a way that is interesting and realistic. The eleven string system is a great way to achieve remarkable life like motions with a humanoid marionette.

In the previous tutorial on how to make an easy marionette we simply rolled up or crumpled up newspaper then wrapped it in masking tape. But there are lots of materials you can use to get a great looking marionette.

Clothing and Dressing

One great way to get a spectacular looking marionette is in clothing it. This lends itself to all kinds of fun stuff and



*A marionette made from this tutorial.
Constructed by Evan.*

fun looking marionettes. Students can custom make clothing or color or paint it on.

Let's Face It!

The head and face of the marionette is arguably the most important part and there are a lot of ways you can get expressive and interesting looking heads and faces such as paper mache or Celluclay-which requires no paste or newspaper strips (sample images below).

Photo Finish

One easy and fun way to make faces is to have the students select a face from a magazine or photo image, cut out the parts they want to use or use an entire face and glue it to their marionette. Students can also use pictures from magazines to create clothing and accessories (as a fabric they can tape on).
Tip: Create hair using tape and yarn by starting at the neck, creating a layer and tape it on, move up higher on the head and repeat.



Porcelain Complexion

You can also make a great looking head with clay or cold porcelain.

This clay can produce very durable results, has a smooth matte finish, is very soft to work with and can be easily colored. And the best thing about it is that students (with help) can make it themselves, it is easy to make and the ingredients are cheap.

At the following link is a short introduction to this clay and if you scroll down a video on how to go through the process. The text is hard to see for some people, so please click CC if you need captions.

<http://puffylittlethings.blogspot.com/2012/12/homemade-cold-porcelain-clay.html> All Rights Reserved

Lisa of PuffyLittleThings also has kindly created a great tutorial which lays out how to create the clay which is easy to follow. *** Please scroll down to see trouble shooting and FAQ on her site if you are having troubles making this clay***

Image Credits and Copyright: <http://puffylittlethings.blogspot.com/2012/12/homemade-cold-porcelain-clay.html>. All Rights Reserved! For non-commercial and educational use ONLY!

Materials:

Important: please stick closely to these ingredients, no substitution and you must use the amount it is required per batch

- 1 cup of cornstarch/corn flour
- 1 cup of PVA glue (school grade white glue, any brand would do)
- 2 tablespoons of vinegar/ lemon juice/ lime juice
- 2 tablespoons of baby oil/ cooking oil
- Lotion



First prepare a microwave safe bowl and put in all the **wet** ingredients.



Add the corn flour/corn starch.



Mix till a gooey texture.



Pop in the microwave for 15s. You'll do this three times. Between these intervals take it out and mix it. The cooking time depends on the power, so start with a short duration for the first time. The sample batch was made with a 1100W microwave.



You will start to see the top turn into a matte finish, and the clay is getting hard.



This is after the third interval, the clay starts to form lumps.



Prepare a plastic wrap sheet with lotion, this will prevent the clay sticking to your hands and the work surface. **Be careful, the clay is very hot!**



Keep kneading till it's cooled down and forms into a shape.



Don't overcook, the clay is perfect when it has a peak when you pull it apart. If the clay breaks when you pull, it means you have overcooked it. (Don't throw it away, this can be mixed with clay that's just right and it will even out.)



Wrap it up and store in the fridge (Normally it is left overnight).

Get Your Head on Straight!: Materials and Making Marionette Heads

This 'basic cute head' tutorial was originally published in a Portuguese magazine and Mary at New Clay News has translated the instructions into English for those that cannot read the Portuguese. <http://newclaynews.blogspot.com/2010/08/how-to-create-dolls-head-with-cold.html>. All Rights reserved.

Materials needed are some cold porcelain paste (or other soft air-dry-clay) and a Styrofoam ball or ball made out of paper and tape, and wire. Tools used are students' fingers, a cutting tool, a crochet hook and a ball-end tool. One option is to tint your clay/cold porcelain a peach tone or other flesh tone unless you prefer the porcelain color or tinting or painting after it has cured.



First, make sure your wire is in place, either in the Styrofoam ball or paper and tape ball, like in the original tutorial, so that the strings can be attached to the head and the head can be attached to the

body. Next, wrap the Styrofoam or paper & tape ball in clay or cold porcelain (CP). Select enough CP paste to completely cover the foam ball (approximately 2" ball shown here). Press the foam ball into the CP and shape the CP around it



Close any gaps that appear as you wrap the CP so that you completely enclose the foam ball inside. Avoid trapping any air.

With the palms of your hands, smooth and shape the CP into an egg shape. Using your thumbs, enhance the curvature of the nose and forehead.



Refine the shape of the head and add a neck. (Make sure the wire loop still sticks out on each end for later. During the whole process, always make sure the wire loops stick out.)



With a crochet hook, push the CP paste from the bottom up and then form the nose with your fingers



...leaving a pointed nose shape.



Strengthen the shape around the area of the eye with your thumb. Add nostrils.



To mark the mouth, envision an imaginary line that creates a cross between the nose and neck and from one cheek to the other cheek. Where the imaginary line crosses, insert the tool straight in to form a mouth.

(Note: The numbering of photos in original tutorial skipped #4...it's not missing)



With the end of a crochet hook, create a diagonal mark in each corner of mouth.



7 Com o polegar levante a bochecha e marque o queixo, descendo o polegar para o pescoço.

Using the diagonal mark as a guide, use your thumb to lift the cheek and indent the chin, smoothing down toward the neck.



8 Com o boleador pequeno defina o lábio inferior, rodando de um lado a outro.

With the small end of a ball-end tool, shape the lower lip....running tool from one side to another.



9 Faça o lábio superior com o mesmo boleador com movimentos suaves.

Shape the upper lip with the same tool, using gentle movements.



10 Defina os cantos da boca com o boleador grande.

Define the corners of the mouth by dimpling with large end of ball-end tool.



11 Com o boleador pequeno marque em cima do lábio superior.

With smaller end of ball-end tool, create small mark on top of the upper lip.



12 Orelhas – Repita os passos das orelhas da Joaquina e cole na cabeça da boneca.

Ears ... create 2 ears and glue onto the head of the doll. Shape 2 equal amounts of CP into 2 small ovals. Roll between fingers to indent slightly. Attach an ear to each side of head using round-end tool to apply pressure to center of ear.

After CP has dried and cured, flesh color can be painted (if you didn't pre-tint) and eye decals can be glued on or eyes painted on. Hair can be molded from additional CP paste or various types of doll hair material can be glued on.

Note: If they want, students can also adjust this process to make hands and other body parts. Don't forget the wire!

It's Really Stringy!

On the next page is an illustration of how to string up a more realistic eleven string marionette. This takes two hands to operate and with some practice you can get this marionette to move in a very realistic manner. Note that the string lengths shown in the illustration are not to scale. You should string up your marionette with appropriate lengths of string.

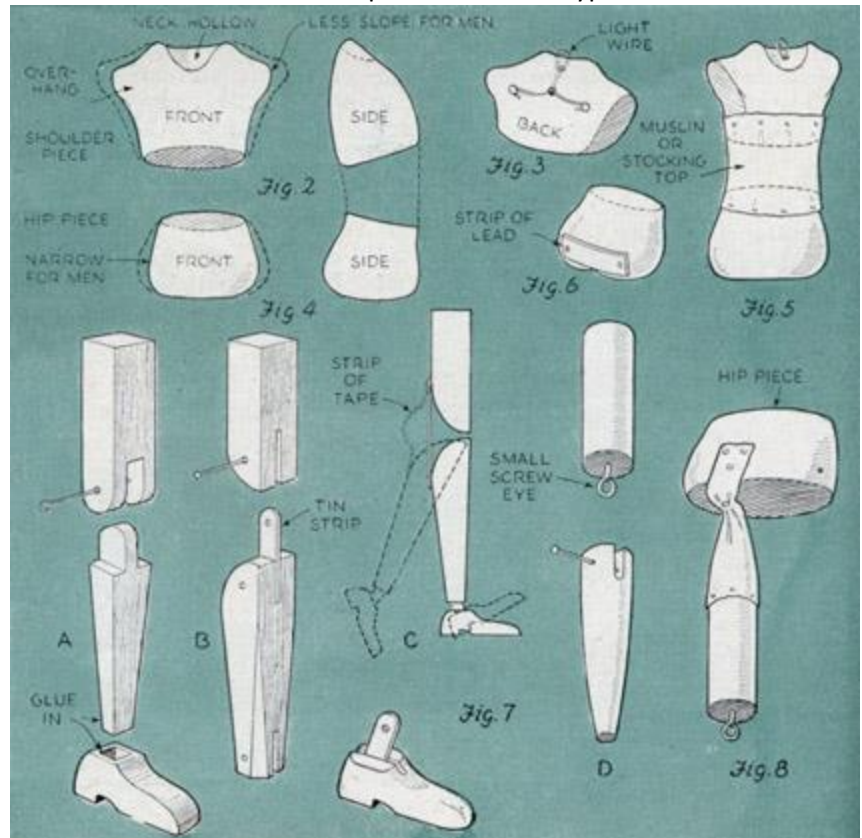
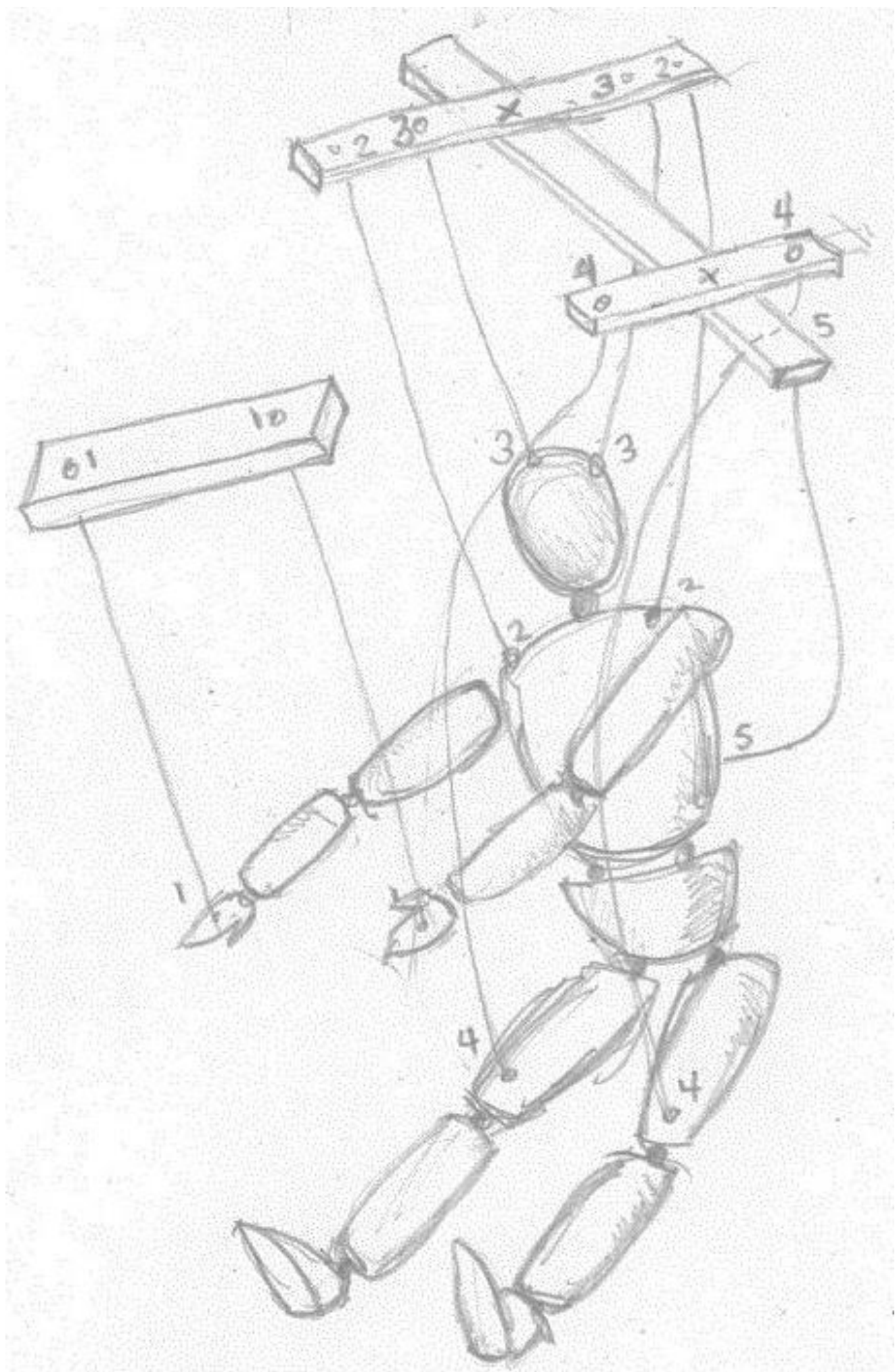


Image Credit: <http://blog.modernmechanix.com/the-art-of-making-lifelike-marionette-bodies/>



Staging Our Production

Source Unit: Heart Strings

OK! We have written a tale, made our marionettes, and now we are almost ready to put on a show! But wait...where are we going to perform it?

It's time to take center stage! Oops, it's time for the stage to take center stage!

Materials (depend on the style of stage, sets, and props you want to make)

- Fabric
- Paint/markers/crayons
- Cardboard
- Big box!
- Scissors
- Craft knife (used under adult supervision or by adults only)
- Glue
- Dowel Rod
- Stamps
- Grommets
- Props

Since we're making a stage, have students look at the included idea pages and/or online for inspiration.

The basics are: Use a pretty big cardboard box, sort of moving box size, tape the edges and folds together, glue them down with a glue gun, leave or cut a hole up in the "roof" (for the actors) and measure and draw out the details in pencil. When they are happy, cut it out

They can choose whether or not they want make some curtains, which can make changing scenery easier. If so, they'll need something to hold the curtains up.

Have students choose a dowel, measure the inside of the box, measure the dowel and cut it to size. Then students can either add some extra grommets (plastic rings) to or holes in the side of the box so the dowel can be removed or it can be glued in.

Hmm, curtains don't stay to the side on their own. Well you can't have a marionette show with closed curtains! It's time to add a curtain tie back.

Now...have students add some color, *texture*, and details!

At the back add an opening where we can hang scenery the kids create to go with their stories, ex. paintings of several scenarios, a castle, a forest, a village, a river, a room... The puppet master of the group can then change between scenarios.

Your class stage needs a lighting system, but you don't want anything that needs to be plugged in. You need something basic like a flashlight. You cut a hole on the top or side of your theater for the flash light to have a moving spotlight to highlight your characters!

Have each group create their individual sets and collect any needed props.

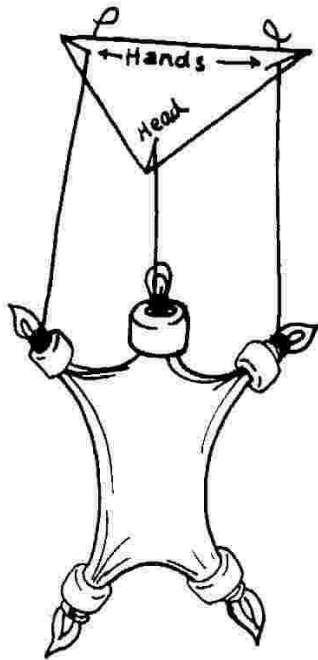
Basic decisions for groups:

- What type of stage will be needed? (The class may have one central stage all groups use to present their plays)
- What special effects? Have students compile a list of twenty different special effects that might be used in puppet shows, ex. a storm or fire. Invent a simple way to achieve each special effect.
- What type of scenery?
- What props?
- Any other technical elements to be added? (ex. Specialty lighting by putting a colored filter over the flashlight?)
- Any specialty characters? Ex. Ghosts. (Scarf Marionettes work well for specialty flowing characters, or elements, like the wind)

A Scarf Marionette

Source Unit: Heart Strings

Making a Marionette out of a scarf



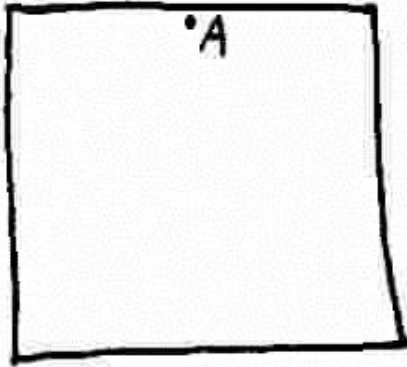
A scarf marionette is a very elegant puppet that can walk, sit, crawl, and even fly. You can make a simple one in probably less than 45 minutes, or you can get "fancy" and add details and decorations. Start with the simple one and see how you like it!

Materials

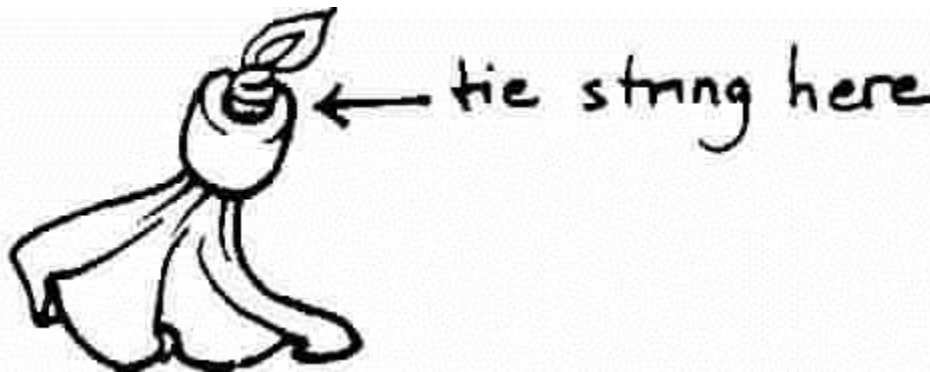
- 1 scarf, the big, silky kind works best. (If you don't have a scarf you can cut a square of slinky, silky type fabric, about 1 yard (or 1 meter) square.
- 1 triangle piece of stiff cardboard, about 8-12 inches on a side
- 5 wooden beads with holes big enough to pull the corners of the scarf through. One inch diameter beads are good.
- String (like kite string) or thread, to string your puppet
- Tools
- Needle (Optional, to sew the thread onto the puppet...if you don't want to sew, you can just tie the thread on...it will work just as well.)
- Scissors

LET'S GET STARTED!

Lay out the scarf and find the center of the top edge of the scarf (point "A" in the drawing below.) HINT: To find center-point A easily, you can measure with a ruler, or just fold in half with the two top corners together; the fold will be right in the center!

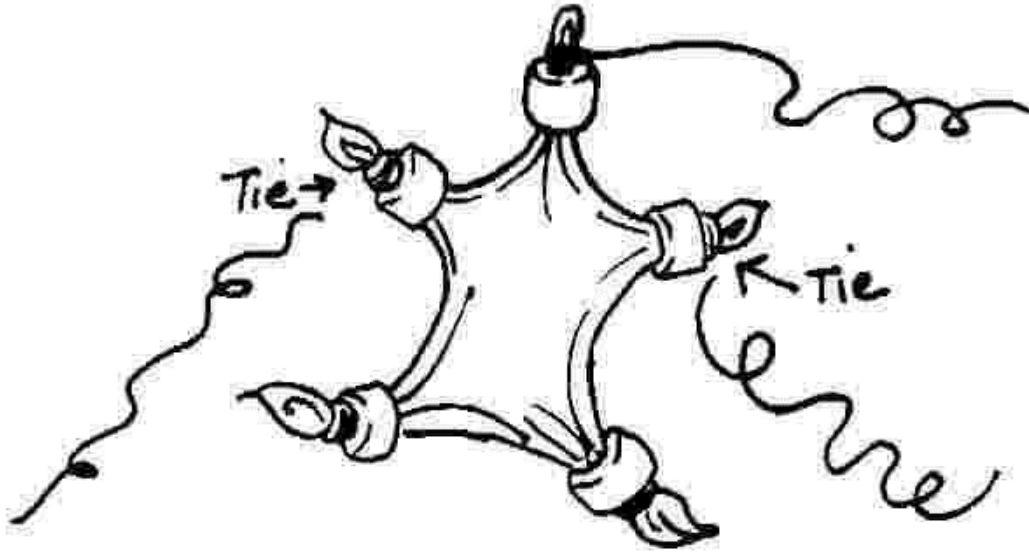


Take the cloth at point A, and pinch it together so you can push it through the hole in one of the wooden beads (this will be the head, so if you have a bigger bead you can use it here if you wish, but any size will do.) Tie a simple overhand knot in the fabric above the bead so the bead will not slip off of the scarf. (See the next drawing, below.)



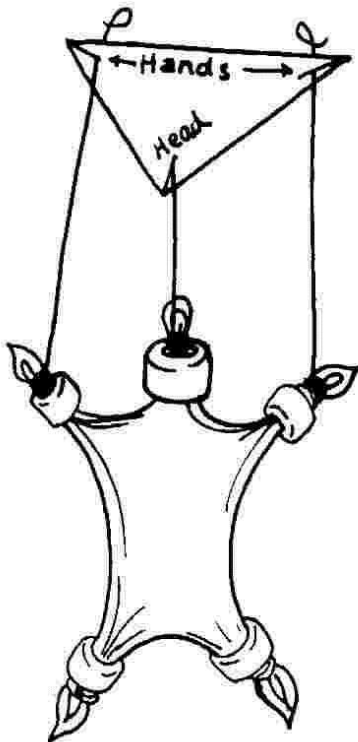
Then you can tie your first string or thread to the knot above the wooden bead. This will be your head string for your puppet. HINT: Make the head string about 3 feet long for now, you can always shorten it later.

Now you are ready to put beads with knots on all four corners of the scarf, like in the drawing below.



Next you can tie on strings to each hand like you did on the head (but don't tie them on the feet. You won't need them there).

Now your scarf marionette is ready for the controller. Take your triangle of cardboard and cut a small slit in each corner. Slide the string into the slits as shown in the drawing below. The head string should go in the center corner of the triangle that faces back (towards the back of the puppet.) The slits should hold the string but allow you to adjust the length of the strings until you have them just the way you like them.



Adjusting your controller strings: The cardboard triangle should be more or less parallel to the floor when you work your puppet. You should adjust the length of the strings by sliding them up or down in the slits in the cardboard until you can hold the cardboard triangle controller at a comfortable height when your puppets feet are on the floor. Adjust the head string length first, and then adjust the arm strings so they are of equal length to each other. Practice a bit with your puppet before attaching the strings permanently (wrap the strings a few times through the slits when you like the length and then tape them so they won't come out--that way if your strings get tangled, you can undo them from the cardboard easily to untangle them.)

Practicing With Your Puppet

Now students are ready to make their puppet walk! "Wait!" you say. "How can I make my puppet walk when there are no strings to control its legs?" The answer is very easy. Are you holding your puppet with the triangle parallel to the ground? Is the point attached to the head pointing back? Good. Now, I want you to tip the controller to the side so that the left arm rises up in the air. Did you notice that the left leg lifted up too? (If it didn't, try adjusting the length of the arm strings so that it will.) With the leg lifted up, move the puppet slightly forward, then lower the left arm and leg and lift the right. Move the puppet slightly forward again. This is how you walk your puppet, moving it forward while you rock it back and forth.

Advanced movement with your puppet: There are so many things you can do with your puppet that you can discover on your own, but these few hints might help get you started. Make your puppet "walk" with its hands on the floor; now it is crawling! Now, imagine where your puppet's bottom is. Hold your foot out and make the puppet back up to your foot and sit its bottom down on your foot. Pretty good! And now for the fantastic part (don't try this yourself!) Swing your puppet gently through the air; it's flying!

Your puppet is just great the way it is, but if you want to decorate it or put a face (or hands) on it you can. Remember not to glue or sew too much to the scarf. You don't want it to get too stiff or heavy. Part of the charm of these puppets is their light elegance and flowing movement.

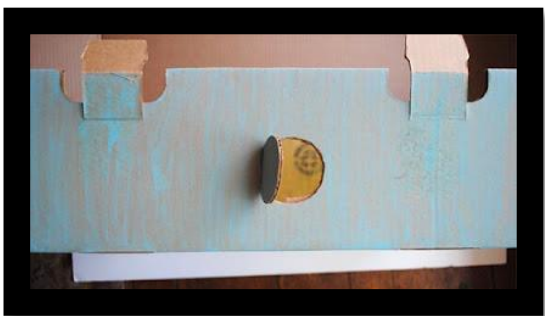
Hint: When you go to store your puppet, you can store it hanging from the controller to keep it from getting tangled, or you can carefully wrap the string around the controller, then carefully unwrap it when you are ready to use it again.



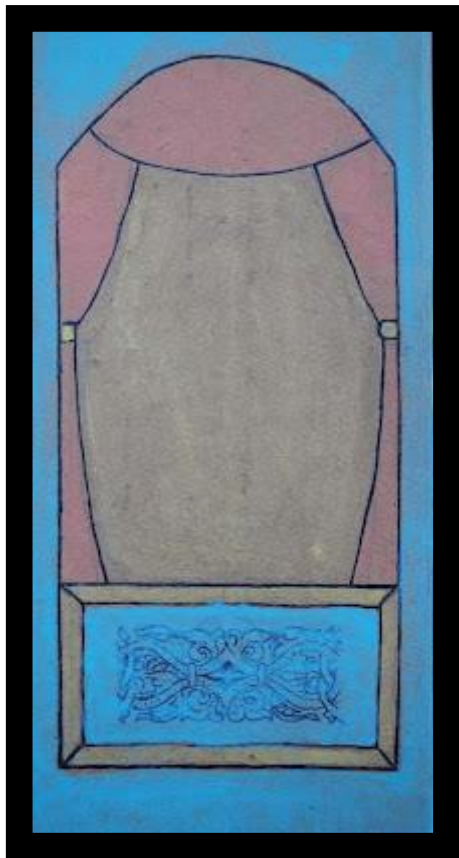
Curtain Tie-back



Back side of theater.



Hole for Flashlight/Spotlight



Details



Front of theater

Image Credits: Zakkalife. <http://zakkalife.blogspot.com/2012/04/craft-cardboard-puppet-theater.html> Check out the blog for more fun ideas and amazing crafts! Copyright 2013. All Rights Reserved!



Cutting out the Front of the stage



Construction style idea.

Image Credits: Raori <http://raori.blogspot.com/2012/12/diy-cardboard-marionette-theatre.html> Check out the blog for more fun ideas and amazing crafts! Copyright 2013. All Rights Reserved!



Construction style idea.

Image Credit: Emmy's Crafty Blog

<http://emyscraftyblog.blogspot.com/2012/04/cardboard-box-theatre.html>. Copyright 2013. All Rights Reserved.

Printmaker, Printmaker, Make Me a Print!

Source Unit: *Click!*

1. While we don't want to expose young students to all the chemicals involved in wet process and film development techniques there are some fun ways to show them how materials can be light sensitive, how images can be captured, and give a little insight into the process of making prints and film.

Materials

- Sun Sensitive Paper
- Water
- Containers to hold water in and papers, ex. 9x13 aluminum cake pans
- Cardboard and push pins to keep your prints in place or a shallow tub where the paper will be protected from blowing away in the wind
- Objects to take a "picture" of on the photosensitive paper

1. Have students collect objects that will make interesting prints (living (some students have put tiny frogs on the sheets), non-living, from nature, man-made, etc.)
2. Have students place their Sun Sensitive Paper, blue side up, in the shallow tub or pin the corners to a piece of cardboard for stability.
3. Place the objects they wish to "print" on top of the paper. If their objects are particularly lightweight, you can hold them in place with a piece of clear plastic wrap.
4. Expose the paper to the sun for 2-4 minutes, until the Sun Sensitive Paper turns very pale blue.
5. Students should remove the paper from the tray or cardboard and soak it in water for about one minute. Have students observe the change that occurs when the paper is placed in water.
6. Then, remove the paper from the water and let it dry flat. The image will sharpen as it dries.

Now Try This!

Another interesting way for students to see the chemical reaction that occurs with Sun Sensitive Paper is to test the effect of different types of light sources on the paper. They can test different light sources and the effect that various exposure times play in the process.

Some light sources to try if available:

- 100, 60, 40, 25 and 15 watt light bulbs
- Green, red, blue, yellow and black light
- Fluorescent light
- Bug light
- Infrared heat lamp

Have students try exposing the paper to each light source for set intervals of time, with



zero exposure being their control in the experiment. Have students record their data and compare results between the light sources and exposure times.

How does it do that?

Basics: Like film, or photographic plates, the Sun Sensitive Paper is coated with light-sensitive chemicals, which react to light waves and particles when exposed to light. When you place objects on the paper, they block the light and turn white while the paper around them remains blue. Water stops the process and fixes your images on the paper. The intensity of the blue depends on the amount of time the paper is exposed to the light source and the intensity of the light source. For example, Sun Sensitive Paper doesn't work nearly as well on a cloudy day as it does on a sunny day.

More Details: In the lab, the sun paper/photosensitive paper is made by coating a sheet of paper with a water-soluble (Water-soluble means can be dissolved in water), bluish-green compound (compound means to mix things together, so it's a mixture) called iron (III) hexacyanoferrate (III), $\text{Fe}[\text{Fe}(\text{CN})_6]$. The common name for this chemical is Berlin Green, a well-known photosensitive chemical. When exposed to ultraviolet light (UV), a chemical reaction takes place where the water-soluble Berlin Green changes into a water-insoluble (can't be dissolved in water) chemical called iron (III) hexacyanoferrate(II), $\text{Fe}[\text{Fe}_4(\text{CN})_6]_3$. The common name for this chemical is Prussian Blue. When you rinse your print in water, the water-soluble Berlin Green washes away, but the water-insoluble Prussian Blue remains fixed (stuck) on the paper. The intensity of the Prussian Blue depends on the amount of time the paper is exposed to the light source and the intensity of the light source.

Discuss the nature of sunlight and how light-sensitive chemicals work. From here, launch a discussion about how color photos are developed, as each layer of chemicals on the film reacts to photons (light particles) of different color.

Photographic Prints

Traditionally, linen rag papers were used as the base for making photographic prints. Prints on this fiber-base paper coated with a gelatin emulsion are quite stable when properly processed. Their stability is enhanced if the print is toned with either sepia (brown tone) or selenium (light, silvery tone).

Paper will dry out and crack under poor archival conditions. Loss of the image can also be due to high humidity, but the real enemy of paper is chemical residue left by photographic fixer. In addition, contaminants in the water used for processing and washing can cause damage. If a print is not fully washed to remove all traces of fixer, the result will be discoloration and image loss.

The next innovation in photographic papers was resin-coating, or water-resistant paper. The idea is to use normal linen fiber-base paper and coat it with a plastic (polyethylene) material, making the paper water-resistant. The emulsion is placed on a plastic covered base paper. The problem with resin-coated papers is that the image rides on the plastic coating, not the actual base. and is susceptible to fading. At first color prints were not stable because organic dyes were used to make the color image. The image would literally disappear from the film or paper base as the dyes deteriorate.

Kodachrome, dating to the first third of the 20th century, was the first color film to produce prints that could last half a century. Now, new techniques are creating permanent color prints lasting 200 years or

more. New printing methods using computer-generated digital images and highly stable pigments, offer permanency for color photographs.



[Nearly] Hassle Free Hasselblad

Source Unit: Click!

This carefully produced downloadable and printable net file represents an iconic Hassleblad camera as a low impact and functional product that is available to all.

Images created by the community of users will be viewable at www.pinholehasselblad.tumblr.com. Please send any images of your camera or produced by your camera to pinhole@kellyangood.co.uk to be uploaded to the blog.

Instructions

Please refer to the diagrams and very detailed step by step instructional video from Kelly Angood if you need further assistance or a visual reference to making your pinhole Hasselblad. <http://vimeo.com/21702610> If you get stuck, just take a look at the time lapse video of the construction process, it shows the assembling of the camera in 18 minutes

Notes: Print this PDF on regular office paper at 1:1 (called 100% on some printers). DO NOT select 'fit to page'. To ensure that you have printed the document correctly measure the rulers on each page against a real ruler. If the document is printed smaller than intended your film will not fit in the mechanism!

Your pinhole Hasselblad will accept any 35 mm film. Use a 200ISO film for best results as this is what the suggested exposure times are

FYI: Pinhole Cameras

A Pinhole image has to be a Slow Shutter Speed image. By revealing the pinhole light starts to pour into the camera - 4 seconds, 12 seconds, 30 seconds etc. We see much quicker than this – Our eyes seem to see things as they happen. However, in a slow shutter speed or pinhole image people blur if they move, or appear more than once – as the light reflected is distorted and marks the light sensitive paper.

based on.

Numbers on the tabs indicate which cut-out the tab should be glued to.

Apart from the print out you will need:

- A scalpel or craft knife
- A ruler (preferably metal)
- 2 regular paper clips A cereal box
- Either a 2cm x 2cm square of aluminum foil or a square of aluminum from a drinks can and a sewing needle.
- 3 sheets of black paper
- Spray adhesive or a glue stick
Glue (UHU or PVA is recommended)
- 2 x 35mm 200ISO films
- A roll of black electrical tape
- A bottle opener

STAGE 1: Initial steps

8 00:00:00 > 00:00:38

- 1) Print out the PDF as instructed.
- 2) Cut away a roughly A4 sized section from your cereal box.
- 3) Using your glue stick or spray adhesive stick page one of the PDF to the printed side of your piece cereal box and stick pages 2-4 to your black paper.
- 4) Make all the cut outs from pages 1-4 taking special care to remove the inner cut outs from pieces 1, 10, 15 & 17.
- 5) Lightly score along the dashed lines on your cutouts to make folding easier.

STAGE 2: Making the main body

8 00:00:38 > 00:04:25

- 1) Fold cut out 1 into a three sided box and glue the tabs to the inside of the box to secure.
- 2) Now attach cut out 2 to the top of the box to complete the main body.
- 3) Take the rectangular cut outs
- 4). Glue the longer lengths to sides of the box, sticking them so that half of the width is inside the box and half sticking out. Do the same with the shorter lengths along the top and bottom of the box.
- 4) Now take cut out 3. Create a slight curve in the rectangular section be gently pulling the

paper through your fingers. Do this to the upper and lower parts of the rectangle.

5) Now glue the tabs to the inside of the rectangular section. You may wish to hold some of the tabs together with paper clips whilst the glue dries.

6) When both the front box section and rear curved section are dry take your black electrical tape and tape along the inside of the joints. This is to prevent light-leaks.

STAGE 3: Making the roof

8 00:04:25 > 00:07:17

1) For this section you will need cut outs 5,6,12, a paper clip and a sewing needle.

2) Construct cut out 6 by folding along the dashed lines, making a slight curve at the front where the tabs are and gluing the tabs to the inside of the side sections.

You may wish to hold the tabs to the main roof body with paper clips whilst they are drying.

3) When dry take your sewing needle and punch a hole through the small marker on both cut-outs 5 and 6.

4) Now glue cut out 5 to the top of the main body where indicated.

5) Open out your paper clip and shape as illustrated in the diagram.

6) When 5 and 6 are dry feed the paperclip through the holes you have made in 5 and 6 to attach them together. This can be a little tricky. When the mechanism is in place you should be able to move the roof of the Hasselblad up and down.

7) Now fold cutout 12 into a three sided box and glue the striped area to the inside of the inside of the roof section (6).

8) When dry hold the back of 12 with your fingers and push down 6 with gentle force. This will allow you to move the roof up and down and create the folds as illustrated in the diagram.

STAGE 4: Making the lens & side sections

8 00:07:17 > 00:10:40

1) For this section you will need cut outs 7, 8, 9, 10 & 11.

2) Take cut out 7 and fold down the triangular tabs on both sides.

3) Glue the triangular tabs marked 7 to the inside of the black circle and glue the two ends together where they meet.

4) Now glue the triangular tabs marked 1 to the circle on the side of the main body.

5) Now take cut out 8 and glue it to the circular surface of cut out 7. (See diagram)

6) Take section 9 and fold down the triangular tabs and glue to the front of the main body as previously done on cut out 7 taking care not to cover the cut out circle on the main

body.

7) Glue cut out 10 to the inside of section 9.

8) Take cut out 11 and do not fold the tabs down but instead glue the tabs to the inside of section 9.

STAGE 5: Making the film mechanism

8 00:10:40 > 00:16:56

1) For this section you will need cut outs 15, 16, 17, 18, & 19. You will also need a 2cm x 2cm square of tin foil or aluminum, a sewing needle, black electrical tape, two 35mm films and a bottle opener.

2) Take cut out 15 and glue the tabs marked '15' to the inside of the box.

3) Now take section 17 and fold along the score line and glue together so that the black side is facing outwards.

4) When dry, place cut out 16 into cutout 17 and glue section 19 across the thinner section of the inner cut

out from section 17 to prevent the slider from falling out. (See diagram).

5) Now take your square of tin foil or aluminum and place a pinhole directly in the centre then glue around the outer edges and glue to section 15 so that the pinhole is roughly in the middle of the central square cut out.

6) Glue the constructed sections 16, 17 & 19 to the front of section 15 as shown in the diagram.

7) Whilst that section is drying gently ease off the bottom of a 35mm film using a bottle opener. Take care not to damage it too much as the removed section has to be used again.

8) When you have removed the bottom, take out the film from the canister and discard.

9) Now remove the spool from the canister and turn it upside down.

10) Now pull a few centimeters of film from the second 35mm film canister and feed it into the empty spool.

Depending on the film you are using you may need to cut some of the film away to create a tab to feed into the empty spool. You may also need to use a little electrical tape to make sure that the film is attached to the empty spool securely.

11) Slide the spool back into its canister and push the section you removed with the bottle opener back onto the canister to secure.

12) You are now ready to attach the film to the constructed mechanism.

13) Place the exposed film onto the back of section 15 and fold the section with the rectangular cut out on top of the film.

14) When in place push the tabs into the film feed of the canisters. This helps to prevent

light leaks.

15) When you have done this fold the last remaining tab over the back of the box and secure with black electrical tape to complete the section.

16) If you feel that there is anywhere in the mechanism where light could leak in (apart from the pin hole) cover with black electrical tape.

17) When the mechanism is fully dried, place glue to the front of the mechanism taking care to avoid the slider.

18) Then feed the mechanism into the main body of the camera, feeding the slider through the small

rectangular cut out on the right of the main body.

19) When in place open the slider to ensure that the pinhole can be seen through the cutout in the front of the main body and that the side of the bottom film is accessible through cut out at the side of the main body.

20) When fully in place, close the slider and allow to dry fully.

STAGE 6: Making the film advance mechanism

8 00:16:56 > 00:18.30

1) For this section you will need a paper clip and cut outs 13 & 14.

2) Bend the paper clip as shown in the diagram.

3) Glue cut out 14 to the folded cut out 13.

4) Glue the shaped paper clip into the constructed sections 13 & 14. You may wish to use a paperclip to hold these in place whilst it dries.

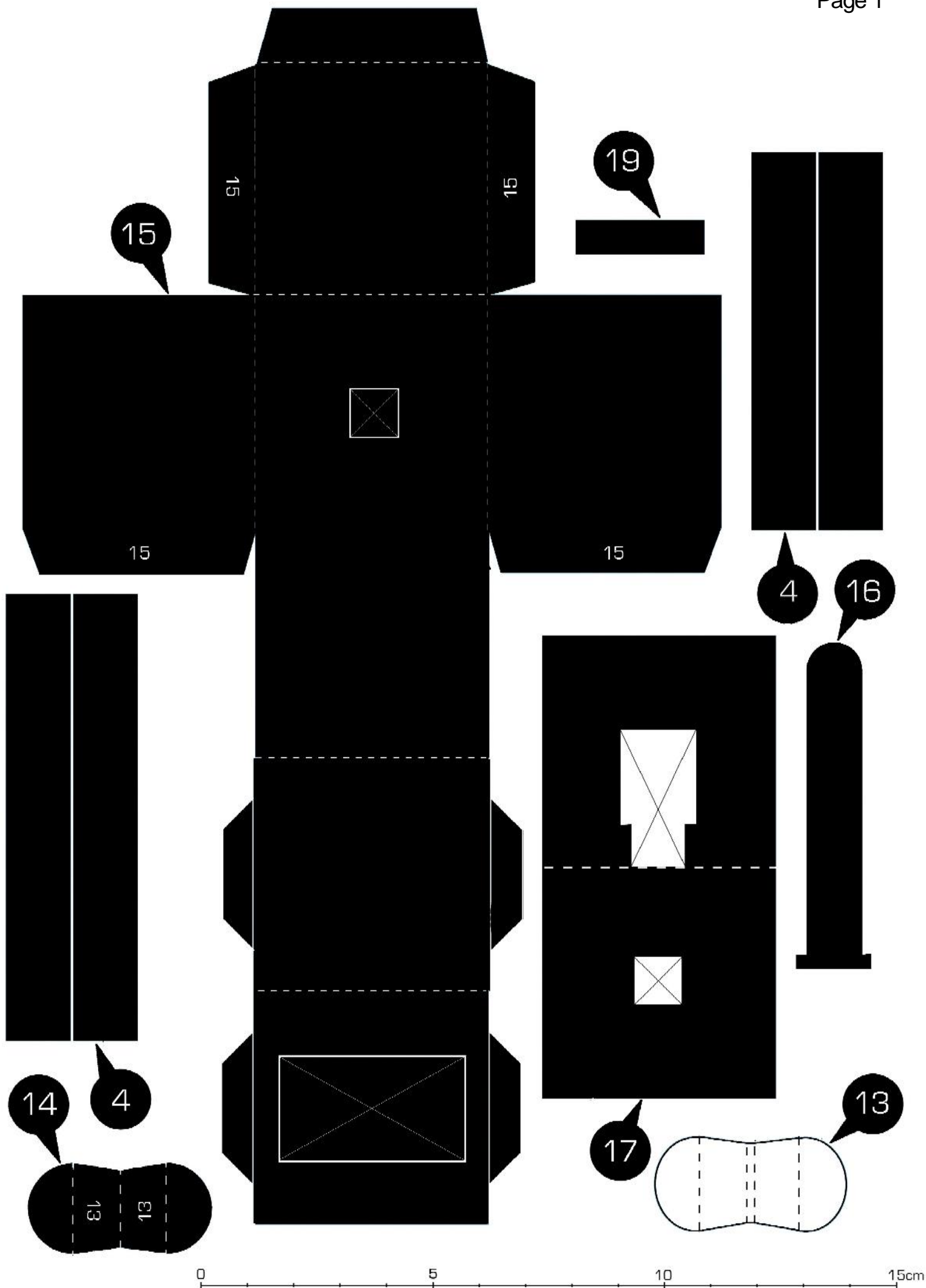
5) When dry, place the constructed winder into the bottom film canister. This mechanism winds the film on, in the first instance make about 8 full winds before you take your first photo and from then on wind the film 1.5 full turns between each exposure.

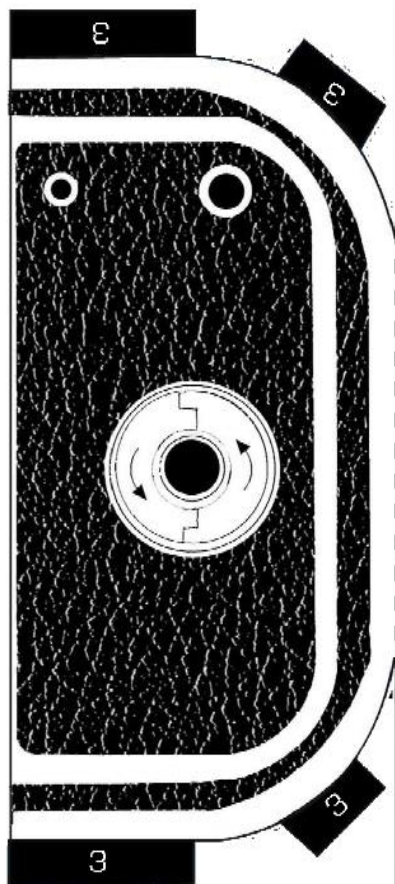
Your pinhole Hasselblad is now ready to use. To get a sharp photo, it's important to hold your pinhole camera steady. Ex. Attach it to a tripod with rubber bands, or a brick, or whatever method your students determine.

When the film is finished, remove the tape holding the mechanism together, remove the film and pull the film away from the top spool and feed it into the bottom spool. You can now take your film to a commercial photo processor for developing. You may want to inform the developer that not all the photos may be clear, as sometimes developers do not . As the exposures on the negatives are not spaced standardly you will need to inform the developer, or you can use a negative scanner, if it's available, to upload them into your computer for editing.

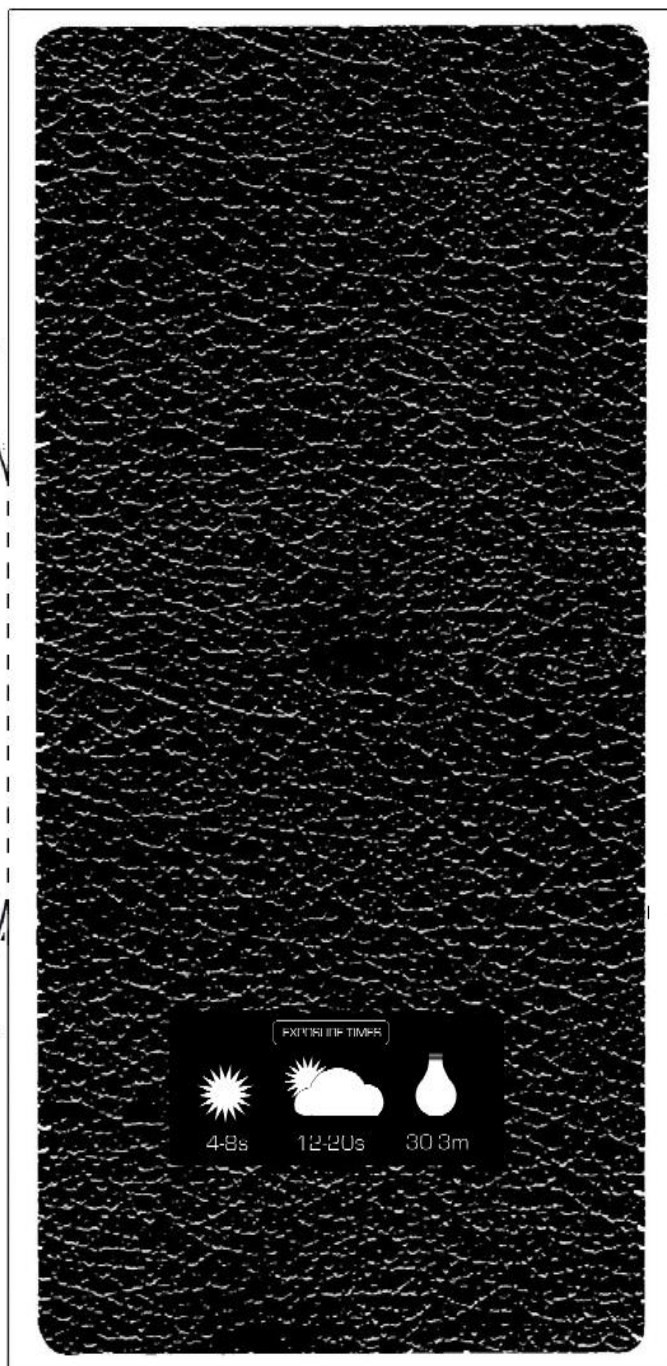
Option: Send any images of or from your pinhole camera to pinhole@kellyangood.co.uk to be published on the blog www.pinholehasselblad.tumblr.com!

Option: Time Lapse Photography Have students use a regular digital camera to take a series of photographs of the project at different stages of development. The object of time lapse photography is to speed up a process that the normal human eye cannot see because the process moves so slowly. Then put the photos together, either on a poster board or as a slideshow, with captions, and show how the camera developed.

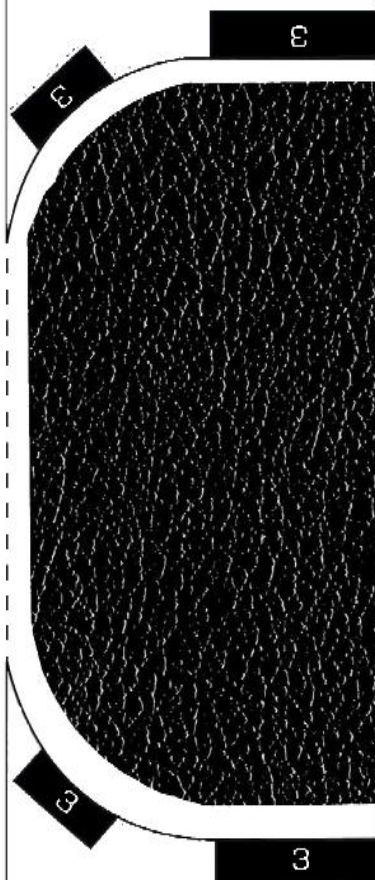




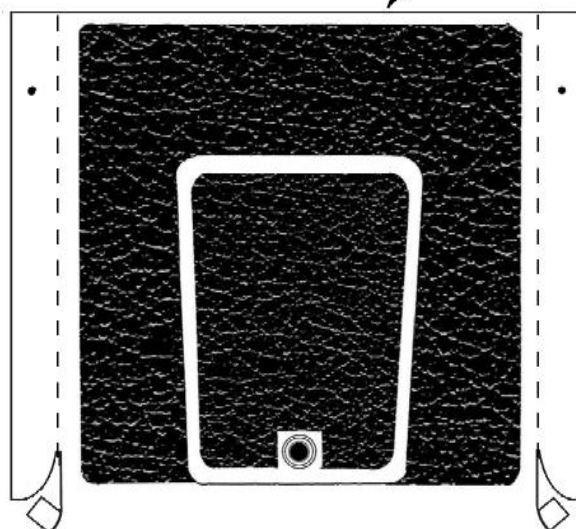
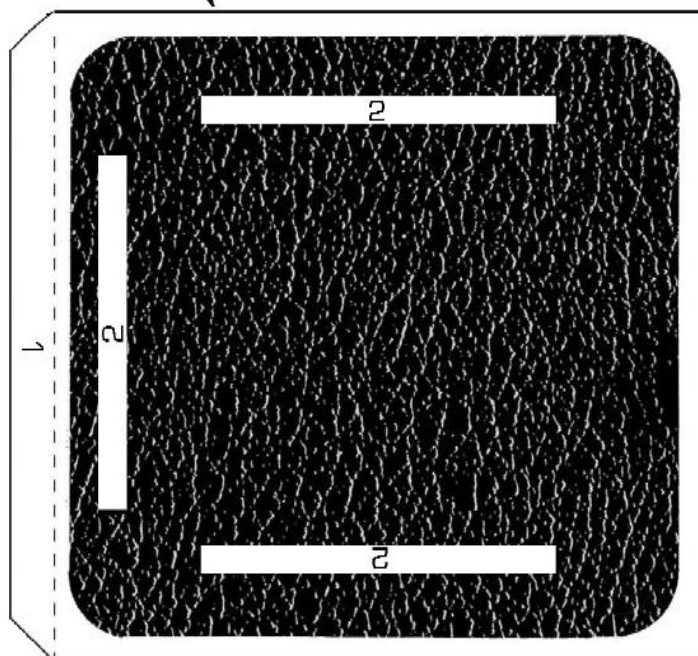
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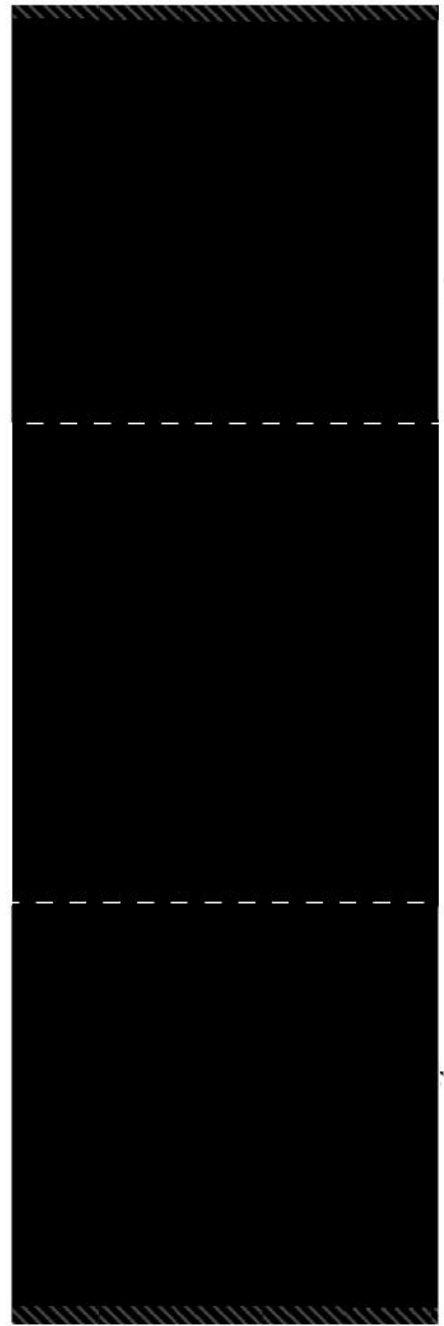
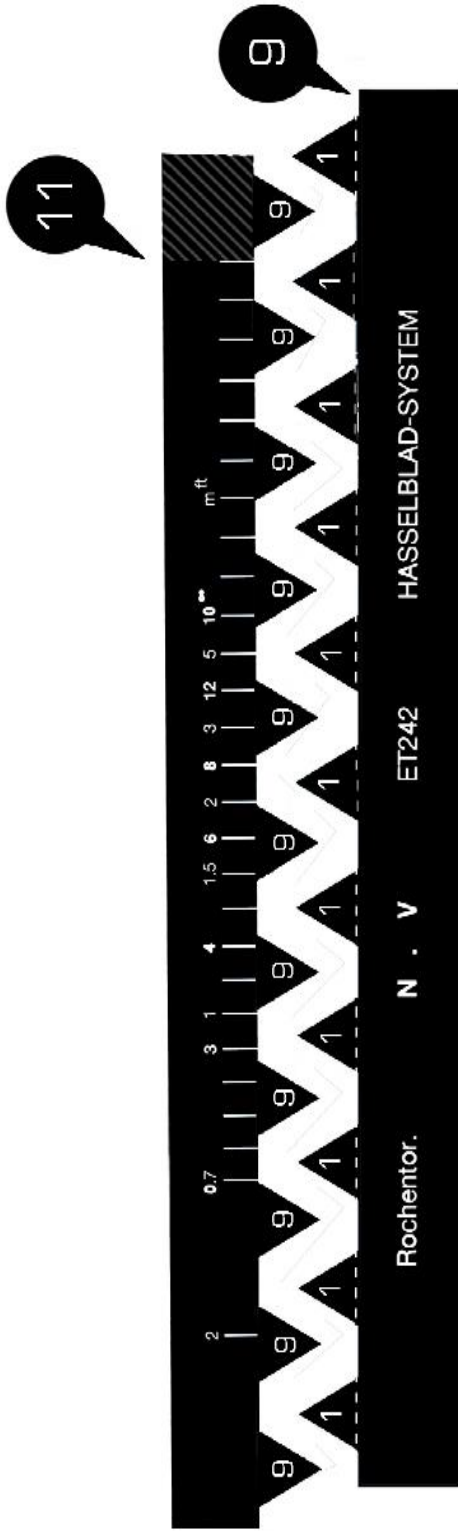
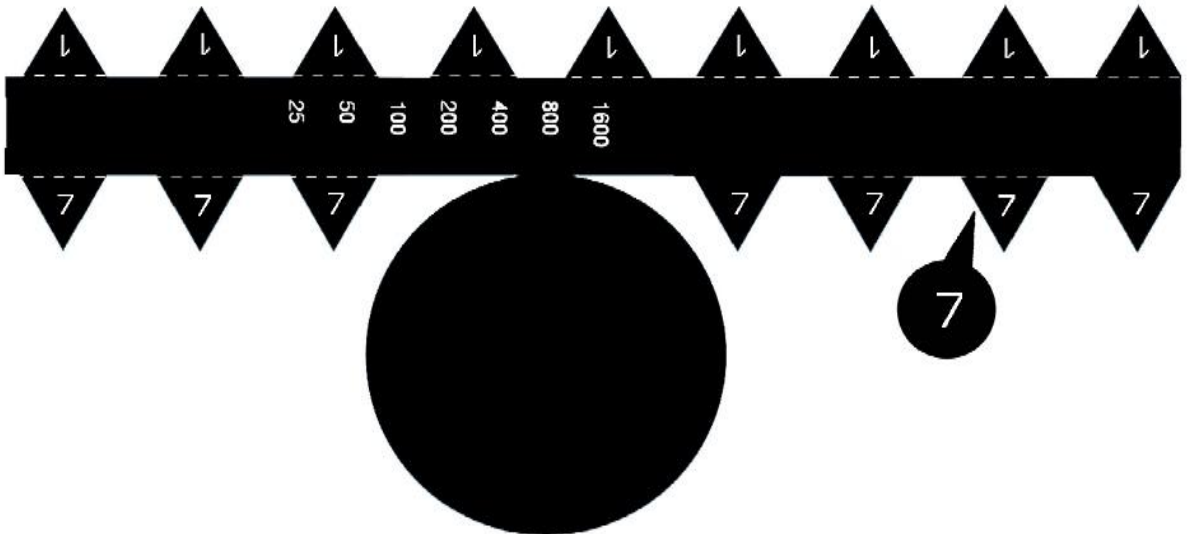


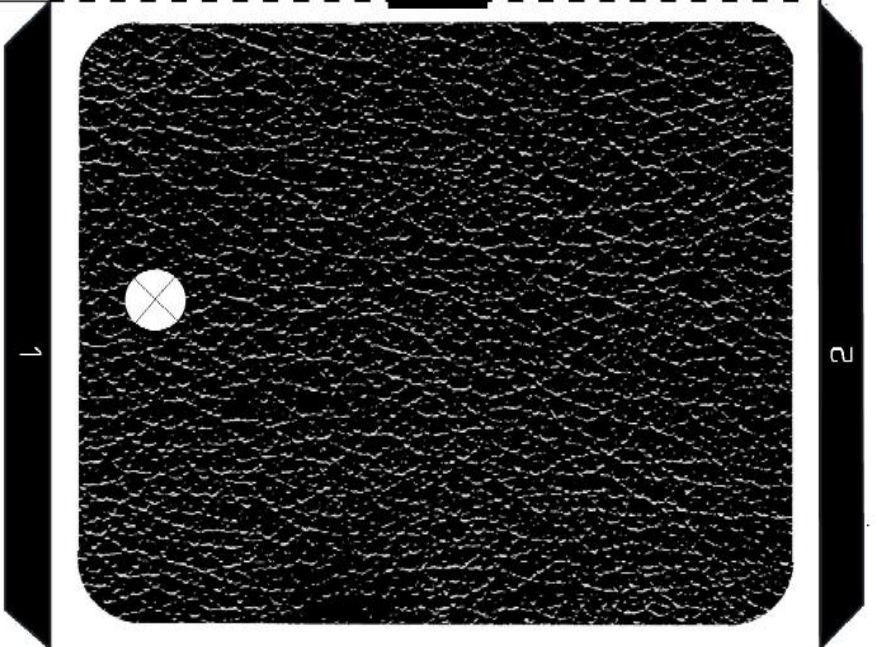
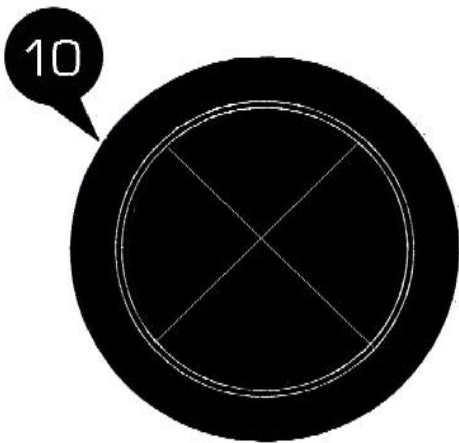
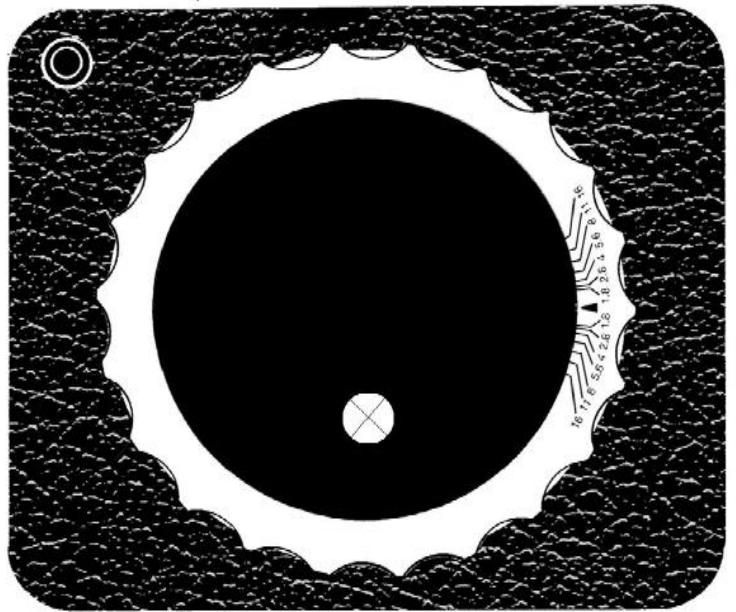
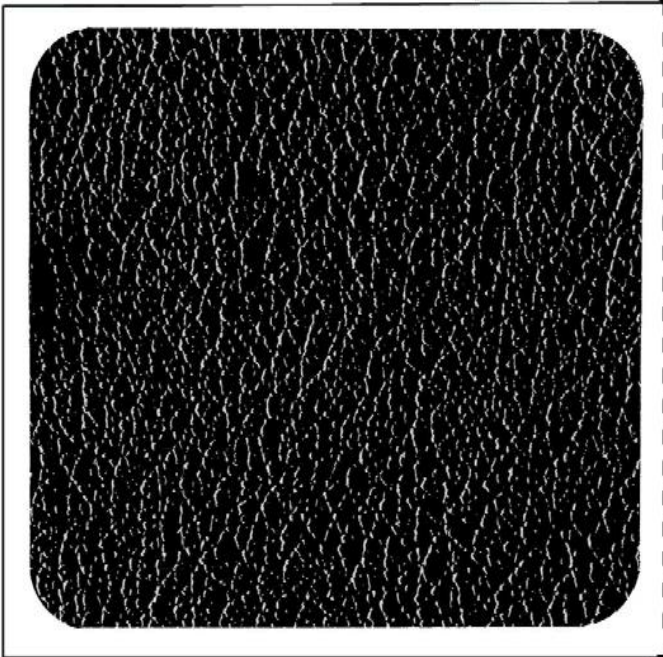
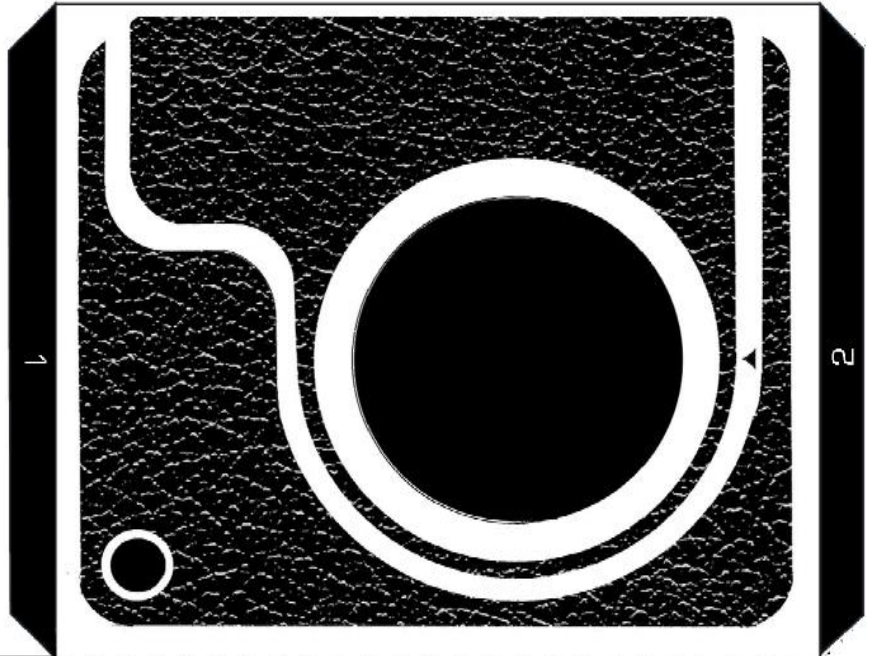
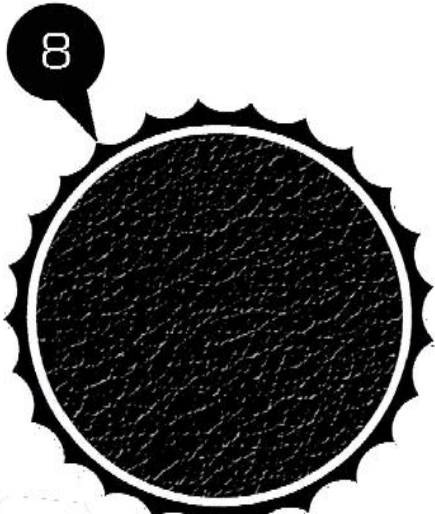
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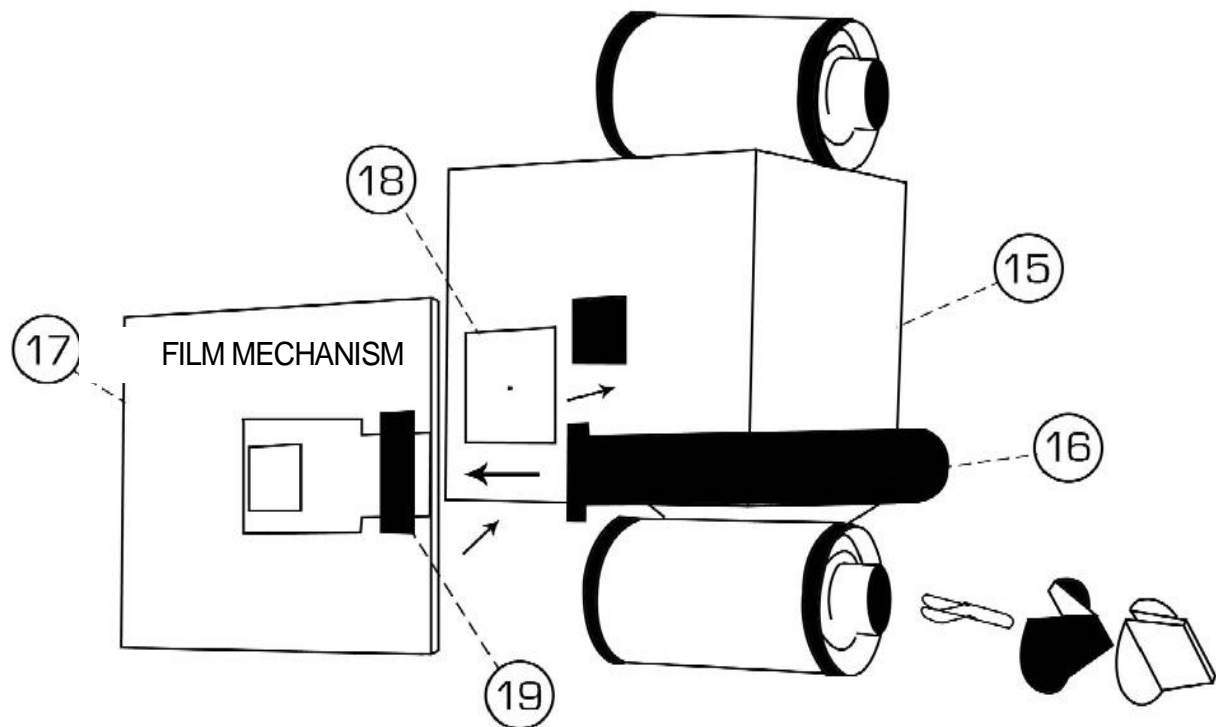
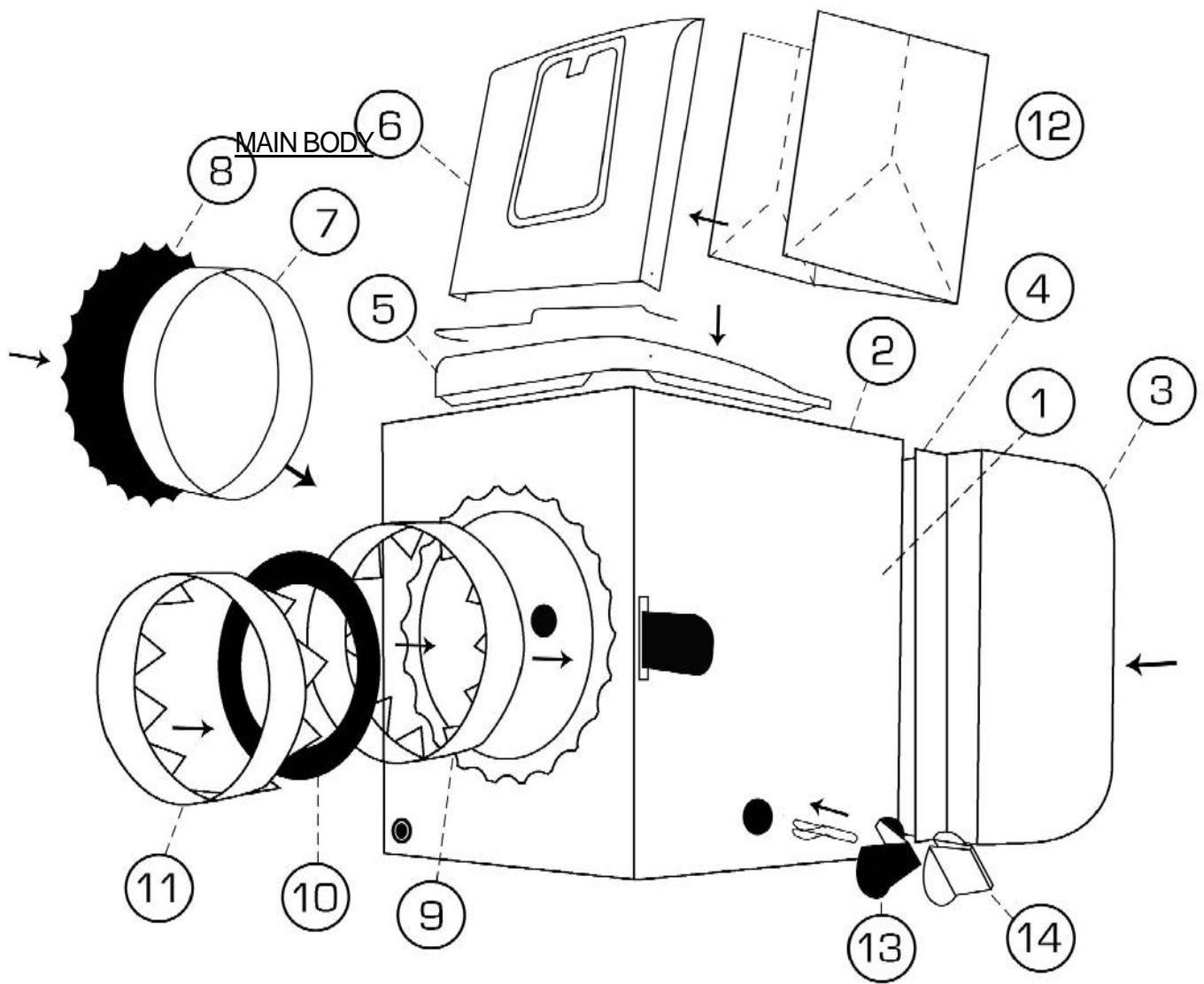


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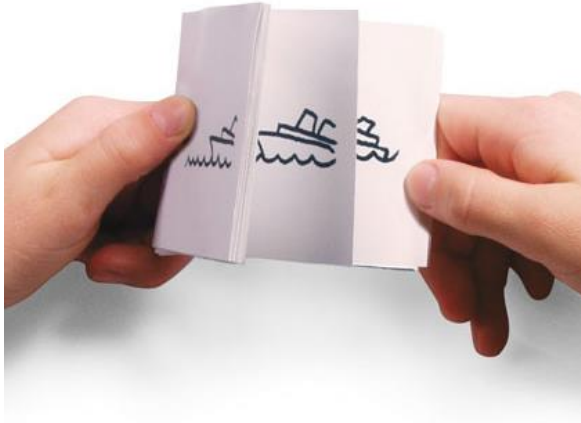






Flip Out! Images in Motion

Source Unit: Click!



Muybridge also adapted the zoetrope, a popular children’s toy that produced the illusion of motion by spinning a series of animation-style drawings behind a viewing slit. The “zoopraxiscope” as it was called created the first photographic motion pictures, and it was a hit with Stanford and children. Soon, however, Thomas Edison and the Lumière brothers took Muybridge’s proof of concept and gave birth to movies as a commercial art form and his work eventually led to the development of motion pictures as we know them today.

Most of us remember being shown a flipbook as children. Flipbooks work so that, when the pages are “flipped” through, it appears that an image on the page is actually moving, like in Muybridge’s zoopraxiscope. A series of still pictures viewed in quick succession creates the illusion of movement, whether it is actors dancing across the silver screen, a horse galloping, a tree growing, a rocket taking off, a cat chasing a dog, a volcano, someone dancing with their mp3 player, a fish getting caught on a line, or a man running on paper. Option: Introduce the topic with a fun book such as *Gallop!: A Scanimation Picture Book*, a high tech version of a flip book, in which he black-and-white images openly reference the motion photography of Eadweard Muybridge (an influence that Seder acknowledges on the copyright page).

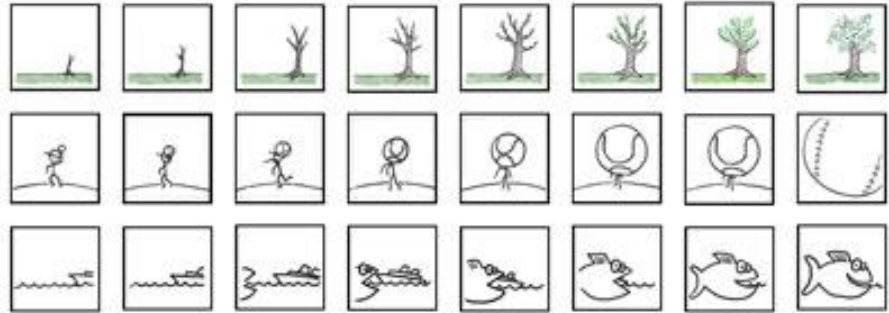
Materials

- Post-it notes, index cards, or an old paperback with wide margins
 - Pencil
 - Markers or other drawing tools
1. Have students look at a terrific example of a simple animation in motion, and explain the idea to them aloud.
 2. Ask students to think of a simple movement that they would like to portray, such as
 - A boy doing jumping jacks?
 - Two people running toward each other?
 - A cat chasing a bird?

- An erupting volcano?

3. Provide students with small pads of paper (or a pile of sheets of paper, all the same size, which they can tape or staple together at the top to make a pad) to use as their "film." Students will need at least 25 pages for their

flip book. The more pages they have, the nicer it will be, so don't be afraid to encourage them to go for 40 or 50 pages. The pages don't have to be large. Small



strips or squares are best. You want something that is easy to hold in their hand and flip with their thumb.

4. Small pre-purchased notepads and notebooks can be great for flip books. Sticky note pads in the traditional two inch square size are perfect. And as a plus, they can be easily taken apart and re-aligned together. If you don't have little note pads, you'll have to cut small pieces to size.
5. To make a picture look like it's moving, it's necessary to draw the same thing, but with a little change on each page to indicate the movement. Ask students to start with the very beginning image, and plan its movement, but to draw the movement in small additions, one page at a time. Beginners should keep things simple. Stick figures, ants, or bouncing balls can all be worthy flip-book stars.
6. Remind students to draw their scenes as close to the unbound edge as possible so the action is easy to see when the pages are flipped.
7. Tip: When drawing, push down hard with your pencil to create an indentation on the next frame. Use this as a guide to help you reproduce parts of your movie that don't change, like background scenery.
8. Make gradual changes from frame to frame. The more similar each frame is to the previous, the smoother the action in the final movie. (To tell a long story, some people use the margins of an old paperback so they'll have hundreds of frames to work with.)
9. Tell students to keep drawing until the movement is complete. Ideally, there should be some twist to your story to give it drama, as in the very very abbreviated samples shown
10. Once the "story" is mapped out, ask students to thumb-flip the pad forward and backward to show their own mini-movies.

Now, If a picture speaks a thousand words, surely students can come up with a few of their own in this hilarious game of which player wrote which caption. Have students write a complete sentence or sentences, grammatically correct, come up with their own punch line/quip for a flip book. Show students a flip book as a group. Then choose a guesser and a reader, or the Teacher may be the reader.

1. Everyone but the "guesser" makes up a caption for the cartoon & gives it to the "reader" Give students a limited time frame to write their own grammatically correct punch line/quip. It's not always easy, which of course is what makes it worthwhile and fun. **Emphasize skills that are appropriate to each grade level and skill level of students in your group. As needed stop the game to cover the skills that students are struggling with [ex. punctuation, action verbs, tenses], this may require small breakouts session or pre-teaching before the game with short review during the game.**
2. Have students peer edit and have the Reader/Teacher check each entry as it is submitted, students may need to go back and edit their sentences for correctness before they can be submitted.
3. Once all entries are in, the "reader" reads them silently first & then shuffles them & reads them to the "guesser."
4. The "guesser" picks his/her 3 favorite captions & ranks them accordingly
5. The "guesser" tries to guess who wrote each of the 3 favorites.
6. The person whose caption was rated first place moves gets 3 points, 2nd gets 2 points, 3rd gets 1 point. For each one the "guesser" guessed correctly the "guesser" gets a point (for a max of 3 spaces)
7. The "guesser" & "reader" rotate each turn, unless the reader is the teacher. Also, choose a new flipbook for each round.

With over 10 people choose, 1st 2nd and 3rd, however if you are playing with less people the "guesser" might only want to choose their 2 favorites.

Designing an Advertisement

Source Unit: Bright Ideas!

Your invention is ready, your campaign is planned! Now you just need to convince people to buy it!

Choose a memorable image. Simple but unexpected is often the best route to take. For example, these stark, colorful silhouette ads that barely even show the iPods they're peddling couldn't get much more straightforward, but because they don't look like any other ads, they are instantly recognizable.



Distinguish yourself from your top competitor(s). A burger is a burger, or a shoe is simply a shoe, but if you let yourself think like that, you'll never make your sale. Sell a lifestyle, not just a product. Use your ad to highlight your product's advantages over that of your competitors. To avoid lawsuits, keep to statements about your product, not theirs. For example, this Burger King ad mocks the size of the Big Mac while speaking the literal truth: that is a Big Mac box, after all, leaving McDonalds no legal ground from which to retaliate.

Design a business logo. A picture says a thousand words, and if a logo is effective enough, it can render text unnecessary (the backwards Nike checkmark, the Apple bitten apple, the McDonalds arches, the Chevron shell). If you're running a print or television advertisement, try to develop a simple, appealing image that will stick in the minds of viewers. Consider these points: Do you already have a logo in mind or one you already use? If you can, think of fresh and creative ways of re-imagining it. Do you have a commonly-used color scheme to work with? If your brand is instantly recognizable by the colors in the ad or the logo, use this to your advantage. McDonalds, Google, and Coca-Cola are good examples.

Find a software or technique for creating your advertisement. How you have students, or how they choose to create their ad will depend on which medium you're using to advertise. Here are some basic suggestions to get you started:

- If they're making a small-scale print ad (such as a flyer or magazine advertisement) students don't have to have dynamic software (though it can be fun), they can use craft materials or a program such as Word. With Word, you can go much further than just word processing. Have students take a trip through Word's menus, buttons and features to put together an eye-catching design that has page flippers stopping for pause. Other programs also work such as PowerPoint, Adobe InDesign or Photoshop. Or, if you're looking for a free option, you can use GIMP or Pixlr.



- If they're making a video ad, try working with digital cameras, and/or software such as iMovie, Picasa, or Windows Media Player may be used to edit any filmed commercials. Web creation sites such as PBWorks and Google Sites may be used to create Internet-based advertisements.
- For an audio ad, you can work with programs such as Audacity or iTunes.

Give students time to meet in small groups and plan the presentation of their ads. Have each group present, allowing time for discussion with the class about the effective use of persuasive techniques in each advertisement.

Note: After the presentations and discussion are complete, distribute the Reflection Questions and give students time to solidify their learning and to allow students to think about what they have learned about advertising and shoe design/construction by responding to the eight questions.

Fluid I-Draw-Its!

Source Unit: Hydraulics

A fun way to introduce this section is with, Frank n Stan by M.P. Robertson. Now that students have built robots with fluid power, have students paint mechanics, with fluid! All successful watercolor projects begin with a great drawing and robots are great fun to draw and paint.

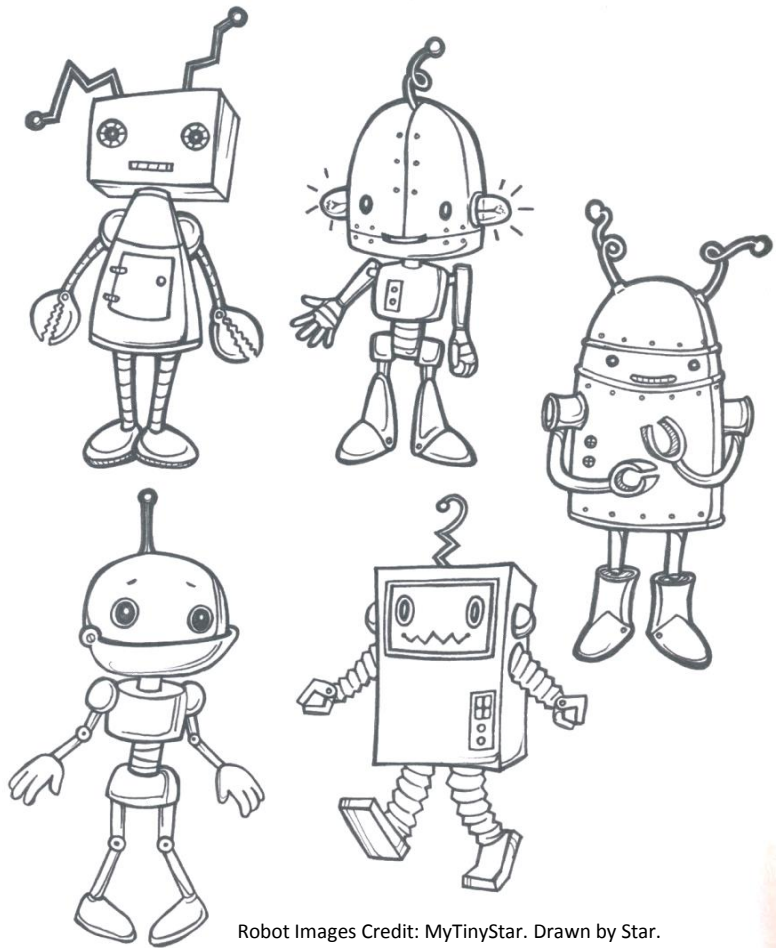
Materials:

- Oil Pastels (dark colors) or crayons
- Liquid watercolors or pan style
- Paper
- Cheap Watercolor paper
- Paintbrushes
- Salt (optional)
- Cotton Swabs (optional)
- Rubbing Alcohol (optional)
- Condiment cups with lids (for extra paint storage and supplies)

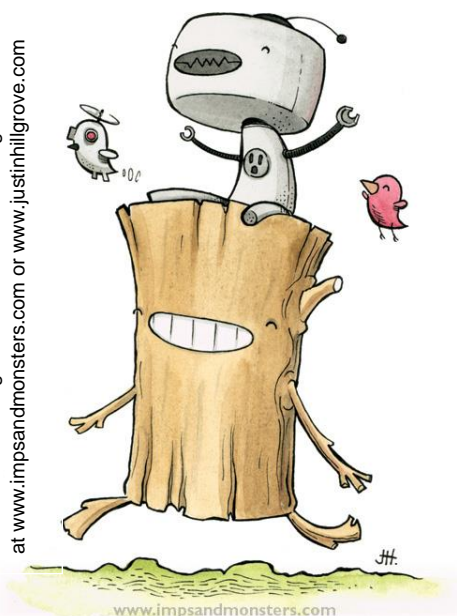
Optionally, start with a directed line drawing of a robot. It's important to note that even though you may use, "directed line drawing", it's rare that you want

to give your students just one option, most of the time you'll end up with many drawings on the white board. Look at pictures and brainstorm together what a robot can look like, and create sketches up on the board. Give lots of examples!

Encourage the children to think about what elements a robot may have. Brainstorm lots of fun ideas and as the children call out things like rivets, wires, solar panels, draw these things on the board. Demonstrate various ways to draw robots using pictures, books and drawings as guides. Stress the importance of working through "mistakes" and having fun with an unexpected line. Draw a few different ones; some realistic, some silly, some animated, then talk with students how you could change the wings, the shape, that sort of thing. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.



Robot Images Credit: MyTinyStar. Drawn by Star.
<http://blog.mytinystar.com/2010/06/robots-hims-and-hers.html>.
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In the process of drawing on the white board, always incorporate mistakes. Always! Laugh at your “mistakes”, tell the kids to expect them and then show them how to turn mistakes into something else.

It’s critical that you show your artistic side, no matter what you privately think of it, and inspire your students

Then have the kids get busy drawing their own robots with an oil pastel, crayon, or a waterproof marker (though the way non-waterproof markers bleed when exposed to water can make some cool effects), etc.

Once the drawing is complete, emphasize large shapes, set out a palette of watercolor paints.

Watercolor Painting

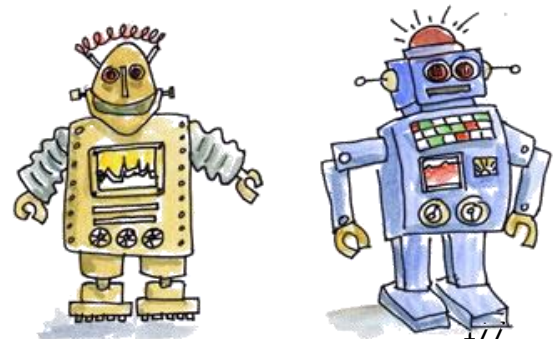
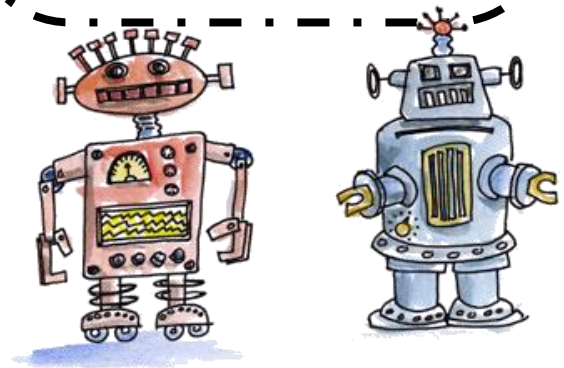
Techniques:

- *Oil Pastel/Wax Crayon Resist:* If they want their outlines of the robot to show through, oil pastel will repel the paint, create clear outlines, and allow the drawing to show through the paint. Note: Wax crayons can also work for this, but aren’t quite as clear, though they are also a lot less messy.
- *Drip Drop:* Rubbing alcohol is delightfully unpredictable, like watercolor itself. If you have rubbing alcohol and cotton swabs, alcohol and watercolor don't mix well, but they make some some amazing effects. Dipping a Q-tip into the alcohol have students proceed to tap and drip alcohol directly into the washes. As the alcohol hits the wash it repels the paint, pushing it away while leaving a lighter tint of the wash exposed. The results of their fight on the paper is strangely organic in nature and not achievable using any other technique.
- When they’re ready to paint, have students paint the background and its details first and spend some time making the colors ooze and blend together on the page.
- If they used oil pastels or wax crayons, students don’t need to avoid painting near or on the outlines, as the watercolor paint will bead off the oil

Teacher Tip!

Ban pencils and erasers.

Sounds harsh, right? It’s not being mean, the reason is purely practical: small pencil leads encourage small drawings. If a kinder is drawing a robot and then is required to paint that very robot, using a pencil will surely lead to frustration. It’s hard to paint teeny tiny eyes! There is another reason: pencil markings can be erased, which leads to second guessing, which leads to lots of eraser action, which leads to class being over before the child has anything on his paper. Using oil pastels, crayons, and/or waterproof markers allows the artist to move quickly, commit to the drawing and forgive their “mistakes”. This is a big and very important part of creating art; giving into the process and not worrying about the details.



pastel/crayon. Encourage the children to mix paints on their paper, not in paint palettes, and use the double-loading technique when you can. It produces very cool results and clean-up is much easier!

- *Wet-On-Dry Technique:* First, students dilute their paint with water and place it onto the dry paper. The color lies on solid **without** gradient (Gradient is blending of shades from light to dark or from one color to another). Encourage students to work with quick and spontaneous strokes. Remind them that if they want crisp edges, they must wait for the paint to dry before painting next to it! Otherwise, they are using the following technique.
- *Wet-On-Wet Technique:* Which is painting a wash of water (or paint), and then painting on top of that area while it's still wet with quick strokes. The result is a blended or blotchy and clouded effect with



www.impsandmonsters.com

Image Credit: Robot Dog Walker. ©2010 Justin Hillgrove and Imps and Monsters. All Rights Reserved. All works on the Imps and Monsters Website are the original creations of Justin Hillgrove. Visit the artist at www.impsandmonsters.com or www.justinhillgrove.com



Image Credits: Robots by Bina. Visit the artist to see other great art at <http://binaviviansantos.blogspot.com/>. All Rights Reserved. Copyright 2012.



www.girls-over-blog.com

3D Hands & Cross Contour Crows

Source Unit: Protecting the Harvest

The following is a very interactive 3D project which will help students in transforming their hand image from 2D into 3D by just nothing else than few sketches and simple drawing sheet. A simple image demonstration is given below which instructors can demonstrate before students start creating some their own projects. It's always good to have an example to show students what they are aiming for, but encourage them to use their own creativity.

Materials:

- Paper
- Pencil
- Markers
- Object to trace or idea to draw
- Ruler (optional)

Have students lay one hand down on their desk, then run a finger along the table, and then their hand. What are the differences between the surfaces?

Encourage them to describe it using vivid adjectives and notice that their hand is rounded and bumped along on the surface, not smooth and flat like the table.

How could they draw it to show the differences between the surface of their hand and the surface of the table?

Write ideas on the board, have students create examples. Discuss 2D vs 3D. What makes something look three dimensional, even when it's not?

Show your sample. Discuss whether or not it looks 3D. Why or why not? What techniques do notice you used? Then have students place their hand on the white sheet of paper and trace it lightly with a pencil.

With a black crayon or marker (fine point markers work best) have students



freehand draw straight lines across the paper, except when they get to a pencil line make an arch from one side to the next pencil line and then go back to drawing the straight line. Have students use this method to cover the entire page with lines. They then can fill in the spaces between their dark lines, practicing patterns or not, as the teacher instructs.

Note: Using a ruler may help younger children keep the lines straight.

Options: This technique can not only be used create 3D hands but using this same concept any unique body part, even a face, can be transformed into an amazing 3D image. Can students do a 3D scarecrow portrait, or a picture of a crow using this technique of basic cross contours? **Discuss: How could they approach it? What would they need to keep in mind?**

Cross contours can also be used to create a collaborative piece of artwork, like this one by Sky Kim [an artist from Seoul, Korea who lives and works in Jersey City, New Jersey <http://artists-studios.com/2011/11/sky-kim/> Copyright 2012, All Rights Reserved]?
Option: The teacher may draw the basic lines and let students fill in the curved lines.



Colorful Scarecrow



Source Unit: Protecting the Harvest

Materials:

- Chosen picture books
- Oil Pastels (dark colors) or crayons
- Liquid watercolors or pan style
- Paper towels
- Cheap Watercolor Paper (construction paper, drawing paper, or printer paper will NOT work well)
- Paintbrushes
- Salt (optional)
- Cotton Swabs (optional)
- Rubbing Alcohol (optional)
- Condiment cups with lids (for extra paint storage and supplies)

Picture Books are a great source for inspiration for students and teachers alike, and there are many good picture books about Scarecrows to inspire, ex. you may wish to show students images from books such as, *The Scarecrow's Hat* by Ken Brown or *The Scarecrow's Dance* by Jane Yolen.

Discuss with students how the illustrators approached their subject. What techniques did they use? Were they always really detailed? If you've shown several, ask students if even though both books are about scarecrows, do they look exactly the same?

To start the painting project, demonstrate how to draw a scarecrow, focusing on the face first (draw a letter "u") then the hat. For variety, show the kids at least three different ways to draw hats, you want to end up with many drawings on the white board. Look at pictures from the books and brainstorm together what a scarecrow can look like, what positions they could do, more or less details, and create sketches up on the board. Give lots of examples!



Stress the importance of working through "mistakes" and having fun with an unexpected line. Draw a few different ones; some realistic, some silly, some animated, then talk with students how you could change the arms, the shape, the position that sort of thing. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.

Next look at the arms and what the scarecrow will wear. Dresses, overalls, jeans are all good choices. With younger students discuss patches and buttons and simpler shapes. With all students discuss background details. Have the younger kids take 10 minutes and sketch their scarecrow with a black oil pastel (no pencil!).

In the process of drawing on the white board, always incorporate mistakes. Always! Laugh at your “mistakes”, tell the kids to expect them and then show them how to turn mistakes into something else. It’s critical that you show your artistic side, no matter what you privately think of it, and inspire your students

Then have the kids get busy drawing their own scarecrows with an oil pastel, crayon, or a waterproof marker (though the way non-waterproof markers bleed when exposed to water can make some cool effects), etc. Once the drawing is complete, emphasize large shapes to younger students, set out a palette of watercolor paints.

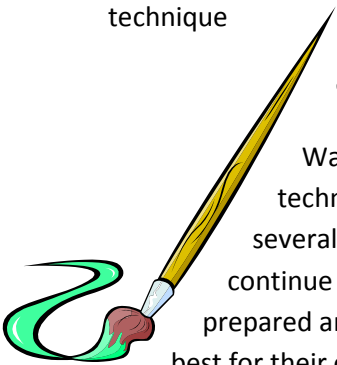
When they’re ready to paint, emphasize that when painting with watercolors you work from LIGHT to DARK, not dark to light. You build up colors, rather than put them on heavily first thing. It is much easier to add than subtract color, though that is possible with some water and a paper towel (see Techniques). Have students paint the background and its details first before adding details to the foreground. . If they paint the background first, they don't have to worry about accidentally painting the background colors into the main figure/subject's colors later on. Encourage the children to mix paints on their paper, not in paint palettes, and use the double-loading technique when you can. It produces very cool results and clean-up is much easier!



Watercolor Painting Techniques:

Watercolor is a hugely variable, flexible, and fun medium and there are many different techniques which students can use to add interest to their paintings. In the following are several varied techniques, which means children can build upon previous experiences and continue to learn new ways of working with the materials. Have examples of each technique prepared and then have students experiment and combine to see which technique they like best for their own art.

- *Oil Pastel/Wax Crayon Resist:* If they want their outlines of the robot to show through, oil pastel will repel the paint, create clear outlines, and allow the drawing to show through the paint. Note: Wax crayons can also work for this, but aren’t quite as clear, though they are also a lot less messy.



- *Drip Drop/Rubbery Effects:* Rubbing alcohol is delightfully unpredictable, like watercolor itself. If you have rubbing alcohol and cotton swabs, alcohol and watercolor don't mix well, but they make some amazing effects. Dipping a Q-tip into the alcohol have students proceed to tap and drip alcohol directly into the washes. As the alcohol hits the wash it repels the paint, pushing it away while leaving a lighter tint of the wash exposed. The results of their fight on the paper is strangely organic in nature and not achievable using any other technique.
- *Wet-On-Dry Technique:* First, students dilute their pain with water and placing it onto the dry paper. The color lies on solid without gradient (Gradient is blending of shades from light to dark or from one color to another). Encourage students to work with quick and spontaneous strokes. Remind them that if they want crisp edges, they must wait for the paint to dry before painting next to it! Otherwise, they are using the following technique.
- *Wet-On-Wet Technique:* Which is painting a wash of water (or paint), and then painting on top of that area while it's still wet with quick strokes. The result is a blended or blotchy and clouded effect with gradient.
- *Salty Stars:* Yep, you read right. It takes a bit of (fun) experimenting, but using salt on wet paint can result in some amazing and fun effects. On the sky have students sprinkle some salt and let it set for 2-3 minutes until the paint completely dries. The salt absorbs paint and moisture leaving a unique texture. wait until it is completely dry and brush off any remaining salt crystals before resuming painting. (They do not want to get salt on their paint brushes or transfer the salt back to their palette-- it will make all of their paint come out blotchy!)Voila, star filled space!
- *Depth:* To make a night sky even deeper and more dimensional have students use a less diluted blue or other color on top of the more diluted area already painted to bring the area to life, ex: make circular blotches around the stars, and blotches on some stars. The effect makes for a more celestial sky.
- *Erasing/Creating a Glow:* It's outdoors and you want things like windows, stars, or the Moon to glow. When first starting to use watercolors students always tend to resort to their white paint to create shine, or think they can't have shine without white paint. Don't do this. There is a better way. Applying diluted white paint can muddle colors, so use the erasing technique. SAMPLE: For a glowing moon students could paint a light wash of yellow on the moon, keeping it light to reflect the moon's brightness. But, as a moon, it must cast a glow. So, have students get their paper towel ready, and wet an inch and a half around its outside. They don't have to press hard, just brush some water on the paper. Then, have them take their paper towel and gently rub off the water which removes some blue paint to reveal the original yellow wash. Now, the moon glows. This also works if an area is too dark, erase = wetting down the spot and wiping excess paint away with a paper towel.

- *Spitter Spatter Splatter Paint:* using a brush loaded with color, run your fingers along the bristle to create large and small splatters.

Finalizing: Have students finish up their projects, practice additional techniques, and discover their own methods. If a student has extra time, and didn't use oil pastels, have them go the extra step and outline. It really makes the art piece pop. If you are doing a drawing in pencil and then decide to paint with watercolors, it's really hard to keep the contrast unless there is a dark line in there somewhere. On a fully dry painting use a sharpie waterproof black marker, oil pastel or even black paint and a small brush. It really makes a difference. And it doesn't always have to be black...they can try a blue or even a red.



Teacher Tip: Don't throw your liquid watercolors away. Use a dropper (think half-size turkey baster) to recycle any left over paint and store them in small condiment containers with plastic lids or baby food jars. This keeps the watercolors well. If a color, like yellow, gets too muddy, toss it, but mostly the colors stay true. This way you can go about a year and a half before you start to run out of basic colors like red, yellow and blue.

The Greek Fire Daily Paper: Siege Engine Ads

Come one, come all! Fire in the Hole!

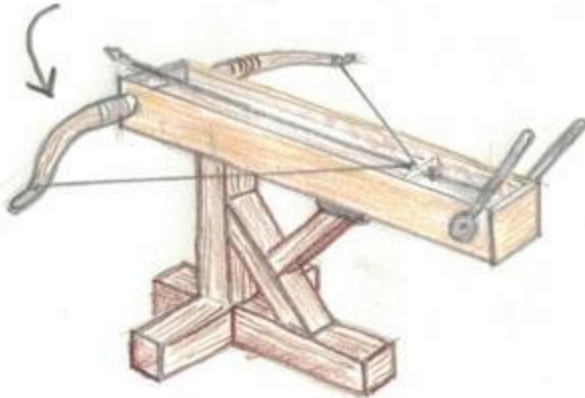
Source Unit: F-tWaNg!! ThW-uMP!!



Have students decide on their favorite kind of catapult (their own design, regular catapult, trebuchet, onager, or oxybeles) and design a poster advertising it. Have them think about why they believe that design (or their own design) is better, what it can do/throw, how far, etc. Their goal will be to convince an investor to invest in their invention **and diagram how their siege engine uses force and kinetic and potential energy**. Why is their design superior? What features in their design will lead to a successful siege? Students can use the included directions and guides by Will Kalif of Storm the Castle to help draw their siege engine ads.

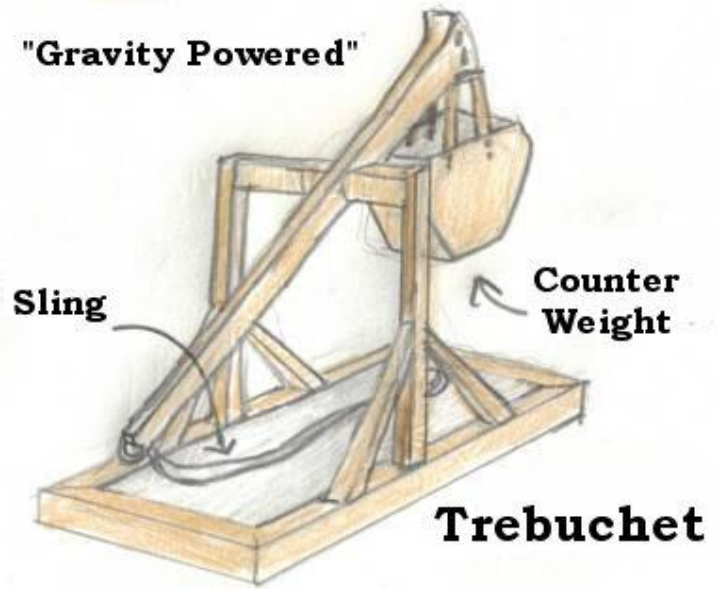


Flexion powered



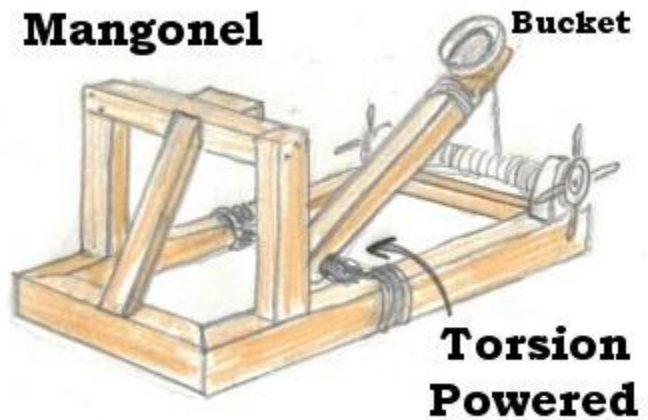
Oxybeles

"Gravity Powered"



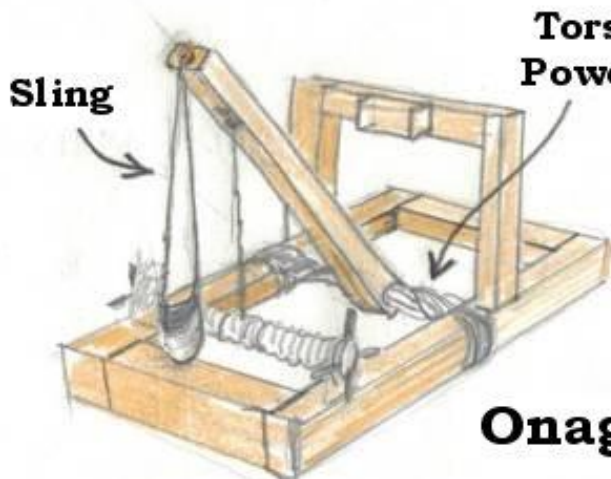
Trebuchet

Mangonel



Torsion Powered

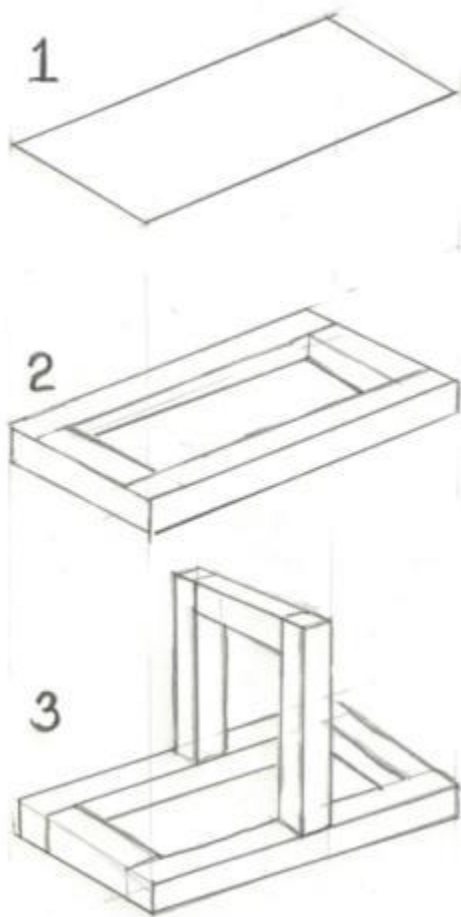
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Onager

How to Draw a Catapult

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Catapults are typically very rectangular machines.

This group of drawings will show you how to make a drawing of a catapult. You start out (1) with a parallelogram. This will be the base, the bottom, of your catapult.

Then, start drawing the timbers/boards of the catapult (2) It starts to take on a three dimensional shape, meaning it looks like it sticks up off of the paper.

Now continue to build the structure of your catapult as shown in (3).

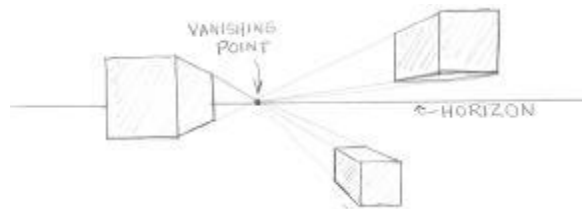
An important thing to think about is that the catapult is made up of a lot of parallel lines (lines that are the same distance apart and never touch, like the sides of a ladder.) These lines tend to get just a little bit narrower/thinner the farther away from the viewer they are. So you draw the board that's farther away just a little bit thinner than the board that's close to you. And the structure gets a little bit smaller the farther away from the viewer it is. This is called using perspective and vanishing point.

Practice drawing some different siege engines using the different ones on the other page for inspiration. If you really want to get some good practice you can take a good look at one of the catapults for a couple of minutes then looking away and trying to draw it from memory.

Vanishing Point

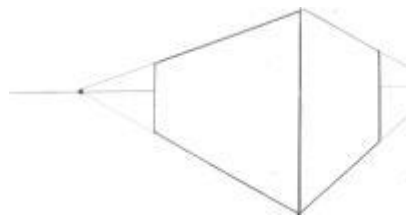
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The first and most important thing about perspective is understanding what is the vanishing point of a drawing. The vanishing point is the point on the horizon (eye-level) where everything disappears into. Below here is an example of a vanishing point. The cubes, one on the horizon, one below the horizon and one above the horizon all point toward and fall in line with the vanishing point.



This usage of the vanishing point sets the object firmly in place and makes them three dimensional in a way that looks good to your eye. It is always a good idea look at your drawings and decide where the vanishing point is and draw light lines to it in order to guide you into drawing the objects with a correct looking perspective.

Multiple Vanishing Points - Not all drawings have just one vanishing point. They can have two or even many more vanishing points. It depends on what you are drawing, how complicated it is and where you, the artist, are looking at things from. Here is an example of a simple drawing with two vanishing points.



Using two vanishing points sets this rectangle firmly on the ground. It looks very solid and it looks correct to your eye. Let's take a look at an actual drawing that uses two vanishing points. This is a



sketch of a block in a medieval renaissance type of town.

See how everything fades off directly to the two vanishing points? This gives a proper sense of depth. You almost feel like you could walk along the buildings off into the distance.

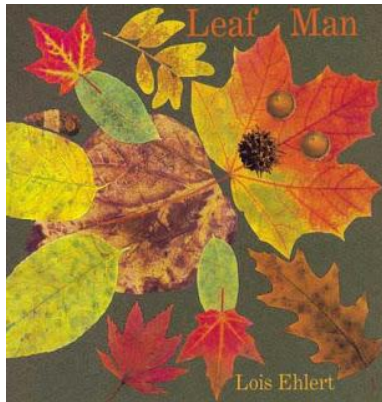
Perspective may seem to be a challenge at first, but all it takes is a ruler and some practice doing some perspective drawings with one, two or more vanishing points. Do some common objects in all shapes and sizes. Try small objects like a laptop computer or a stapler then do some larger objects like cars and a refrigerator. Then finally draw some large objects and some scenes like the buildings in the medieval picture shown here.

Branching Out With Art

Source Unit: Falling for Leaves

Read Leaf Man or another book about fall leaves and inspire your students to make some wonderful creations!

Fall has come, the wind is gusting, and Leaf Man is on the move. Is he drifting east, over the marsh and ducks and geese? Or is he heading west, above the orchards, prairie meadows, and spotted cows? No



one's quite sure, but this much is certain: A Leaf Man's got to go where the wind blows.

Leaf Man is a fantastic book by Lois Ehlert where the leaves transform into people, birds, fish, vegetables, trees, and more.

Image Credit: Butterfly leaves image and idea from Art Projects for Kids at www.artprojectsforkids.org/2008/10/fall-leaf-...

Materials:

- Lots of different leaves in varying colors
- Sheet of white or black paper
- Glue
- Pencils
- Books for inspiration

Directions:





foul
the project

If you are so fortunate as to live near some fall foliage, you can take the real thing to a color copier and make lots of prints of multiple leaves. If you live nowhere near any color-changing trees, you can go to www.gettyone.com or Google or Clip Art and search for "leaves, close-up". On GettyOne download the preview images, which are free, and print out on a color printer. If you use photo paper the color seems to be about 10 times brighter but it is more expensive, especially for bulk projects.

Tips: If using copied leaves, young students can cut out the leaves leaving about an 1/8" of white around the outside. The reason is that intricate leaf shapes can be tricky to cut right on the edge, but because the

background will be white, the excess paper will blend in. Older students can be more precise and cut out the leaf exactly.

First, gather leaves. Gather a variety in different colors. We try to pick leaves that have already fallen to the ground. Next, decide what type of animal you want to make and begin assembling the leaves on a white sheet of paper. This may take some experimentation. Try not to alter the shapes of the leaves – work with what you have. Creating leaf illustrations is like assembling a puzzle.

Options: Experiencing the real thing is always best for students. But in case of weather or other prohibitive factors here are a few ideas to help you continue and to make dozens of flat, easy-to-cut and glue leaves.



To make butterflies: The leaves are then to be cut in half right down the middle, along the spine. The two sides are then glued down with a little space left in between. A body and antennae are cut from scraps pieces, or from leftover stems.

Leafy Beans



Source Unit: Falling for Leaves

This project is a great way to celebrate the origins of leaves. Read a book such as *Leaf* by Stephen Michael King (When a little boy runs in a panic from a haircut, a bird sees to it that his luxuriously follicated head is put to good use and drops a single seed right on top. Time passes, and wait...could it be? Something grows. A leaf! . . .)

Materials:

- Pencil
- Canvas boards/cardboard squares
- Small paintbrush
- Craft glue
- Dried beans (ex. Lentils, kidney, white beans, peas, etc)
- Ruler



Directions:

1. Have students start by drawing a pattern in pencil on their cardboard. Have students create a fallen leaf pattern, flying leaves, leaves and pinecones, etc (other options are geometric designs, a still life, or even a portrait in dried beans) – have them think of it as a color-by-numbers painting. Have students arrange leaves on the canvas in a way that looks good to them, then trace shapes with a pencil,

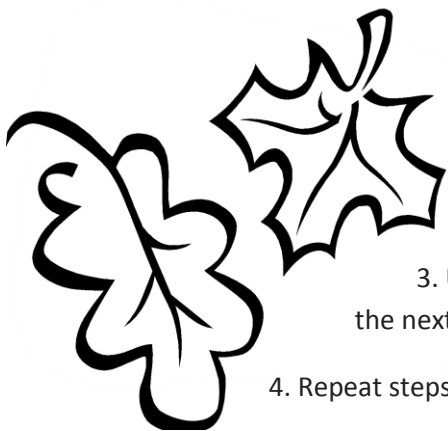
maintaining design. Remove the cutouts and set the cardboard aside.

2. "Paint" a thin layer of glue in one area of your pattern, and sprinkle the area with colorful beans. Use a single color in each area.

3. Use the ruler to tidy up the edges of the beans before moving on to the next area.

4. Repeat steps 1 through 3 until the board is covered. Let dry for 1 hour.

Tip: Be sure to give the beans a good layer of glue over the top. This will keep bugs away.



Colored Sand Collage

Source Unit: *That's Rubbish*

Worms may turn dirt and sand into a nearly magical fertilizer, but for people, this humble grit transforms into a magical art supply. Using salt shakers for the sand makes it easy to control and refill, and with just a bit of tape stuck to the lid, you can control the speed of the granules coming out of the bottle. *Label the bottles with the names of the colors to help your youngest students practice identifying the color words.* If working with larger groups it may be simpler to just pour the sand into bowls and let the kids take pinches of sand and sprinkle it where they want. It works just as well, if not better.

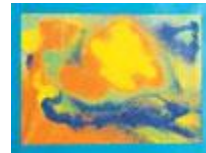


Materials

- Scissors
- Colored card stock or construction paper
- White and clear Con-Tact paper
- Colored sand (available at craft stores and large chains)
- Salt shakers (ex. available at a dollar store for \$1 per pair) or other empty containers like bowls
- Tape

Instructions

1. Have students use scissors to create a frame by cutting out the center of the card stock, leaving a 1-inch border.
2. Next, have them trim the Con-Tact paper so that it's slightly smaller than the frame, then set the Con-Tact paper face down and peel off the backing. Carefully lay the frame over the sticky surface and press it in place.
3. Pour the sand into the salt shakers, then put on the lids and cover some of the holes with tape. Give your student the bottles and let him pour the sand over the sticky surface -- one color at a time.
4. Have students dump off the extra sand as they fills the space, conserving colors, ex. pouring it back into the bowl.



5. When they're done, they can set a piece of clear Con-Tact paper over the front to help preserve the design.

Variation: Mandalas, the world in a grain of sand

An updated version of an ancient skill. You may wish to get a book of mandala designs to inspire students.

Millions of grains of sand are painstakingly laid into place on a flat platform over a period of days or weeks, creating an overwhelmingly beautiful painting. In ancient times powdered precious and semi precious gems were also used. When finished, to symbolize the impermanence of all that exists, traditionally the colored sands are swept up and poured into a nearby river or stream where they believe the waters carry them throughout the world to help heal it.

Buddhist Monks first created this amazing style of art by carefully placing grains of different colored sand on the ground in patterns. Once you place sand on the ground, it's very difficult to pick up and take home with you! So instead, have students create symmetrical designs on cardstock and use glue to help keep the sand in place. Once students spread their glue in a pattern, the next step is to sprinkle different colored sand onto the picture. Let it dry and then they're done!



Recyclart: Any old thing will do?

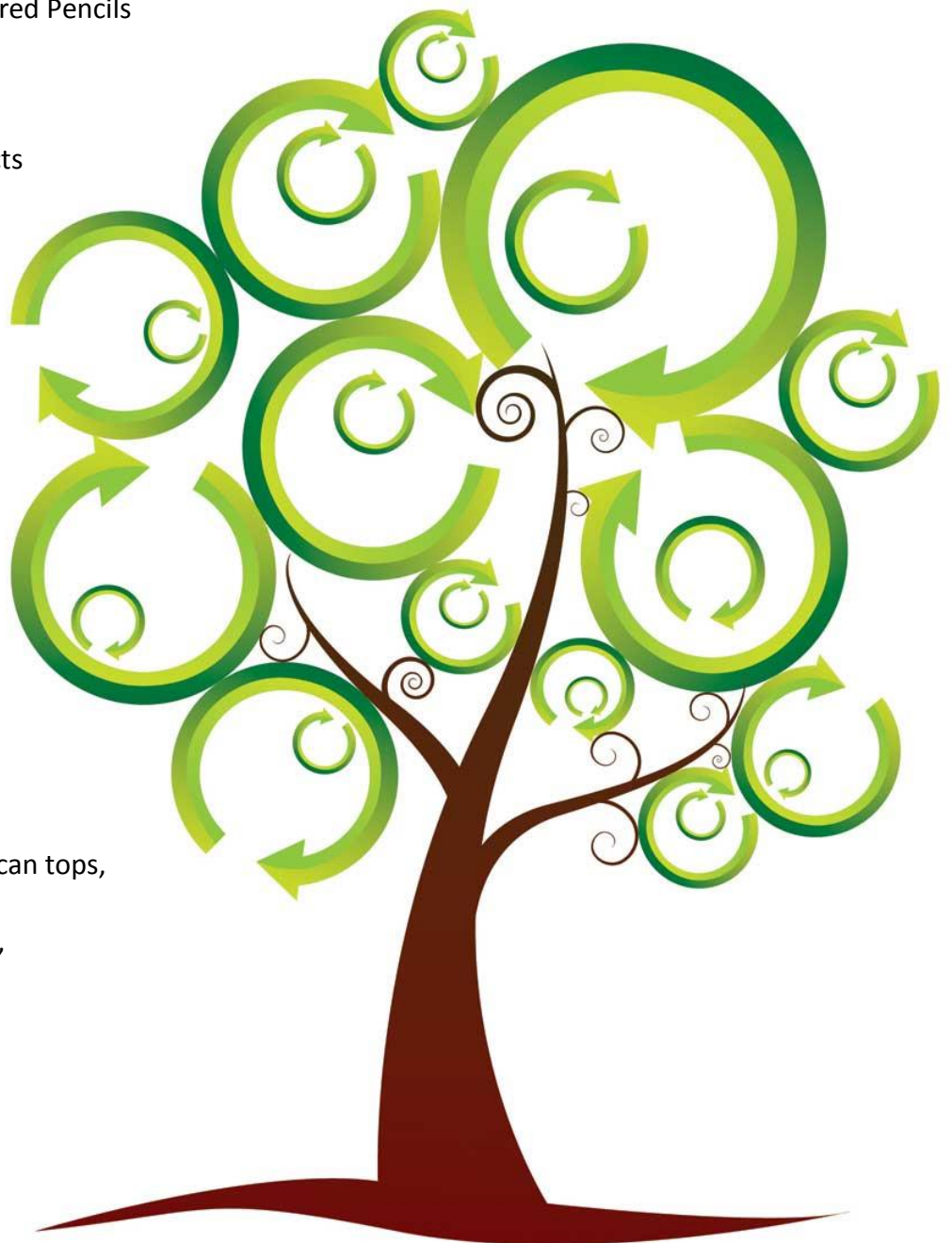
Source Unit: Piling Up!

Materials:

- Glue
- Scissors
- Tape
- Recyclables
- Paper
- Markers/Crayons/Colored Pencils
- Pen & Ink
- Imagination

Recycling and reusing objects normally destined for the landfill has always been a creative process, but in the hands of an imaginative artist, the practice can result in masterpieces superior to works crafted of more traditional mediums. The most unassuming trash-bin or cluttered drawer, with a little imagination, can be turned into an artist's palette. Art can be made using:

- buttons,
- toys,
- plastic forks,
- concentrated juice can tops,
- soda can tabs,
- plastic fruit baskets,
- 6 pack soda rings,
- beads
- magnets,
- old toys,
- tin cans,



- egg cartons,
- fabric
- newspapers,
- old lunch bags,
- paper plates or recycled card stock,
- cereal boxes
- toilet paper rolls,
- menus,
- junk mail,
- greetings cards,
- advertising brochures,
- twist ties,
- oatmeal containers
- Berry baskets
- Baby food jars
- Plastic soda bottles
- Tuna cans (no sharp edges)
- glossy junk mail,
- gum/candy wrappers
- calendars,



All American Girl
 Main Recycled Materials: Tax Forms and Political Junk Mail
 Artist: Sandhi Schimmel Gold

- old cassette tapes,
- fruit and vegetable net bags (great for creating texture),
- paper towel rolls
- and/or nearly anything else students can get their hands on, as long as it is something that was headed to the trash can or recycling bin.

[Make sure to check the items so that they are clean and safe for the children to use.]

If we all look closely enough at all the material clutter of our lives, who knows what sort of possibilities will emerge? Wild and wonderful



project ideas jump out at students from deep within recycle bins and throwaway boxes, everything from murals to jewelry. We have to teach students to see things in a different way, and practice the art of “upcycling”, or literally turning everyday trash into creative treasures and the results are worth it!

Ideas & Inspiration:

From Roots to Wings & Leaves of Glass

Help kids create a tree made of recycled wire, paper, plastics and other recycled material, including birds and other creatures, out of all recycled materials for display and to teach other students about recycling. For inspiration go to: <http://vimeo.com/5956108> &

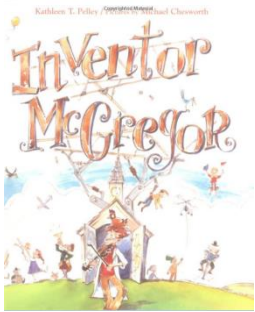


<http://www.youtube.com/watch?v=rJStBTESCTI>

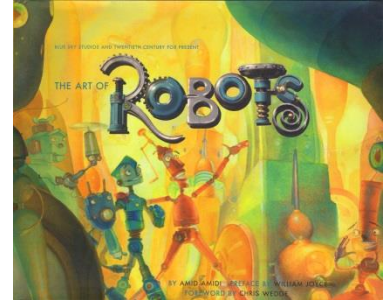
Remember: With children who have allergies to all sorts of things including eggs or peanuts be careful of what kinds of materials you bring in.

WHIM-AGINATION

Source Unit: Robots Unit One: Weeks One & Two

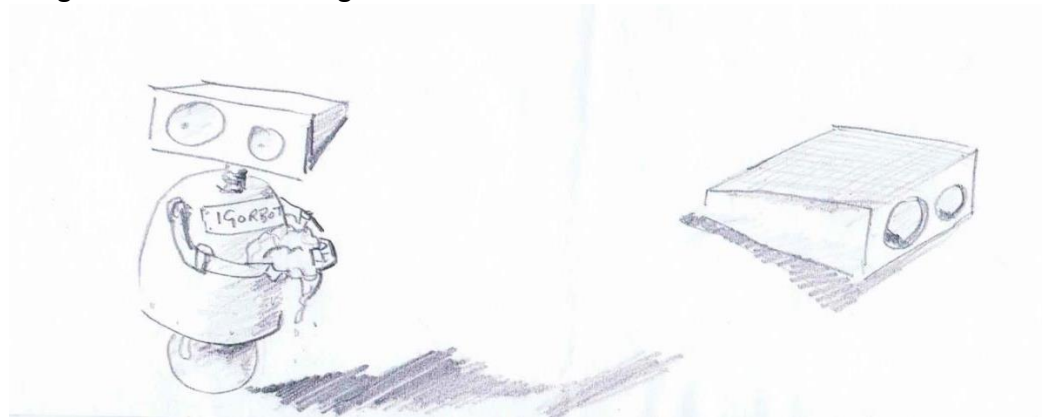
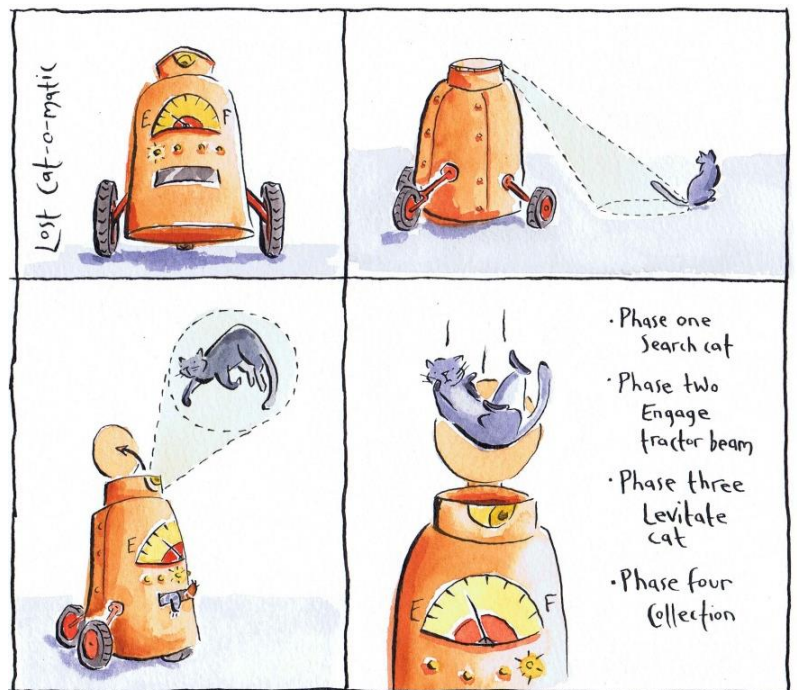


For a fun introduction to finding inspiration read a book such as *Inventor McGreggor* by Kathleen T. Pelley and/or look at the images from *The Art of Robots* by Amid Amidi or *50 Robots to Draw and Paint*. So if you could create a robot to do anything, anything at all, what would your robot do? According to Drawsome Illustrations [<http://drawsome.co.uk/tag/robot/>] we tend to have robots working their way more and



more into our lives. Soon, we will have robots for every imaginable whim, perhaps even searching out lost cats...

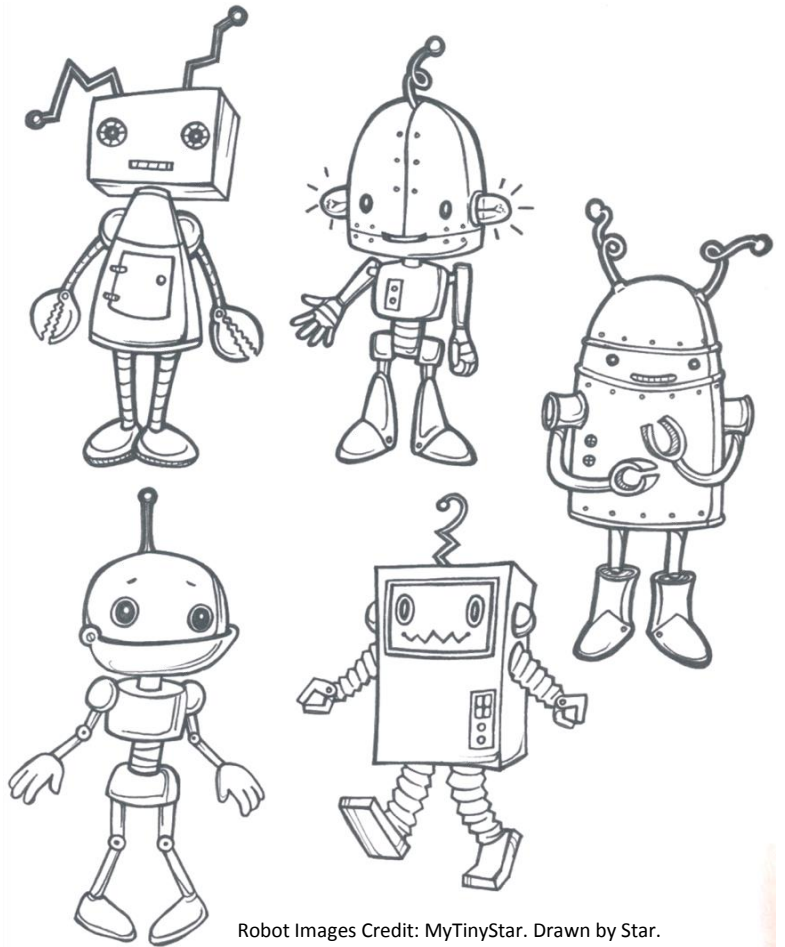
“The Lost Cat-o-matic is fed an image of your lost cat, it then heads out into the wild urban jungle to track down accidentally homeless kitties. Once a lost cat is found, the robot will collect the cat via the scientific gift of a powerful tractor beam. Once a cat (or cats, depending on how successful a trip out is) has been found, it will be returned to its rightful owner.” Look around the room, look around your mind...perhaps you might find inspiration of some kind! Like take pencil sharpener and make it into a robot (as Drawsome did)! The joy of imagination! Here is the Igorbot.



“Igorbot is the robot dogsbody of an evil scientist, sent to fetch brains, cups of tea and tend to the various experiments. He takes his job seriously but has a secret love of cupcakes (which unfortunately don’t fit in with his evil job description).”

A fun way to introduce this section is with, Frank n Stan by M.P. Robertson. All successful watercolor projects begin with a great drawing and robots are great fun to draw and paint.

Have students think of something they’d like their robot to do (ex. solve some sort of issue from loneliness to moon landings) and what it would need (ex. what kinds of attachments, etc) to be able to do those things.



Robot Images Credit: MyTinyStar. Drawn by Star. <http://blog.mytinystar.com/2010/06/robots-hims-and-hers.html>. Copyright 2012. All Rights Reserved.

Image Credit: Robot and Log. ©2010 Justin Hillgrove and Imps and Monsters. All Rights Reserved. All works on the Imps and Monsters Website are the original creations of Justin Hillgrove. Visit the artist at www.impsandmonsters.com or www.justinhillgrove.com



Optionally, start with a directed line drawing of a robot. It’s important to note that even though you may use, “directed line drawing”, it’s rare that you want to give your students just one option, most of the time you’ll end up with many drawings on the white board (like the variations above). Look at pictures, books, and brainstorm together what a robot can look like, and create sketches up on the board. Give lots of examples! Encourage the children to think about what elements a robot may have.

Brainstorm lots of fun ideas and as the children call out things like rivets, wires, solar panels, draw these things on the board. Demonstrate various ways to draw robots using pictures, books and drawings as guides. Stress the importance of working through “mistakes” and having fun with an unexpected line. Draw a few different ones; some realistic, some silly, some animated, then talk with students how you could change the wings, the shape, that sort of thing. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.

In the process of drawing on the white board, always incorporate mistakes. Always! Laugh at your “mistakes”, tell the kids to expect them and then show them how to turn mistakes into something else. It’s critical that you show your artistic side, no matter what you privately think of it, and inspire your students

Then have the kids get busy drawing their own robots with an oil pastel, crayon, or a waterproof marker (though the way non-waterproof markers bleed when exposed to water can make some cool effects), etc. Once the drawing is complete, emphasize large shapes, set out a palette of watercolor paints.

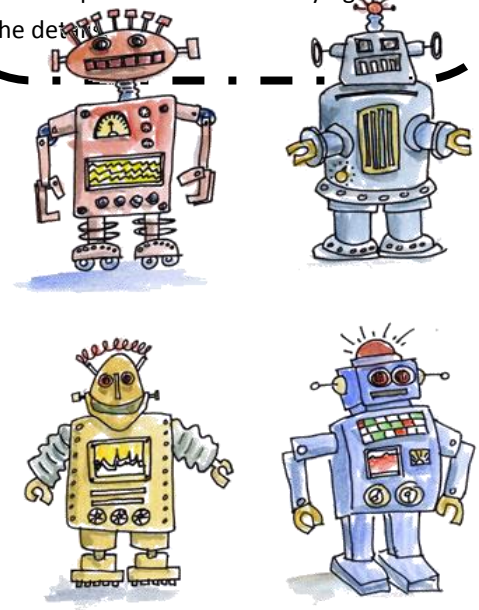
Watercolor Painting Techniques:

- *Drip Drop*: Rubbing alcohol is delightfully unpredictable, like watercolor itself. If you have rubbing alcohol and cotton swabs, alcohol and watercolor don't mix well, but they make some some amazing effects. Dipping a Q-tip into the alcohol have students proceed to tap and drip alcohol directly into the washes. As the alcohol hits the wash it repels the paint, pushing it away while leaving a lighter tint of the wash exposed. The results of their fight on the paper is strangely organic in nature and not achievable using any other technique.
- When they're ready to paint, have students paint the background and its details first and spend some time making the colors ooze and blend together on the page.
- If they used oil pastels or wax crayons, students don't need to avoid painting near or on the outlines, as the watercolor paint will bead off the oil pastel/crayon. Encourage the children to mix paints on their paper, not in paint palettes, and use the double-loading technique when you can. It produces very cool results and clean-up is much easier!

Teacher Tip!

Ban pencils and erasers.

Sounds harsh, right? It's not being mean, the reason is purely practical: small pencil leads encourage small drawings. If a kinder is drawing a robot and then is required to paint that very robot, using a pencil will surely lead to frustration. It's hard to paint teeny tiny eyes! There is another reason: pencil markings can be erased, which leads to second guessing, which leads to lots of eraser action, which leads to class being over before the child has anything on his paper. Using oil pastels, crayons, and/or waterproof markers allows the artist to move quickly, commit to the drawing and forgive their “mistakes”. This is a big and very important part of creating art; giving into the process and not worrying about the details.



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- *Wet-On-Dry Technique:* First, students dilute their paint with water and place it onto the dry paper. The color lies on solid **without** gradient (Gradient is blending of shades from light to dark or from one color to another). Encourage students to work with quick and spontaneous strokes. Remind them that if they want crisp edges, they must wait for the paint to dry before painting next to it! Otherwise, they are using the following technique.
- *Wet-On-Wet Technique:* Which is painting a wash of water (or paint), and then painting on top of that area while it's still wet with quick strokes. The result is a blended or blotchy and clouded effect with gradient.
- *Oil Pastel/Wax Crayon Resist:* If they want their outlines of the robot to show through, oil pastel will repel the paint, create clear outlines, and allow the drawing to show through the paint. Note: Wax crayons can also work for this, but aren't quite as clear, though they are also a lot less messy.



Plastic wrap (shattered/broken mirror effect)

Generously add watercolor paint to paper using a basic technique, such as wet-in-wet, first. Then,

press crunched-up plastic wrap over the top and leave it to dry. The watercolors will pool under the plastic wrap texture and dry there, creating an interesting, textured look. The effect always gives surprises and is startlingly beautiful to look at. Tissue paper will give a similar effect. *(Image via www.watercolorpainting.com. All Rights Reserved.)*



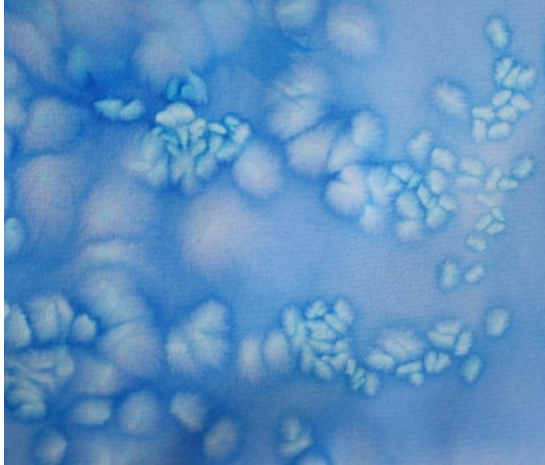
Doily stencil (beautiful lace pattern)

Carefully paint over the lacey part of a paper doily. Be careful not to use too much water or the paint will spread under the doily's surface. Repeat until desired space is filled.



Rice (smooth blobs of absorbed color)

Paint paper as usual (use other techniques like a graded wash to create a more interesting effect). Paper should be very wet with paint before sprinkling dry rice over paper surface. Let dry overnight. *(Image via fairydustteaching.com All Rights Reserved.)*

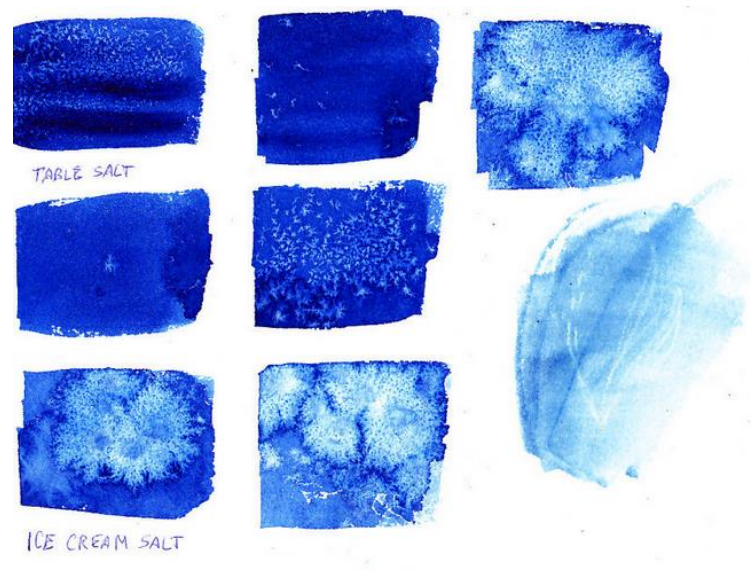


Glue and salt (rough, textured outline)

Begin by drawing with white school glue. Pour small amounts of salt over glue outline. Carefully touch watercolor brush onto glue and salt line. Color will bleed with glue and salt. Let dry at least overnight. Variation (that's less likely to get salt in your paints): Drizzle (or glob) school glue onto a still wet painting. When the glue dries clear, it appears to have removed the paint leaving ghosted lines on the paper. The effect is magical. *(Image via gloster.com. All Rights Reserved.)*



Another Teacher Tip: Don't throw your liquid watercolors away. Use a dropper (think half-size turkey baster) to recycle any left over paint and store them in small condiment containers with plastic lids or baby food jars. This keeps the watercolors well. If a color, like yellow, gets too muddy, toss it, but mostly the colors stay true. This way you can go about a year and a half before you start to run out of basic colors like red, yellow and blue.

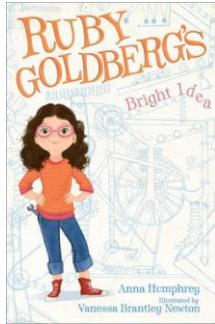


Effects of different kinds of salt via www.wetcanvas.com. All Rights Reserved.

THAT'S SO RUBE OF YOU

Source Unit: Robots Part One: Weeks One & Two

that we know about simple machines, let's combine a few into something new, a complex machine (several simple machines working together)! For inspiration in building Rube Goldberg style machines find some interesting and fun videos such as:



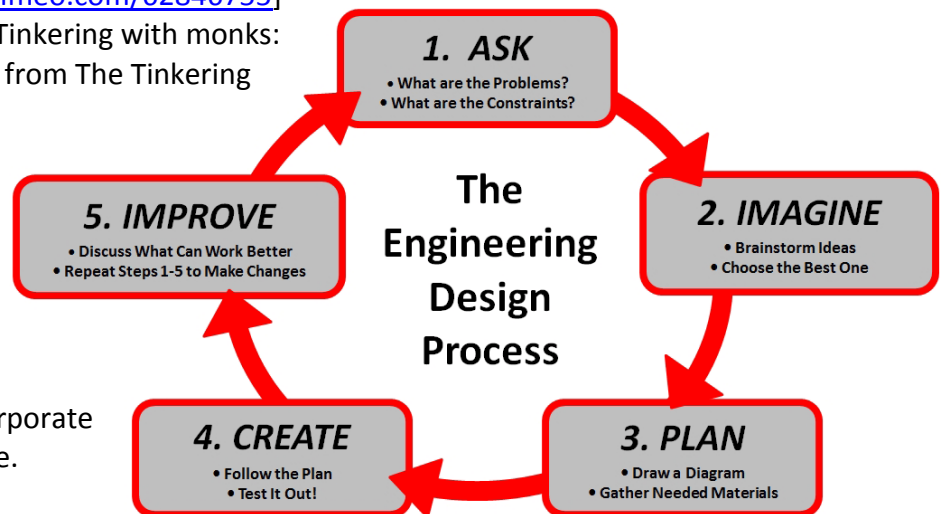
Isaac Newton vs. Rube Goldberg <https://vimeo.com/54913096> or Nat Geo's giant 4 ton machine <http://www.wimp.com/videos/epicgiant/> (a massive machine with 38 triggers and 71 moving pieces, including a few staff members themselves and a car) and you may want to have students explore books such as *The Best of Rube Goldberg* by Reuben Lucius Goldberg or *Ruby Goldberg's Bright Idea* by Anna Humphrey.

Get students' creative juices flowing by having them watch clips from the following and seeing how and what others used to make their Rube Goldberg Inspired Machines:

- Rube Goldberg TV <https://www.youtube.com/user/RubeGoldbergTV>
- Sesame Street: Rube Goldberg Machines (which also does an excellent job of reinforcing concepts about simple machines and how they can all work together.)
<https://www.youtube.com/watch?v=pMpmi5YMcg>
- 75 Rube Goldberg Ideas & Inventions <https://www.youtube.com/watch?v=6FzUx2EFk8s>
[This video is split up into 3 sets of 25 ideas by 3 different youtubers. These short screen linked clips can help you with school projects or making your own chain reaction. This video is intended to help individuals obtain ideas and/or inspiration for building their own Rube Goldberg Machine. It is not meant to look like one actual machine. It is simply screenlinked to give more flow and continuity to the video.]
- Find videos and images at <http://rubegoldberg.com/>, such as [A-Trak & Tommy Trash - Tuna Melt](#) [also at <https://vimeo.com/62846755>] and Tinkering with Monks [Tinkering with monks: Chain Reaction Contraption from The Tinkering Studio on Vimeo.

Give students the challenge for the contest! Discuss the Engineering Design Process and how it relates to this project and draw a diagram of the process up on the board.

Constraint: The machine must incorporate all six simple machines at least once.



Have students sketch their machine before building it. It can help each group choose the right materials and assemble a mechanism that works.

Don't wait until the end to test! Have students test and retest elements of their designs to make sure they work before they have built the whole thing. Take notes on which parts of the machine work and which ones do not. Does it achieve the task? If something doesn't work, what can you do to make it work next time?

Remember, the design process is cyclical, meaning that engineers repeat the steps as many times as needed, making improvements along the way.

By making observations about the ways in which objects and simple machines behave in relationship to one another, new designs can be realized, constructed, and immediately tested. And, seeing common objects such as motors, ramps, toy parts, and kitchen utensils behave in surprising ways leads to unexpected experiments with, and new tests of these things. [Ex. Watch <https://www.youtube.com/watch?v=kOB1hgP1tIE> Pythagoras Switch - Japanese Rube Goldberg machine]

Chain reaction is an intuitively simple concept, but one that allows for an incredibly complex and deep investigation into something we experience every day: the relationship between cause and effect.

Testing Your Machine:

1. Once the machine is complete, test it to see if it works.
2. Take notes on which parts of the machine work and which ones do not. Does it achieve the task? If something doesn't work, what can you do to make it work next time?

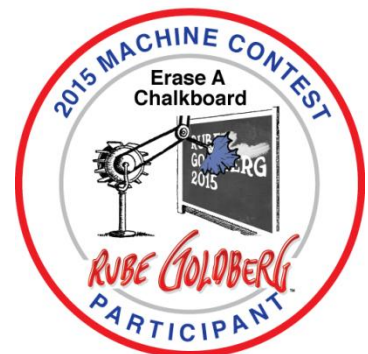
Option: For mid to older level students, require that their Rube Goldberg machine incorporate all six simple machines.

Option: Large Scale Chain Reactions (Large-scale chain reactions allow for collaborative building and provide an opportunity for a dramatic conclusion.) Chain reaction can be done as a collective contraption: each participant/group is given a chunk of real estate on a table onto which to build a sequence of events. The only constraint is that it has to set off the contraption built by the next group: in the end this will result in a continuous chain reaction that goes from start to finish seamlessly, each section having been contributed by a different participant/group.

Did You Know?

The Rube Goldberg Machine Contest (RGMC) is an annual international competition that challenges teams of students from middle school to college age to compete in building the most elaborate and hilarious Rube Goldberg Machine.

Dating back over 60 years, the contest's namesake is the late American Pulitzer Prize-winning cartoonist, humorist and inventor,



Reuben Lucius Goldberg, who specialized in drawing whimsical machines with every-day objects that performed a seemingly simple task.

Goldberg's legacy lives on through the contests -- as students nationwide build crazy machines that complete the annual task, all in the spirit of Rube's illustrations.

For example: the 2015 Task is: ERASE A CHALKBOARD.

Teams and their machines are judged on a range of criteria from absurd complexity, reliability, team chemistry, creativity, humor and story-telling -- along with the successful achievement of the task at hand.

Past Contests have included such challenges as:

2014 Zip A Zipper

2013 Hammer A Nail

2012 Inflate A Balloon and Pop It!

2011 Watering A Plant

2010 Dispense an Appropriate Amount of Hand Sanitizer into a Hand

2009 Replace an Incandescent Light Bulb with a More Energy Efficient Light Emitting Design

2008 Assemble a Hamburger

2007 Squeeze the Juice from an Orange

2006 Shred 5 Sheets of Paper

2005 Change Batteries and Turn on a 2-battery Flashlight

2004 Select, Mark and Cast an Election Ballot

2003 Select, Crush and Recycle and Empty Soft Drink Can

2002 Select, Raise and Wave a U.S. Flag

2001 Select, Clean and Peel an Apple

2000 Fill and Seal a Time Capsule with 20th Century Inventions

1999 Set a Golf Tee and Tee Up a Golf Ball

1998 Shut Off An Alarm Clock

1997 Insert and Then Play a CD Disc

1996 Put Coins in a Bank

1995 Turn on a Radio

1994 Make Cup of Coffee

1993 Screw a Light Bulb into a Socket

1992 Unlock a Combination Padlock

1991 Toast a Slice of Bread

1990 Put the Lid on a Ball Jar

1989 Sharpen a Pencil

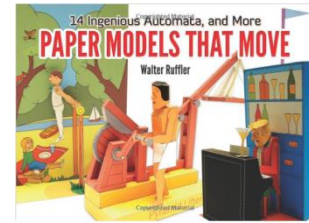
1988 Adhere a Stamp to a Letter

1987 Put Toothpaste on a Toothbrush

CARDBOARD AUTOMATA

Source Unit: Robots Part Two [Week Three]

For inspiration it may be helpful to look at and explore Karakuri and Automata books such as: *Making Simple Automata* by Robert Race, *Paper Models That Move: 14 Ingenious Automata, and More* by Walter Ruffler



An in-depth and fantastic resource is: *How To Design and Make Automata* by Robert Addams
<http://www.smithstudents.com/New Archive MAKE files/How to make automata.pdf>

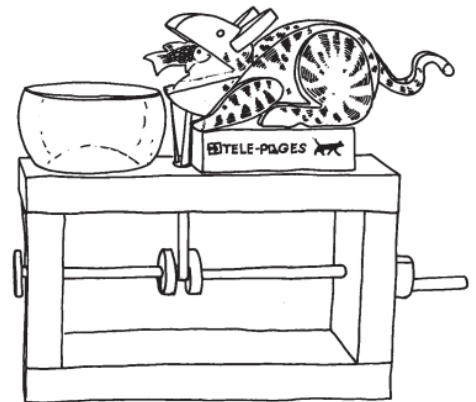
Activity instructions and images via: *Things to Try:*

Cardboard Automata PIE Institute:

www.exploratorium.edu/PIE This material is based on work supported by the National Science Foundation under Grant No. ESI-04-52567.



Automata, or kinetic sculpture, is quite simply art and science that moves. Even the most complicated seeming ones are actually made up of very straightforward bits and pieces.



To get, and give students a view behind the scenes of creating automata, have them watch: *Making the Don Quixote Automaton* with Keith Newstead -- Smart TV at <https://www.youtube.com/watch?v=mnb9vPOf-0k>

Cardboard Automata are a playful way to explore simple machine elements such as cams, levers, and linkages, while creating a mechanical sculpture. This activity was inspired by

the Cabaret Mechanical Theatre, a group of automata builders based in England. Artists like Paul Spooner, Keith Newstead, and Carlos Zapata build beautiful narrative pieces using elegant mechanisms based on cams, gears, springs, and linkages. Working with simple materials, this activity is easy to get started, and may become as complex as your students' mechanical sculpture ideas. And as they tinker, they can learn (and actually see) just how many different solutions there are for the same problem as they build a physical representation of their line of thought and inquiry.

TIME TO TINKER

Tips and Suggestions:

*This activity was developed by staff at the Exploratorium and they have continued to 'tinker,' and come up with new designs and examples of how to create motion, changed some of the "common" motion models and added some new ideas to the mix. Each new example is directly the result of them spending time on the floor facilitating the activity. It is **highly** recommended you go to <http://tinkering.exploratorium.edu/2014/08/20/automata-examples> to see further examples.*

In order to work well, not only has the box to be sturdy and fairly square, but the axles on which the cams and followers are inserted need to be centered and at right angles with each other, and some helpful tips have been included.

Pay attention to the size of the boxes. Experiment on your own to find a size that works well with the rest of the materials, and you might want to keep the size between boxes fairly consistent. If you can get 6"x6" boxes, cut off the flaps to make other parts, and slice each flat box in half; this way, you get two automata for each box.

Another crucial component is the "foamie", foam sheet material has just the right amount of friction and rigidity to work very well as both a cam and a follower, yet is easy to cut and shape with just scissors or exacto knives. They come in thin and thick varieties, and you will want, if you can, to get both: the thick ones you'll use for the cams, and the thin ones as decoration materials.

With Cardboard Automata, providing clear and easy to follow examples of different types of motion is crucial; you might want to set up [five] different examples, made with the same materials that you will provide to the students, that move:

- round and round
- up and down, and around
- up and down, back and forth
- straight up and down
- side to side

Try to demonstrate the motions in a way that is clear and easy to understand but doesn't give visitors direct instructions on how to build and leaves the activity open to new ideas and personal challenges. Encourage students to try out all the different examples, get a feel for the motion, and then chose one to build. The first three are easier to build, and accomplish a remarkable range of motion with minimal variations in cam placement and setup, and therefore can be combined in a more elaborate automaton. The last two are more complicated to build.



In addition, if possible, it's very helpful to have a small selection of examples of completed automata, that span the range of complexity and "achievability" from completely achievable with the materials provided and within the time frame and skill level of the participants, to more ambitious and meant to serve as inspiration more than as a model to follow. So play around with the activity ahead of time, and keep the more inspiring fruits of your labors as examples; as you do this activity

with kids, you might want to be on the lookout for particularly inspiring products, and ask the kids if you can keep them to let other people learn and be inspired from their example.

By building automata yourselves, you will encounter most of the frustrating points that students are likely to run into, and will know how to get them unstuck without giving them a pre-packaged answer to the problem in front of them. Pay particular attention to little tips and tricks like: using little foam bushings at the end of axles to keep the skewer from sliding out; adding weights to the cam follower to ensure a smooth motion; the perfect length of straw that will keep the vertical axle in place while still allowing for the full range of motion of the automata; ways of drawing perfect circles other than using a compass, like tracing round objects of various sizes that you might have around (yogurt cups, the inside and outside of masking tape rolls, etc.)



Once you have the "technical" side of construction down, you will probably find that quite often the most difficult thing to facilitate is the transition between the problem-solving oriented mindset involved in construction, and the creative and expressive mindset required for the next phase: what to make this automata do!

Here, a good selection of materials will prove very valuable: try to shy away from materials that are purely decorative – like crayons, markers, glitter, etc. – because they often end up disengaging kids from the construction aspect of the activity and plunge them into pre-existing play patterns like doodling, coloring, etc. Nothing wrong with that, but the value of this activity is in constructing a physical solution and expression to an idea you have in mind, and so keep your materials palette limited to things that you have to "do something to" in order to use them.

The first thing you'll want is a funny idea.

What makes an automata "good" is very subjective. We all like different things and we don't all find the same thing funny. As the saying goes "You can't please all of the people all of the time." So where do you start. The check list below gives some simple suggestions against which to test your ideas.

- 1) Is it visually exciting?
- 2) Is it funny?
- 3) Will it intrigue the viewer?
- 4) Will it hold the viewers attention for at least a minute?
- 5) Is it too complex?
- 6) Is the humor too obscure?
- 7) Will I enjoy making it?



This is just a general check list and is by no means a full proof system for producing the perfect automata, but it does help to weed out good ideas from the bad. As a general rule at the start, it may be a good idea to encourage students to base ideas on something that they are interested in such as a sport, a hobby, etc. Animals can provide a wonderful subject on which to base a theme for an automata.

As with any creative process, coming up with the idea is often the hardest part of the whole process. You may on the other hand be lucky and be brimming with ideas. But it's probable fair to say that most people have to work hard at the inspirational or ideas stage.

TRY IT! Collect these things:

- Cardboard boxes 15x15cm (6"x6")
- Scissors
- masking tape
- nail or screw,
- drinking straws
- hot melt glue
- glue gun
- skewer stick
- thick (6mm) craft foam
- nut or washer (optional)
- materials for decoration
- thin (2mm) craft foam markers/pens
- feathers
- pipe cleaners

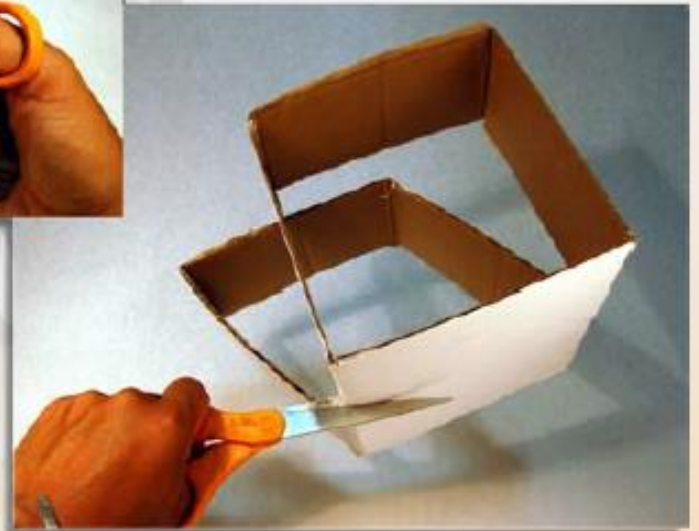
Real World Artist: Peter Markey is an artist who often makes whimsical automata out of wood, utilizing cams and cam followers as his main source of movement.

www.focsle.org.uk/first/markey & www.cabaret.co.uk/artists/markey/htm

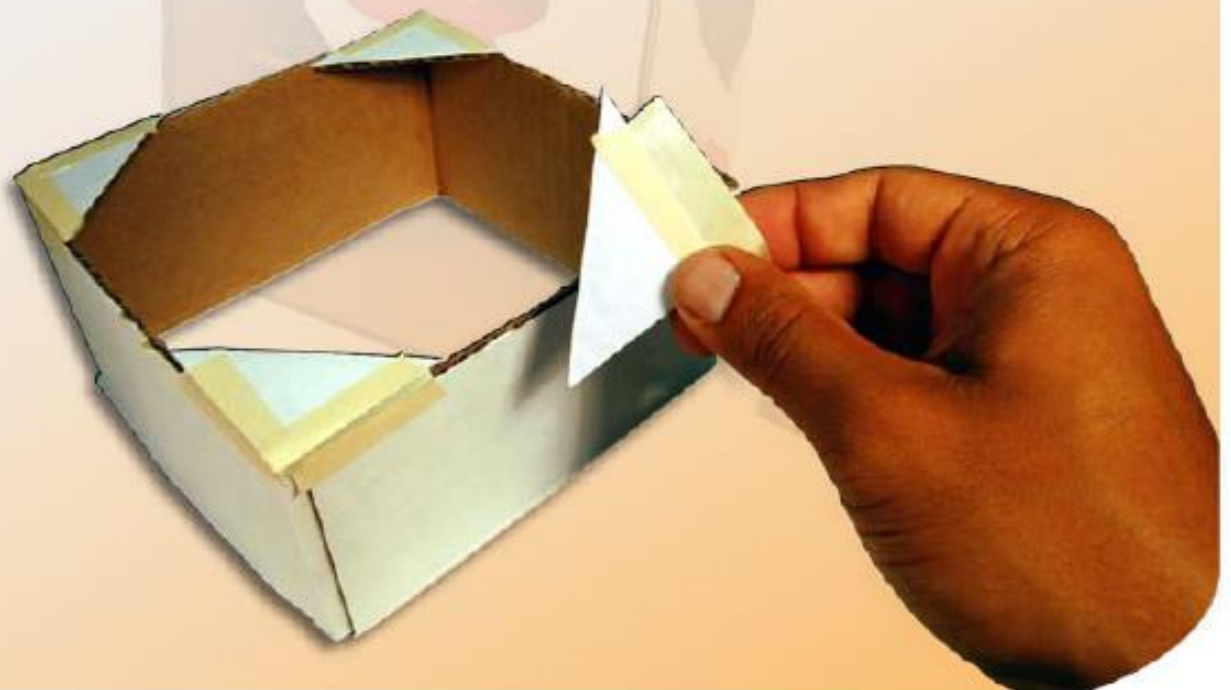
MAKE A FRAME



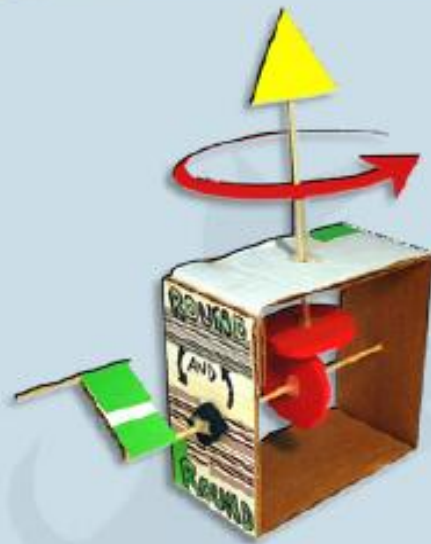
Cut the flaps off the box,
then cut the box in two pieces
(you get two frames from each box)



Cut triangles out of the
flaps and tape them into each
corner of the frame for support.



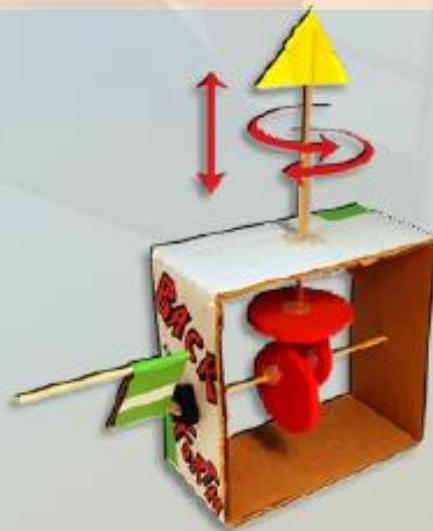
Choose a Motion



Round and Round



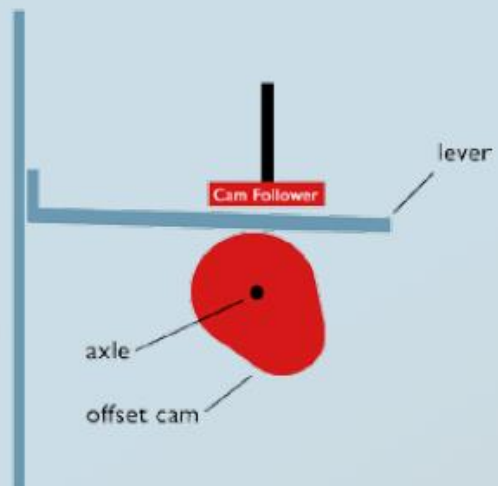
Up and Down,
Round and Round



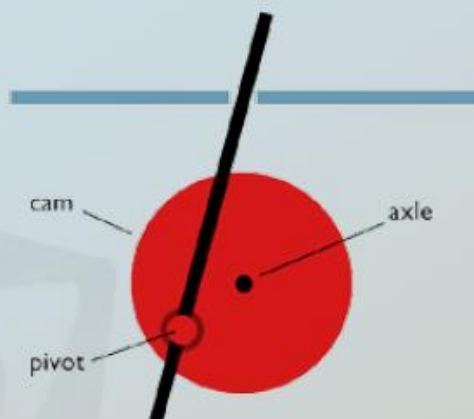
Up and Down,
Back and Forth

More Options

Up and Down



Side to Side

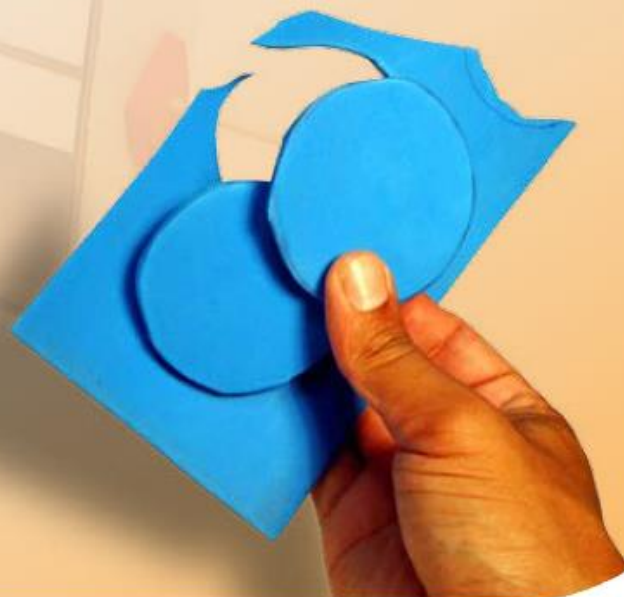


MAKE THE CAMS

Draw your cam and cam follower on the thick Foamie sheet, and cut them out.

The cam should be about 2.5" (6cm) in diameter.

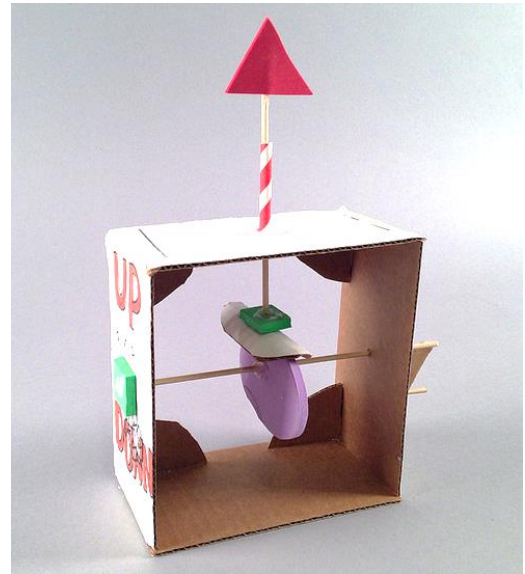
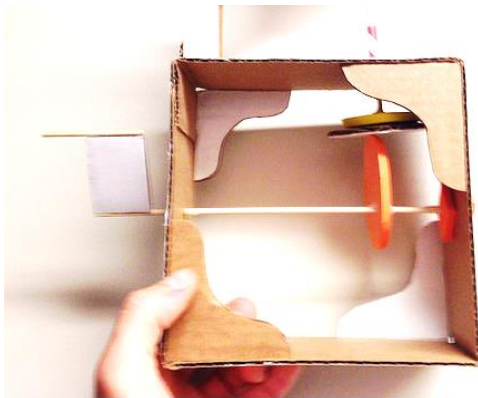
Tip: Cut the cams smoothly, and make sure the cam follower is a little bigger than the cam.



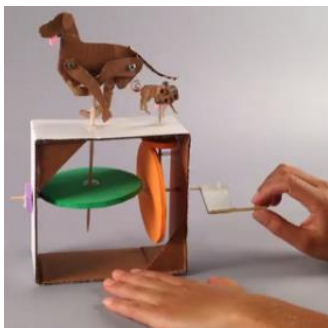
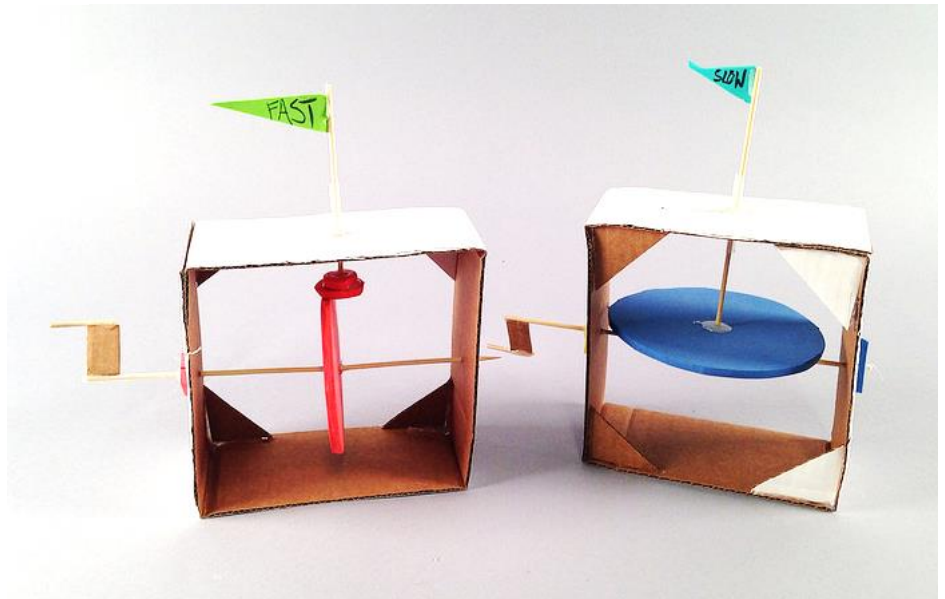
MORE OPTIONS

Right: A different version of the "up and down" mechanism using curved cardboard cam follower that moves up and down with the off-set cam but doesn't spin because of the flaps.

Below: A different method of removing the spin. A little cardboard circle keeps the cam follower touching the top piece but is not directly connected.



Another new addition to our set of examples explores how to make the motion of the automata fast or slow. By changing the relationship of the size of the cam to the size of the cam follower, you can adjust the speed at which the top piece spins. These examples are a little extreme but serve to demonstrate the principle.



The Tinkering Studio

ended up using the idea of the simple example to make this beautiful and funny automata with two dogs "chasing their tails" at different speeds. The addition of springs to the cam followers also really gives the dogs' motion a lot of personality. (Watch the video here:

<http://tinkering.exploratorium.edu/2014/08/20/automata-examples>)

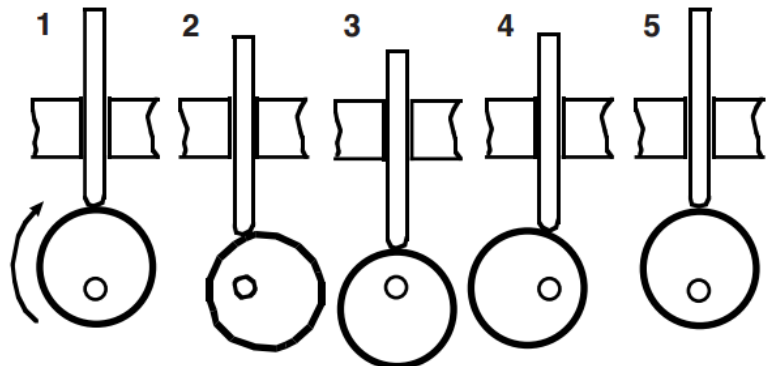
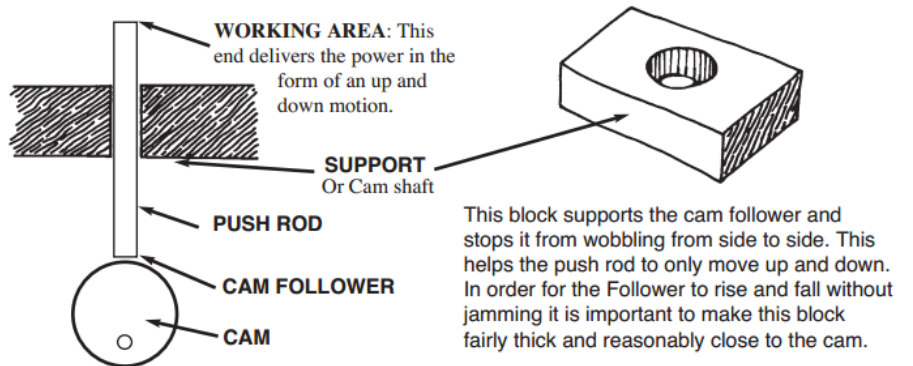
CAMS

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Cams act like small computers, storing information that can be turned into movement. They can be very simple or complex and the only limitation is their size.

The basic principle of the Cam is to turn a circular motion into a linear one. This is referred to as reciprocating movement. In automata the cam is very useful, and is probably the most commonly used mechanical action. As you will see, the Cam is simple to make and very versatile.

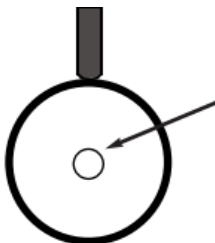
Cams normally work in conjunction with a "Cam Follower". As the name implies this follows the movement of the cam and transfers the movement to the working area. The cam



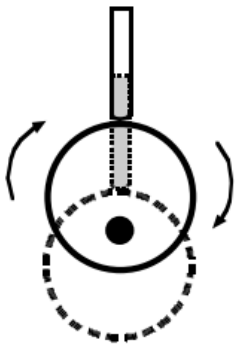
This cam is turning a circular motion into an up and down one. This is referred to as reciprocating motion. As you can see in stages 1-5, the cam follower steadily drops before rising up again. The whole process repeats as long as the cam keeps rotating clockwise.

follower is normally a rod made of rigid material such as wood or metal, which is supported by a shaft that limits the movement and direction. The cam follower is designed with a smooth end that can easily follow the cam's movement. This is a very important as the Cam and Follower will jam if not properly designed.

In order to design a cam you need to know what you want it to do. It may have just one or several movements per revolution. Cams turn on a shaft and so need to be offset to create movement. If you have a circle with the shaft running through its centre then nothing happens.

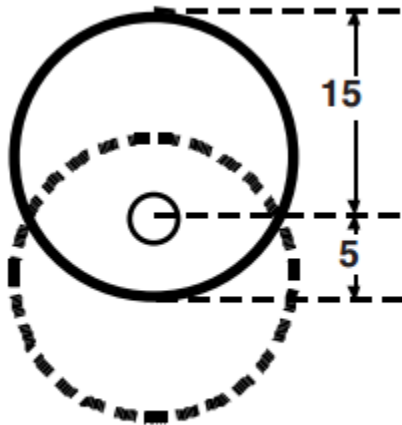


A circle with a shaft running through its centre will simply turn and produce no lift.



Offset the centre and you have made a cam.

The cam follower has lifted by this amount. So the more you offset the cam, the greater the amount of lift you produce.



$$15 - 5 = 10$$

will produce.

This simple equation will enable you to work out how much lift a cam will give. Later on we will come back to this formula to accurately work out the lift of any given cam.

LOBED AND DROP CAMS

From the basic round cam you can increase the diameter across one axis, to produce an egg-shaped, or “Lobed”, cam. Alternatively, you can create a recessed area that drops below the circumference of the circle, producing a “Drop” cam. You can, of course, combine these two elements in a cam, which is why they are so versatile.

THE LOBED CAM

If you raise part of the circumference, you produce a lobe, hence the name lobed cam. This will lift the cam follower by the maximum height from the tip of the lobe to the circumference of the circle. When the cam follower returns to the circle it will pause and this is referred to as the dwell angle. You can produce a pause or dwell angle on top of the lobe if you design it properly

THE DROP CAM

However, if you offset it you can create a mechanism that can lift. With this lift you can create many marvellous automata.

It is very simple to calculate the amount of lift by simply taking the measurement from the centre of the drive shaft to the lowest point of the cam and subtracting this from the measurement to the highest point from the

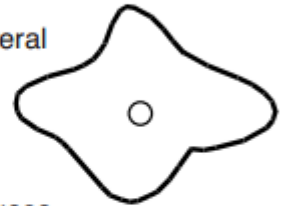
centre of the shaft. This calculation will give the amount of lift the cam

Different types of cam

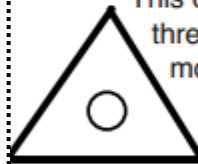
This cam produces a smooth uplift which suddenly drops down. It is often referred to as a snail cam because of its shape or contour. This cam can only work in one direction. If you turn it the other way the cam follower would jam. You need to bear this in mind when you are designing cams.



This cam produces several short up and down movements from one revolution.



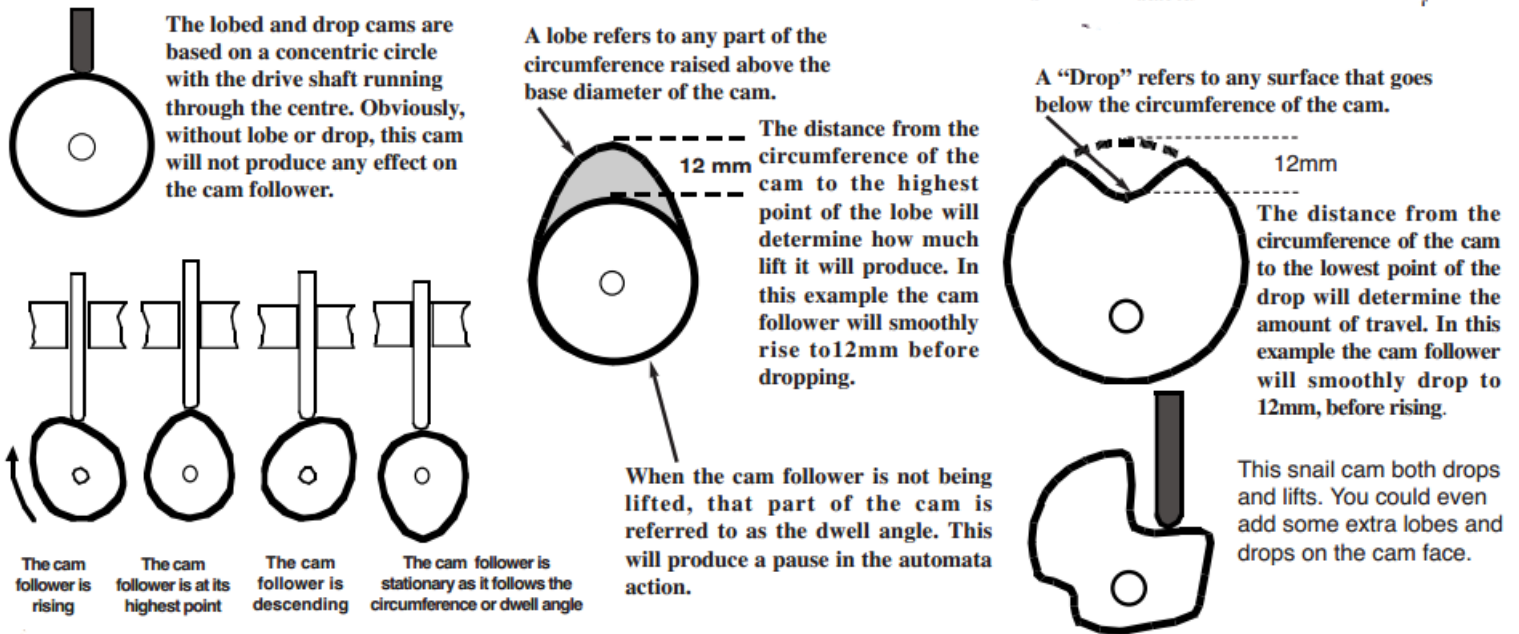
This cam produces three very distinct movements from one revolution.



You can combine as many movements as your cam will allow. Remember that the cam follower has to work smoothly. If you try to make it do too much or make the contours too steep such, as this one on the right, it will jam. The cam followers can only move on gentle curves. Make them too tight and you will have problems!



If you dip below the circumference of the circle then the cam follower drops, hence the term drop cam. You can calculate the drop of the cam by measuring from the lowest point of the drop to the circumference. A very popular form of drop cam is called the snail cam. This has a sudden drop that slowly rises to the next drop point. This cam is used a lot in automata and is a blend of both drop and lobe cam.



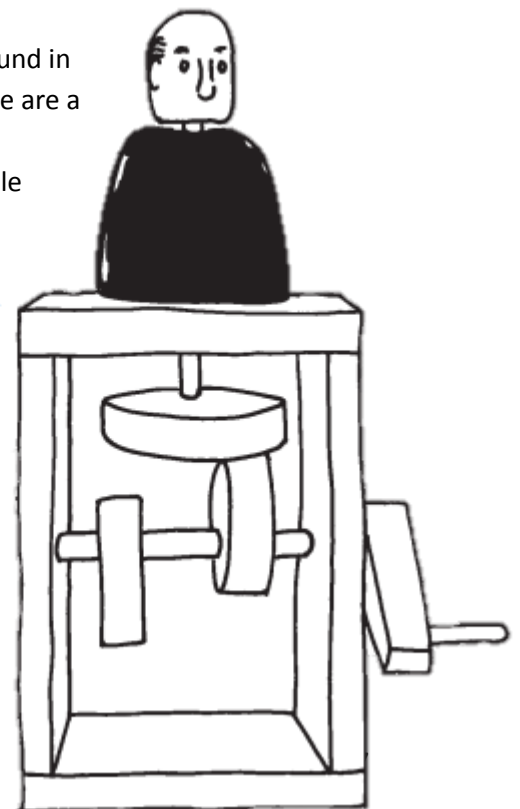
SPECIALITY CAMS FOR AUTOMATA

The cams covered so far are fairly simple. They are the sort that can be found in many everyday machines like car engines and washing machines, but there are a range of more unusual cams that can be used for added versatility or sophistication when making automata. They are, in themselves, very simple but may require more skill when making them.

For example, an offset cam not only moves things up and down but also in a circular motion. You must make sure that the cam contacts the cam shaft drive plate either side of the cam shaft.

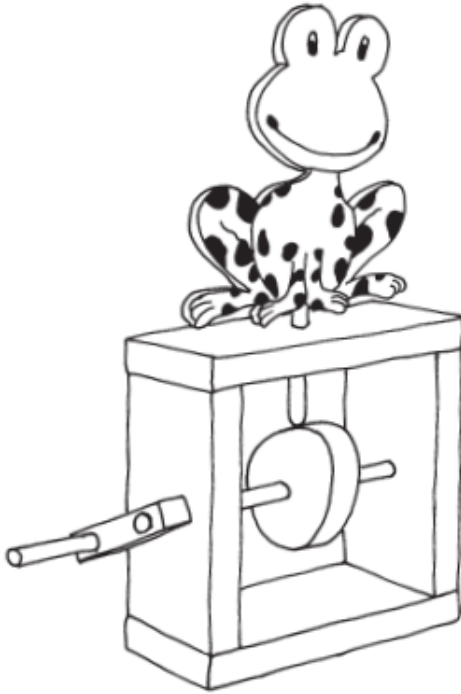
If it contacts directly underneath then it will only lift. Offsetting 2 cams either side produces movement in opposite directions. This then gives you both up and down as well as a side to side movement.

The man in this automata shakes his head from side to side. There is a small amount of lift but it is not really noticeable.

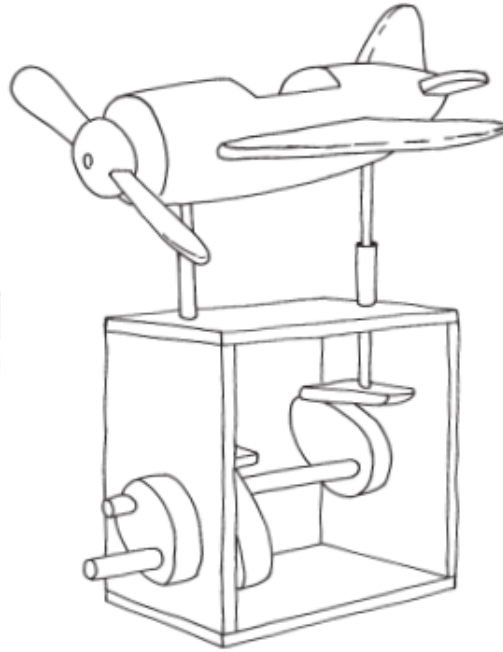


CAMS FOR AUTOMATA

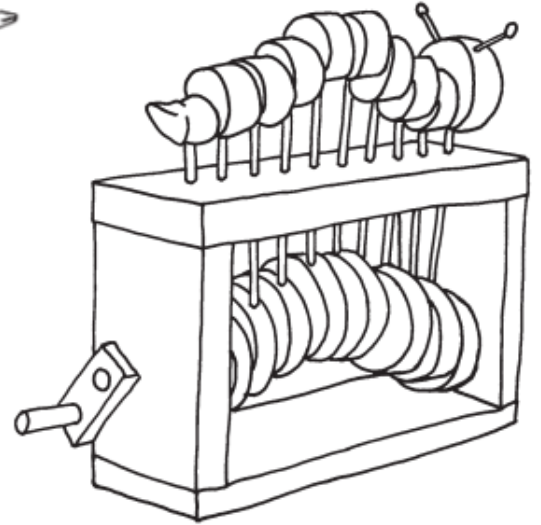
The examples below show how you can use the cam when it comes to making automata. The key point to make in mechanical terms is that it produces a linear movement from a rotating input and you can create an enormous amount of things with this. The illustrations below show a range of uses for simple one lobe cams.



FROG - USING A SINGLE LOBE CAM.
This will produce a single, smooth up and down movement.

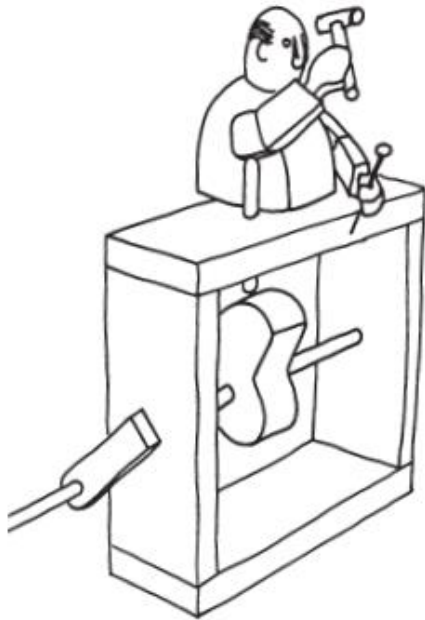


AEROPLANE - USING TWIN LOBE CAMS.
The two cams are at opposite ends and are set at 180° to each other. This causes the plane to dip up and down from nose to tail..

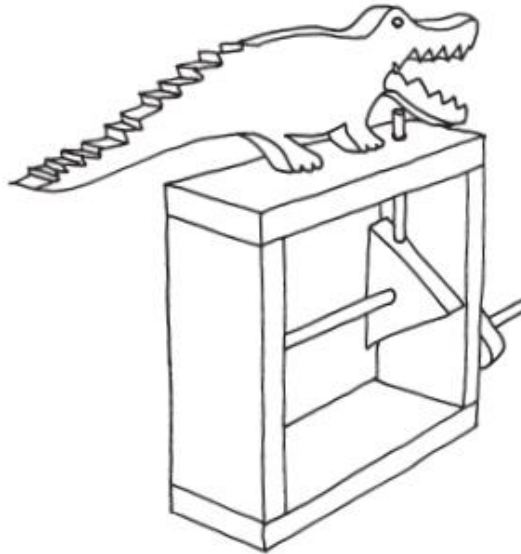


CATERPILLAR - USING MULTIPLE CONCENTRIC CAMS.
Each cam is slightly offset from the preceding one. This gives a smooth, wriggling motion.

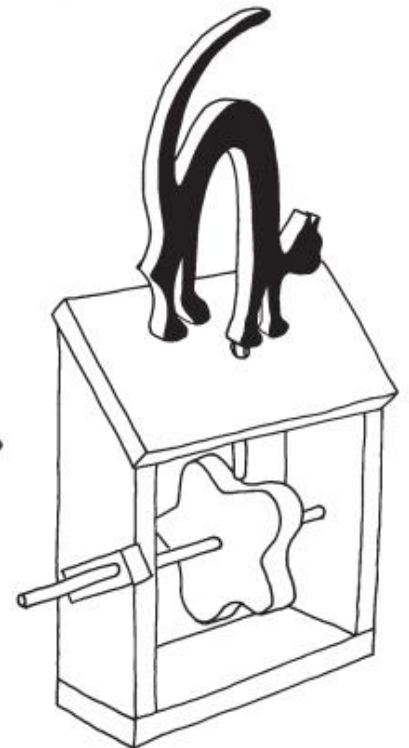
Cams can often have more than one lobe. Multiple lobe cams produce even more diverse and exciting movement.



This drop or snail cam allows the hammer to rise smoothly and then suddenly drop.



This pointed triangle will produce three equal sharp movements in one revolution, snapping the jaws open and shut.



This cam has five lobes, one of which is higher than the rest. The cat will make four small jumps and then one big one.

DESIGN TIPS

When designing a cam, think about it creating a performance or event in one revolution. This can be simple or complex. Remember to use gentle curves to allow the cam follower to operate smoothly. If you design a cam that produces several events you may need to make it bigger.



The designer of this cam wanted to create 4 up and down movements per revolution. This design would probably jam and not function properly.

This bigger cam will do the same job, but now the cam follower is able to follow the contours as they are more gradual. It will still produce 4 varying up and down movements per revolution.

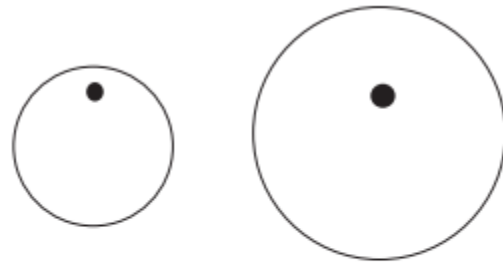


MAKING AND MEASURING

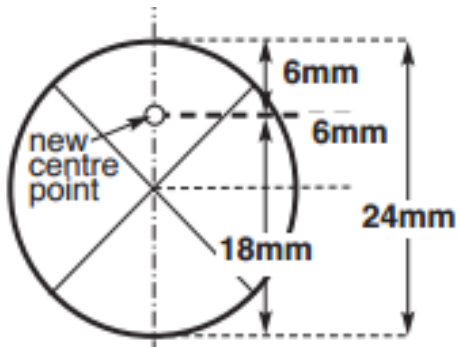
This final section on cams shows students how to use a simple mathematical formula to work out the lift for concentric cams.

The concentric cam, is a circle with an offset centre. By offsetting the centre we are able to produce the lift and the further you move away from the centre point the greater the amount of lift you produce. Do not overdo things, it is better to make a larger cam that rises gently than a small one that rises rapidly. They will both do the same job but the smaller cam is more likely to jam.

When making Automata, we need to work things out fairly accurately. This applies to cams when you need to produce lift to a specific height. The following formula is very simple and shows you how to quickly and accurately work out the centre point for the drive shaft.



Both cams lift by the same amount but the larger circumference of the bigger cam will produce a much smoother lift. As a rough guide, try to make the biggest cam that will comfortably fit into your Automata.



For every millimetre that you move away from the centre point, you must double this figure, in order to calculate the amount of lift generated by the cam.

In this example you can see that the centre point has been moved up by 6 mm which will produce a lift of 12mm. Students can confirm this by using the formula we looked at earlier by subtracting the two distances from the new centre point $18\text{mm} - 6\text{mm} = 12\text{mm}$

It's as simple as that. Remember you only have to accurately locate the centre point. The actual diameter of the drive shaft is not important.

TWIST AND TURNING

A small pin can be placed behind the frog which will stop it turning. Usually only one stop is needed as the motion is in one direction.



A square tube and rod eliminates any twisting action.



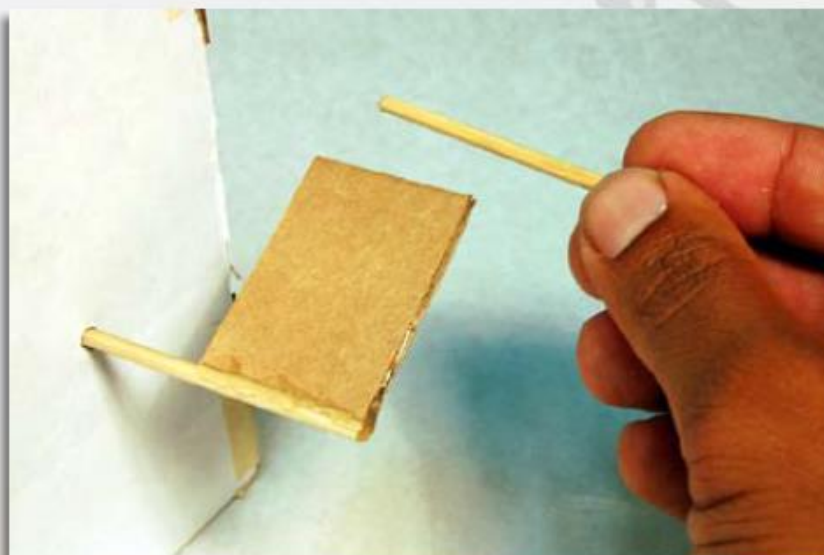
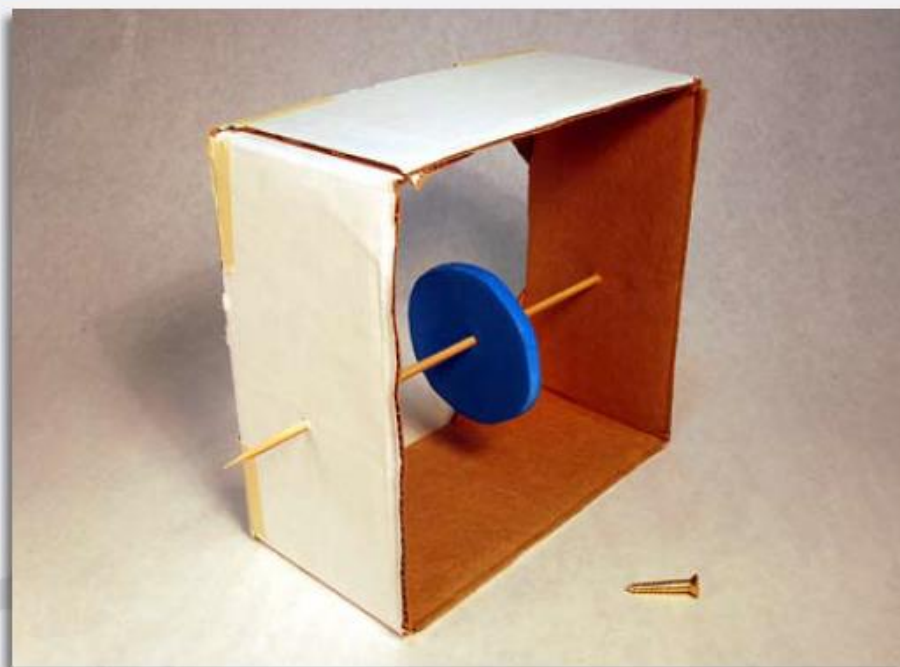
A rather annoying characteristic of the cam is that it produces a turning motion on the push rod. This may only be very slight but can cause problems. The leaping frog for instance slowly turns round as it moves up and down, which in some instances could be a problem.

To eliminate the turning affect you can either build stops (ex. put a pin behind the frog) to prevent turning, (this can affect the overall look of your automata) or another method is to use square tube and rods. These hold the push rod firmly in place and eliminate any turning action.

Make the Axle

Put your cam on a skewer stick inside the frame.

Tip: Start the holes in the frame using a nail or screw, and make sure the cam clears the top and bottom of the frame.



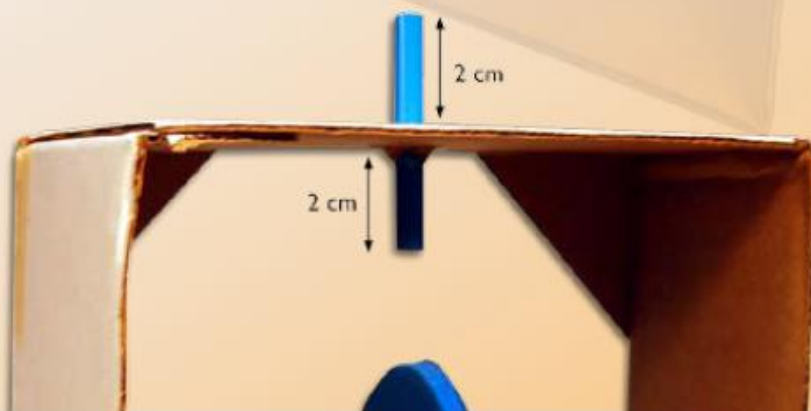
Make the Handle

Glue a small rectangle cut from the cardboard box flap to the skewer stick axle.

Glue a second piece of skewer stick to the end of the rectangle to make a handle.

Add the Cam Follower

Poke a hole in the top of the frame where you want your cam follower to be located, and insert a drinking straw. Carefully glue the drinking straw in place.



Tip: Use a pencil to make the hole large enough for the drinking straw.

Glue your cam follower on the end of a skewer stick and put it through the straw.

Tip: The straw will keep the skewer stick from falling over.



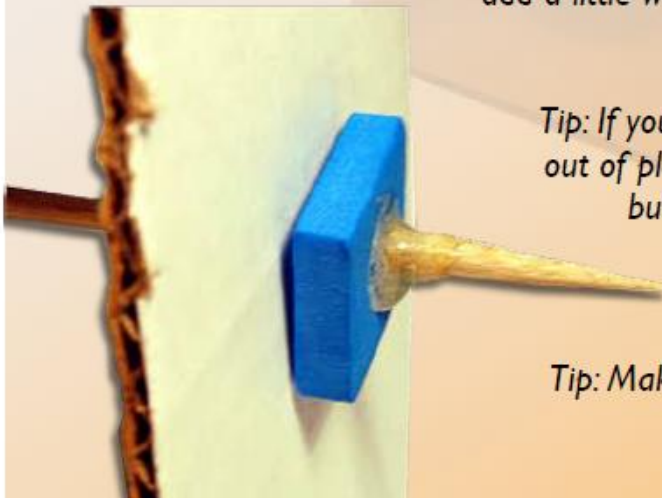
Test it!

Adjust your cam under the cam follower until you get the motion you like, then **GLUE** the cam into place on the skewer stick axle.

Tip: If the cam follower does not fall on the cam, attach a washer or nut to add a little weight.



Tip: If your cam and axle move out of place, add a small bushing made from a scrap piece of a thick Foamie.



*Tip: Make sure to glue the bushing to the axle and **NOT** to the frame.*



DECORATE YOUR AUTOMATA

Using cardboard, paper, pencils, foam, tape, glue, and whatever comes to hand...make your automata come to life!

EXPANDING THIS ACTIVITY

If you offer this activity repeatedly, or over a long period of time, you may want to start expanding the materials palette, and add some other elements that deepen the experience. Here are some ideas to play with:

- Radically change the scale of the automata.

Cardboard comes in great big sizes; what would it be like to make an automaton the size of a refrigerator box? This could be a great collaborative project for all the kids to work on together, figuring out how to

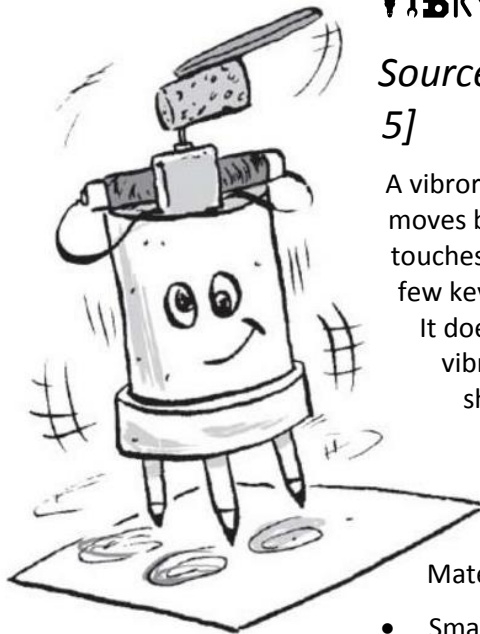
make a box of that size stable, what materials to use for cams and followers, and how to operate the whole contraption. On the other end of the scale, could you make automata that are very tiny, for example fitting in a match box?

- Change the materials used for construction. Wood is a prime candidate for an alternative, but you can think even more laterally: what about scrounging for parts that can be adapted from the local dump, or recycling centers? Or you might decide to take apart a machine, like a typewriter, and make automata using parts salvaged from that. Or [use food!](#)
- Add technology. Perhaps the [PicoCricket](#): a tiny programmable computer that can greatly expand the realm of possibilities by adding sensors, displays, and motors that can be programmed to respond to inputs and interact with each other. One initial project might be to make a coin operated automaton!



VIBROBOT: ARTIST IN THE SHAKING

Source Unit: Robots Part Four: Evolution [Week 5]



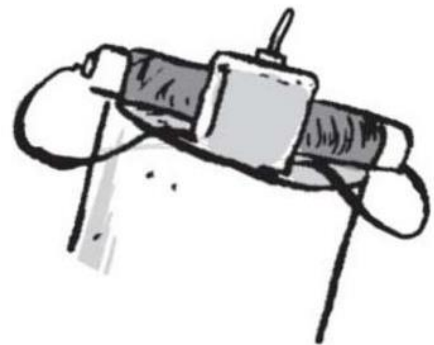
A vibrorobot isn't actually a real robot, but it acts like one. A vibrobot moves by, you guessed it, vibrating, shaking, or jiggling along. When it touches a wall, it turns and keeps on going. But a vibrobot is missing a few key parts it would need in order to fit into our definition of robot.

It doesn't have a controller or a sensor to tell it what to do—it just vibrates away! A motor spins a weight to make the vibrorobot shake. By placing the weight a little bit off center, the whole vibrorobot will be thrown around enough to move.

Using these principles, our Vibrorobot Artists will skitter across a piece of paper, drawing as it goes.

Materials (per robot):

- Small DC motor (1.5 volts)
 - Insulated electrical wire, about 1 foot or 30 centimeters long
 - Wire cutters
 - Electrical tape
 - 1 paper, plastic, or foam cup
 - Foam mounting tape
 - 2 AAA batteries
 - Rubber Band
 - Cork
 - 3 Markers
 - Cardboard box lid or box with low cut sides, about the size of a piece of 8.5 X 11 printer paper, ex. the lid of a box of printer paper
 - Plain white paper
 - Optional: Pipe cleaners, craft sticks, Styrofoam or wooden pieces, decorative glue-ons, googly eyes, glitter pens, quick-dry glue, or hot glue gun
1. If your motor doesn't have wires attached, use the wire cutters to cut two pieces of wire about 6 inches (15 centimeters) long. Remove about $\frac{1}{2}$ inch of insulation from each end so that the metal inside is exposed (1 centimeter). Attach one wire to each of the metal terminals coming out of the motor so that the metal touches metal. Secure that with electrical tape. Test the motor by touching the other end of the wires to the ends of a battery. If you have done it correctly and have a good connection, the shaft of the motor will start to turn.
 2. Turn the cup upside down. Attach the motor to the bottom of the cup with the foam tape so that the wires



stick out either side and motor shaft is sticking up.

3. Line up the batteries so that the top (positive end) of one touches the bottom (negative end) of the other. Secure them together with electrical tape.
4. Put the rubber band around both batteries so that it covers the ends. Wrap more tape around this to secure if you need to. Use the foam tape to secure the batteries next to (alongside) the motor.
5. Stick the end of the wires under the rubber band so that the bare wire touches the ends of the batteries. The motor shaft should turn on. If not, move the wires around until it does. Turn the motor on and off by taking out one of the wires. You can tape the other wire in place.
6. Make an off balance weigh that will shake the cup by sticking a cork onto the motor shaft. You can hot glue a craft stick on the cork to make it even more off-balance.
7. Use the electrical tape to attach the markers as 'legs' on the cup. This is when the students can decorate their robots as desired.
8. To make an artist's arena for the 'bots', cover the inside of the box lid with a piece of paper. Take the caps off the markers, place the Vibrobot inside, and start your motor! The Vibrorobot will dance around and bounce off the walls, covering the paper with its own designs.
9. If the Vibrorobot doesn't work, or students are not happy with the way it's moving, there are a few things they can try.
 - a. Make sure the weight on the motor isn't hitting anything on the robot.
 - b. Try shifting the legs, the weight, or the decorations to chance the balance.
 - c. If it's too heavy it may not move very well. Remove some decoration or use a 9V battery.
10. Just like with the Jackoon Artbot, some human artistry is needed with our Vibrorobot created skitter scatter art.

SKITTER SCATTER ART



Give students access to sets of water color paints, crayons, colored pencils, or other tools and instruct them to fill in each skitter art section of circle/space a different color.



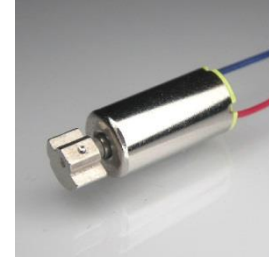
Image Credit: <http://imgkid.225/scribble-art.shtml>. All Rights Reserved.

Making the Bots

Source Unit: Robots Part Five: We Like to Move it Move It! [Week 6]

Materials:

- Small vibrating motors, often called pager motors, available from most electronics dealers, or recycle them from old cell phones, pagers, or Oral B Pulsar disposable electric toothbrushes. Ex. <http://shop.evilmadscientist.com/productsmenu/partsmenu/131-pagermotor> or <http://www.goldmine-elec-products.com/products.asp?dept=1107>
- Three or more small coin cell batteries (1.5 to 3 volts)
- Foam tape
- Three or more 2-inch (5cm) acorn-shaped plastic gumball machine capsules (the kind used to dispense toys)
- Smooth test surfaces, ex. large piece of posterboard and/or cardboard box top for a confined test area.



First, list out the goals of the project for students. Ex. The goal is to assemble quick and easy Gliding Vibrorobots that travel in large loops. As the number of little bots grows, so will the patterns we are likely to see. The more, the merrier!

Plan the project together. Putting the pieces together for this project is really easy. The challenge comes in positioning them just right, to achieve the kind of movement we're hoping for. While the plastic gumball machine capsules look great without any decorations, students can add personality and change the behavior of their bots with added decorations. Have them keep in mind that this project has no on/off switch. Keep a few extra batteries on hand, since they will burn through them as they test (and play with) their Vibrobots.



Have students keep track of directional movements and emerging/existing patterns by drawing diagrams.

Tip: check out the original bristlebot how-to on the Evil Mad Scientist website for inspiration and building tips. <http://www.evilmadscientist.com/2007/bristlebot-a-tiny-directional-vibrobot/> The ingredients? One toothbrush, a battery, and a pager motor. The result? Serious fun. [make a bunch of them to race them competitively.]

Now, build your prototype:

1. If you're repurposing an old vibrating motor, make sure each of its wires have a little metal exposed at the end. If not, strip off about ¼ inch (3mm) of insulation with a wire stripper (or carefully with a scissor or wire cutter.)
2. Cut a piece of foam tape about 2 inches (5cm) long. Stick the motor onto the tape, with the weight on the shaft hanging off the end of the foam tape. It needs to be able to spin freely.
3. Press one wire down along the tape. If the wire is more than an inch (2.5 cm) long or so, curve it ab it so that the metal end is closer to the bottom of the motor. Then press the disk battery on top of the metal end of the wire to hold it in place. When you're ready to turn the Vibrobot on, secure the other wire to the top of the battery with more tape.
4. Take off the clear plastic lid of the gumball capsule and set it aside. Stick a square of foam tape inside the bottom (colored flat part) of the capsule. Make sure it is a little off center.
5. Attach the foam tape holding the motor and battery onto this piece of tape. You will have to fiddle with it a bit to get the vibrobot to move forward and not spin in place. One configuration that works is to put the battery up against the side (for ballast) and the weight on the motor shaft almost touching the side as well.

Make several more the same way. Start each vibrobot moving by attaching the top wire to the top of the battery with foam tape. Snap on the clear lid and you're ready to test, test, test!

Give them a clear space to move around in. A long piece of posterboard makes a nice smooth surface or the lid of a copy paper box makes a great confined space.

Turn them on, set them down, and observe how they move.

Adjust the position of the motors and the batteries as needed to get the kind of motion you'd like.

Troubleshoot and Refine

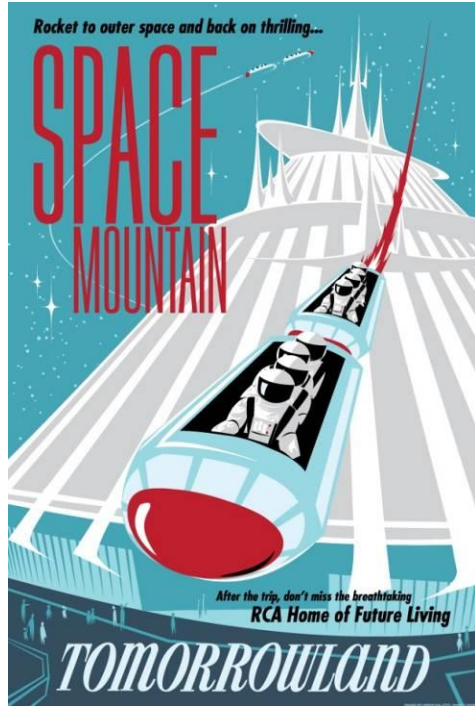
Make sure the vibrating motor is firmly attached to the inside of the bot at all times. If it just sits and spins, try moving the parts around until it moves forward(ish).

Adaptations & Extensions

Decorate! Stick on some googly eyes, ballpoint pen springs for antennae, or add mini craft-stick skis to the bottom. You can even create flying saucer style landing gear by sticking some long straight pins with plastic ball ends through the bottom of the plastic gumball capsule and hotgluing them in place. For advanced makers and older students, trying adding some popular upgrades like two flat vibrating motors and a light sensing circuit that tells the bot to turn towards or a way from the light.

Vivid Posters for Roller Coasters

Source Unit: Scream Machines



Goal: Students will concept, design and create marketing pieces to advertise their or other students' roller coasters.

Variations: Students may either be assigned to create a poster for their own roller coaster to take advantage of their enthusiasm, or, to make the situation similar to real life, have each group trade and "hire" an advertising company (another group) to create the ad/poster. Receiving a project that you have no familiarity with is a common experience in the real life design world. This technique is designed to teach them to problem solve and find the answers they need. When describing the project, if having them trade, tell students: Your advertising agency has been selected to handle the advertising and marketing of a new roller coaster. Even if you've never heard of the coaster or been to an amusement park, you'll have to research this coaster (talk to the original group), think about what the public needs to know in order to attend and how you'll visually convey all that information in a way that will get

attention! They can then work on submitting designs for approval to the original group, making a final official poster of an approved design, etc.

Next Item on the List!

Now that they've designed it, pitched it, sold it, and built it, will people come to ride it? Like any business venture, roller coasters require strategic marketing in order to become successful. The goal of most media messages is to persuade the audience to believe or do something.

Image and marketing are a key element of roller coaster success, after all, roller coasters are built to make money, and advertisers have to capture the imagination of thrill seekers in order for them to spend



Image Credit: Entertainment Designer
<http://entertainmentdesigner.com/news/theme-park-design-news/mirabilandia-italy-set-to-open-worlds-tallest-water-ride-in-june/#more-5803>. All Rights Reserved.

money to ride it. For this they hire graphic designers.

Careers in graphics design are abundant and present career opportunities now and for the future. Along with writers, clients, and other creative people who decide on what the content or message should be, graphic designers make the content look appealing to the client's audience. Graphic designers are the people who design the magazines, product labels, shopping bags, websites, cereal boxes, newspapers, logos, stationery, books, movie posters, billboards, and millions of other things that we see many times every day.

Is their client's roller coaster the "the biggest, baddest, longest, fastest wooden roller coaster in the world!" like King Island's Beast? Will they go for terror and "dare" people to ride, or for fun and adventure, or humor?



Have students work in groups and compile adjectives (discuss the differences between the difference between common, proper, and demonstrative), and intensifiers such as comparatives, hyperbole, and superlatives to describe their roller coaster. Demonstrate the conventions of standard English capitalization, punctuation, and spelling when writing as a group.

The language of ads is full of intensifiers, including superlatives (greatest, best, most, fastest, lowest prices), comparatives (more, better than, improved, increased, fewer calories), hyperbole (amazing, incredible, forever), exaggeration, and many other ways to hype the product.

Pretty or elegant? Good or scrumptious? Nice or delightful?
As a group discuss and explore word relationships used in

advertisements and nuances in word meanings and distinguish shades of meaning among closely related verbs (e.g., toss, throw, hurl) and closely related adjectives (e.g., thin, slender, skinny, scrawny, by acting out the meanings and through discussion. There is power in the adjectives (and other words) you choose. How can there be power in words? Have students give their explanation of the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences. Just like Clark Kent and Superman or Bruce Wayne and Batman, some adjectives are plain, ordinary, everyday words. Others are alter-ego Super



Adjectives that leap into your customers' minds in a single bound. Adjectives are boring, but Super Adjectives impress, inspire, and convince your customers more effectively.

Examples:

Before: Great Drink for Hot Summer Days

When it's hot outside, this lemonade will help keep you cool. Made with fresh water, sugar, and lemon juice, you'll love how it tastes. Available in four flavors.

After: Icy Refreshment Perfect for Sticky Sweaty Summer Days

When the temperatures are steamy outside our ice cold lemonade will help keep you perfectly cool. Made with ice cold distilled spring water, all-natural sweet cane sugar, and tangy fresh-squeezed organic lemons, you'll adore the refreshingly zingy taste and the way it banishes the heat. Available now in four tasty fresh fruit flavors: tart raspberry, smooth mango, sweet peach, and tangy original lemonade.

What's the difference? Why are the "afters" so much more powerful than the "befores"? Because compelling adjectives were used. **Have students analyze adjectives role in the text.** Adjectives let the reader know more about the product and develop a connection with it. But boring ordinary adjectives aren't the answer. You need Super Adjectives to entice your customers.

Putting it in Action

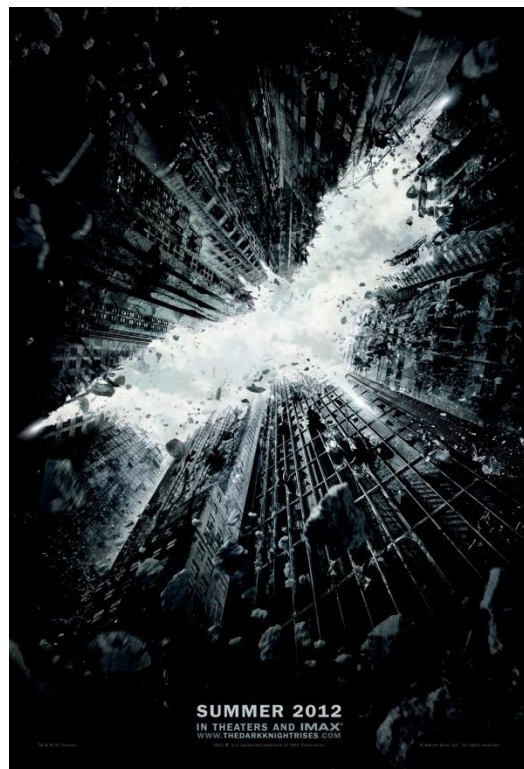
On the included "Ordinary, No Extraordinary!" sheet, and/or as a group, have students write down a list in each column of nouns, adjectives, adverbs and verbs they might ordinarily use to describe their coaster. Then, in to fill in the other columns, have students Consult reference materials (e.g., dictionaries, thesauruses), both print and digital to look for **vivid** synonyms to those words that could be used instead, to spice up their ads. Attention grabbing superlative advertising is what brings in crowds, who bring in money.

Get the Message! Art in Advertising

Once students have determined what words they want to use, they then are ready to design a layout for a positive/negative space poster to advertise their roller coaster.

In the case of art, positive and negative don't mean that a drawing is either good or bad. These terms define the shape of an object as well as the space around it. Does a negative space really have shape? In this project, the students will explore the relationship between positive and negative space. After all, one can't exist without the other.

Poster designing is one of the most creative part of graphic designing, and creative posters always attract,



whether it be business, people, but most of all, creative posters are designed to capture attention.

Positive/Negative Space: How much room an image takes up on a page (positive space). The space leftover is the negative space (often the background).

In many basic drawing classes, students learn that there are three basic elements of a composition: the frame, the positive and the negative space. The positive space is easiest to understand. Generally, it is the space occupied by your subject

Conversely, negative space is the space that is not your subject. Though fun, negative space drawing is not taught very often, and the concept can be elusive because it is a very different way of looking at things, but any age group can do it, they just need a bit of explanation. Instead of looking at objects, you look at where the objects aren't.



Defining Space

Discuss with students that positive space refers to the shape of an object. **Have them look around your room.** Every object that you are looking at is creating positive space. Don't worry around the patterns or details of the item, just focus on the shape of the object. Select one object and trace its outline with your eyes. If you are looking at something that has a few parts, like a lamp, notice the shape created by the lampshade and the base. If you look at a television, the shape may be a flat rectangle.

Negative space refers to the shape around an object. It can be much harder to look at an object and see the space around it. **Have students look around the room for an object, ex. a stool, or an object against a wall, and try to focus on the shapes created all around the object.** You've probably noticed that positive and negative space are connected.

The negative space is defined by the edges of the positive space and the frame or border (our third element). So, part of our negative space is bounded by the frame and another part is bounded by the positive space. Sometimes the negative space is completely bounded by the positive space. If you look at an object, you are also looking at the shape around the object. You do this automatically when looking at everything, but you don't stop to think "positive and



negative space” – instead you notice lamp, bed, or chair. What is important also to note is that the negative space also defines our subject.



The positive space is masked in black in the second photo. The negative space is masked in black in the third photo.

Have students look at positive/negative space posters, there are endless numbers of them if you Google positive and negative space posters and art images and see how the artist pairs text and image.

- The Dark Night Rises movie poster
- Disney’s Brave movie poster (if you cover the bear’s eye, what does it look like?)
- Aladdin Poster
- Woody Pirtle’s *Amnesty International’s Stop Gun Trafficking*.

Have students look for and discuss ways artists use negative and positive space to effectively capture attention. Some artists use the negative space to create another image; others simply highlight the intended images and text.



Initially, when creating their own, students may tend to create a poster that literally describes the image or coaster with words, but hold additional discussion and observation of advertising works to help them develop more complex visual approaches to combining text and image, even if the image and text are simple. The images can be as simple or as complex as the age level of the students will allow, the composition is what determines the impact.

Have students draw a sketch of the poster with a pencil on sketch paper.



This will allow them to go through several drafts to get the layout and design right before submitting their designs to the original group and before they actually draw it on a poster.

Have students lightly transfer the final draft onto poster paper with a pencil just in case they need to erase anything in this initial process.

Then, have students carefully fill in the negative space in their design with dark markers or paint so that it can be seen from a reasonable distance away.



Option: If they need assistance remembering where their positive space is, have students put masking tape in the positive areas to remind them, or *very* light pencil marks.

Note: A poster is an essential visual tool in most school projects. It allows students to display information in a clear and readable way to others, which permits them to present their projects with efficiency and professionalism. Clarity and color are two of the most important elements when designing and creating a poster for a school project, so make sure students have all the art and layout tools they need to create an eye-catching poster.

Have students present their designs to class. This is an opportunity to practice public speaking and group critiques.

Option: Posters may be worth points.



Start with a directed line drawing. It's important to note that even though you may use,



“directed line drawing”, it's rare that you want to give your students just one option, most of the time you'll end up with many drawings on the white board. Look at pictures and brainstorm together what a planet, black hole, moon, or rocket can look like, and create sketches up on the board. Give lots of examples! Draw a few different owls; some realistic, some silly, some animated, then talk with students how you could change the wings, the shape, that sort of thing. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.

In the process of drawing on the white board, always incorporate mistakes. **Always.** Laugh at your “mistakes”, tell the kids to expect them and then show them how to

turn mistakes into something else. It's critical that you show your artistic side, no matter what you privately think of it, and inspire your students.

After watching your demos, have students make their choice of owl and began drawing with an oil pastel, not pencil! Encourage light strokes until the owl began to take shape and then have students darken the oil pastel when lines become clear they are keepers.

After instructions are given, the paper handed out and the children are engaged in their project, begin a ten-minute quiet time. This is their time; the chance to reflect on their work, the opportunity to lose themselves in their art, and perhaps the most important of all, the permission **not** to speak to their best friend.



- *Oil Pastel/Wax Crayon Resist*: If they want their outlines to show through, oil pastel will repel the paint, create clear outlines, and allow the drawing to show through the paint. Note: Wax crayons can also work for this, but aren't quite as clear, though they are less messy.

A watercolor wash acts as a basic resist giving the drawing a night-time feel. When they're ready to paint, have students paint the background and its details first. If they used oil pastels or wax crayons, students don't need to worry about avoiding painting near or on the outlines, as the watercolor paint will bead off the oil pastel/crayon. If they paint the background first, they don't have to worry about accidentally painting the background colors into the main figure/subject's colors later on. Encourage the children to mix paints on their paper, not in paint palettes, and use the double-loading technique when you can. It produces very cool results and clean-up is much easier!



Notes on Additional Techniques:

- *Wet-On-Dry Technique:* First, students dilute their pain with water and placing it onto the dry paper. The color lies on solid **without** gradient (Gradient is blending of shades from light to dark or from one color to another).
- *Wet-On-Wet Technique:* Which is painting a wash of water (or paint), and then painting on top of that area while it's still wet. The result is a blotchy and clouded effect with gradient.

- *Erasing/Creating a Glow:* It's night time and you want things to glow. When first starting to use watercolors students always tend to resort to their white paint to create shine, or think they can't have shine without white paint. Don't do this. There is a better way. Applying diluted white paint can muddle colors, so use the erasing technique. SAMPLE: For a glowing moon students could paint a light



wash of yellow on the moon, or leave it white, keeping it light to reflect the moon's brightness. But, as a moon, it must cast a glow. So, have students get their paper towel ready, and wet an inch and a half around its outside in the sky. They don't have to press hard, just brush some water on the paper. Then, have them take their paper towel and gently rub off the water which removes some blue paint to reveal the original yellow wash. Now, the moon glows. This also works if an area is too dark, erase = wetting down the spot and wiping excess paint away with a paper towel.



The Wild Blue Yonder

This lesson is very fluid, watercolor is a hugely variable, flexible, and fun medium and there are many different techniques which students can use to add interest to their space paintings. In the following project outline are several varied techniques, which means children can build upon previous experiences and continue to learn new ways of working with the materials. Have examples of each technique prepared and then have students experiment and combine to see which technique they like best for their own art.



Materials:

- Liquid, tube, or pan/cake watercolors
- Brushes
- Cheap Watercolor Paper (construction paper, drawing paper, or printer paper will not work well)
- Salt
- Paper Towels
- Cups
- Water
- Oil Pastels or Wax Crayons
- Pipettes (small droppers)
- Rubbing Alcohol
- Optional: small condiment (salsa cup) containers with plastic lids or baby food jars

Note on Paper: You can use the standard 12" x 18" drawing paper for most projects but if you cut that paper in half, children can complete the project in much less

Teacher Tip!

Ban pencils and erasers.

Sounds harsh, right? It's not being mean, the reason is purely practical: small pencil leads encourage small drawings. If a kinder is drawing a portrait and then is required to paint that very portrait, using a pencil will surely lead to frustration. It's hard to paint teeny tiny eyes! There is another reason: pencil markings can be erased, which leads to second guessing, which leads to lots of eraser action, which leads to class being over before the child has anything on his paper. Using oil pastels, crayons, and/or markers allows the artist to move quickly, commit to the drawing and forgive their "mistakes". This is a big part of creating art; giving into the process and not worrying about the details.

time. Not only does it save time, but it saves on supplies as well.

1. Start with a directed line drawing. It's important to note that even though you may use, "directed line drawing", it's rare that you want to give your students just one option, most of the time you'll end up with many drawings on the white board. Look at pictures and brainstorm together what a planet, black hole, moon, or rocket can look like, and create sketches up on the board. Give lots of examples! Draw a few different ones; some realistic, some silly, some animated, then talk with students how you could change the wings, the shape, that sort of thing. This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.



2. In the process of drawing on the white board, always incorporate mistakes. **Always.** Laugh at your "mistakes", tell the kids to expect them and then show them how to turn mistakes into something else. It's critical that you show your artistic side, no matter what you privately think of it, and inspire your students.
3. Have students sketch out their own drawing. After instructions are given, the paper handed out and the children are engaged in their project, begin a ten-minute quiet time. This is their time; the chance to reflect on their work, the opportunity to lose themselves in their art, and perhaps the most important of all, the permission *not* to speak to their best friend.

- *Oil Pastel/Wax Crayon Resist:* If they want their outlines to show through, oil pastel will repel the paint, create clear outlines, and allow the drawing to show through the paint. Note: Wax crayons can also work for this, but aren't quite as clear, though they are less messy.

4. When they're ready to paint, have students paint the background and its details first. If they used oil pastels or wax crayons, students don't need to avoid painting near or on the outlines, as the watercolor paint will bead off the oil pastel/crayon. If they paint the background first, they don't have to worry about accidentally painting the background colors into the main figure/subject's colors later on. Encourage the children to mix paints on their paper, not in paint palettes, and use the double-loading technique when you can. It produces very cool results and clean-up is much easier!



- *Wet-On-Dry Technique:* First, students dilute their paint with water and place it onto the dry paper. The color lies on solid **without** gradient (Gradient is blending of shades from light to dark or from one color to another).
- *Wet-On-Wet Technique:* Which is painting a wash of water (or paint), and then painting on top of that area while it's still wet. The result is a blotchy and clouded effect with gradient.

- *Salty Stars:* Yep, you read right. It takes a bit of (fun) experimenting, but using salt on wet paint can result in some amazing and fun effects. On the sky have students sprinkle some salt and let it set for 2-3 minutes until the paint completely dries. The salt absorbs paint and moisture leaving a unique texture. Wait until it is completely dry and brush off any remaining salt crystals before resuming painting. (They do not want to get salt on their paint brushes or transfer the salt back to their palette-- it will make all of their paint come out blotchy!) Voila, star filled space!

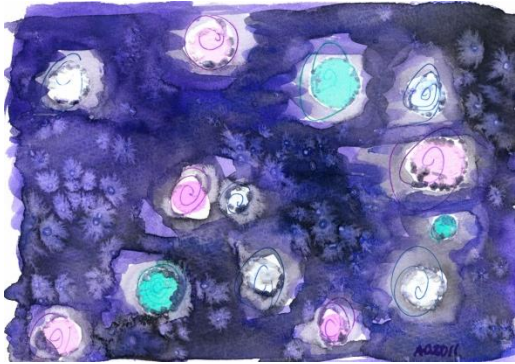


Image Credit: Innocent Stars by Amy Crook. Available at antemortemarts.com. Copyright 2011. All Rights Reserved.

- *Rubbery/Scaly Effects:* While the paint is wet, have students use pipettes to drop some rubbing alcohol onto different sections to create a "scaly" or "rubbery" texture. Perfect for any rockets or aliens.

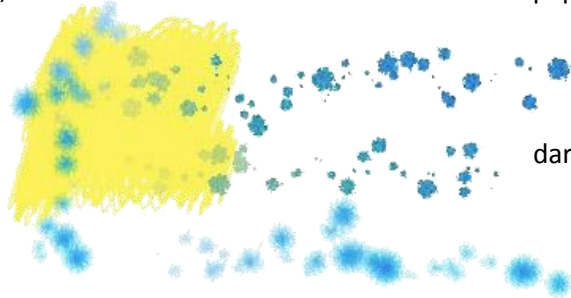


Image Credit: Water color painting by Niklas Åkerblad . <http://eriksvedang.com/> Copyright 2012. All rights reserved.

- *Depth:* To make space even deeper and more dimensional have students use a less diluted blue or other color on top of the more diluted area already painted to bring the area to life, ex: make circular blotches around the stars, and blotches on some stars. The effect makes for a more celestial sky.

- *Erasing/Creating a Glow:* It's space and you want things to glow. When first starting to use watercolors students always tend to resort to their white paint to create shine, or think they can't have shine without white paint. Don't do this. There is a better way. Applying

diluted white paint can muddle colors, so use the erasing technique. SAMPLE: For a glowing moon students could paint a light wash of yellow on the moon, keeping it light to reflect the moon's brightness. But, as a moon, it must cast a glow. So, have students get their paper towel ready, and wet an inch and a half around its outside. They don't have to press hard, just brush some water on the paper. Then, have them take their paper towel and gently rub off the water which removes some blue paint to reveal the original yellow wash. Now, the moon glows. This also works if an area is too dark, erase = wetting down the spot and wiping excess paint away with a paper towel.



- *Spitter Spatter Splatter Paint:* using a brush loaded with color, run your fingers along the bristle to create large and small splatters.

Finalizing: Have students finish up their projects, practice additional techniques, and discover their own methods. If a student has extra time, and didn't use oil pastels, have them go the extra step and outline. It really makes the art piece pop. If you are doing a drawing in pencil and then decide to paint with watercolors, it's really hard to keep the contrast unless there is a dark line in there somewhere. On a fully dry painting use a sharpie waterproof black marker, oil pastel or even black paint and a small brush. It really makes a difference. And it doesn't always have to be black...they can try a blue or even a red.



Teacher Tip: Don't throw your liquid watercolors away. Use a dropper (think half-size turkey baster) to recycle any left over paint and store them in small condiment containers with plastic lids or baby food jars. This keeps the watercolors well. If a color, like yellow, gets too muddy, toss it, but mostly the colors stay true. This way you can go about a year and a half before you start to run out of basic colors like red, yellow and blue.

Come Fly With Me, Come Fly Away!

Creating a Brochure

Source Unit: Solar Travels

Inform students their task is to create a travel brochure like they might find in a travel agency. Tip: provide some examples of real travel brochures or websites with travel ads available for students to preview.

View one student sample at:

http://townsendps.schoolwires.com/7227010419756/lib/7227010419756/Space_Travel_Brochure.pdf

Have students keep in mind the make-up and special features of their destination, taking into account the environmental conditions, and thinking about some of the recreational activities and adventures that could be possible there, Ex. Olympus Mons Volcano on Mars. Remind them, they are trying to convince their very picky public that their destination is the best place to go on vacation! They want to be creative and use a hook to get their audience to come and visit their planet/comet/moon. They want to make the data sound extraordinary but keep the information factual. i.e. Mercury's period of rotation is 59 Earth days long, they can use this information to their advantage. 'Do you like the warmth of summer and its sunshine, looking for that great tan? Then you need to come to the planet Mercury, were the sun shines for 59 days straight and never sets.'

Students may "cut and paste" a brochure on plain paper, or you can have them create one on the computer. Brochure templates are available through Microsoft Word, Microsoft Publisher and sometimes free online.

The brochure should contain the following:

- Information about the physical characteristics of the planet

Examples:

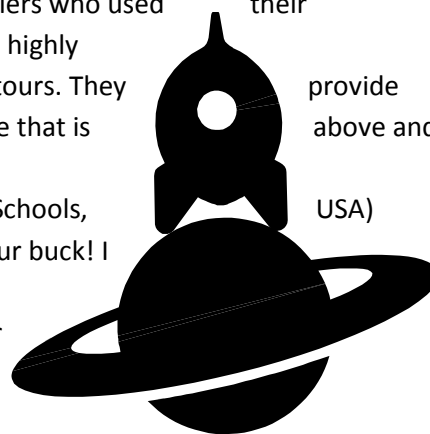
- Name of destination
- Distance from the Sun
- Surface temperature range
- Orbital period (length of year in Earth days or years)
- Rotational period (length of day in Earth hours or days)



- Main components of the atmosphere
 - Gravity
 - Moons
 - Rings
 - Key attractions (volcanoes, hurricanes, craters, etc.)
 - Any other interesting facts that visitors should be aware of
- Historical information about planet (significance of planet’s name, visits by space probes, important discoveries about planet)
 - Descriptions of the uniqueness of your planet
 - Retell, summarize, or provide a synopsis of a mythological account from any culture about this planet
 - Division name, logos, and taglines: Students should use their artistic skills to design a unique logo that visually represents their division and/or their planet (see the two created samples in this section, and the one real organization logo). Students can free draw and/or use Clip Art, text boxes, and interesting fonts to help.
 - Graphics (include at least three pictures)

The brochure may also include the following:

- How information about the various planets has been gathered
- Technical information using graphs, charts, and graphic organizers
- Build a scale model of your planet
- Additional creative ideas, ex.
 - Ratings by travel magazines: Wild Blue Yonder magazine rated “Spark, inc.” the number one outer-space travel company, giving 5 of 5 stars!
 - Comments from past travelers who used their service on past voyages: “I highly recommend Saturn Siesta tours. They provide information and experience that is above and beyond other space travel companies!” - A. Learner (Schools, USA)
 - “You get a real bang for your buck! I hope to become an annual voyager.” – Star. Y. Trekker (Smalltownville, USA)



Saturn
Siestas!

Sample Layout: Travel Brochure [Outside]

Fun Planet Fact



Pictures of various activities available on the planet for tourists

Caption describing picture above

Solar Destination
Travel Division:
Brochure Template

Company Division Name

Street Address
City, State, Zip Code
Phone Number
Fax Number
E-mail address
Website

Your company
logo

PLANET NAME



Planet nickname or famous features

Planet Photo

Creative saying that will interest people in visiting this planet.

Sample Layout: Travel Brochure [Inside]

Planet Slogan or Rhyming Phrase...

Picture of planet's unique physical features

Caption describing picture above

Planet Characteristics

When readers open the brochure, this is the first text they will see, making this a good place to briefly but effectively summarize the best features of your planet.

Make this text interesting so that readers will want to read the rest of the brochure.

Include:

- Size
- Color
- Temperature
- Orbit and rotation speed
- Visual features
- Planet composition
- Distance from the Sun

Reviews

- Three testimonials from previous tourists

Photo of happy tourists on the planet

Caption describing picture above

Tour Features

- Views of Moons, etc.
- Trip includes...
- Sightseeing of physical traits of planet
- Description of food and lodging
- Costs for trip
- Anything else you can think of...

Reservation Information

Clear instructions for making reservations to visit the planet.

Make it Their Own: Mini Rocket Mock-Up

Source Unit: Solar Travels

Rocket Requirements:

Have students focus on an amazing design and the practical questions on human spaceflight: What do you eat? What do you wear? How do you sleep? Where do you get water? How do you defend yourself? How do you get into it? Out of it?

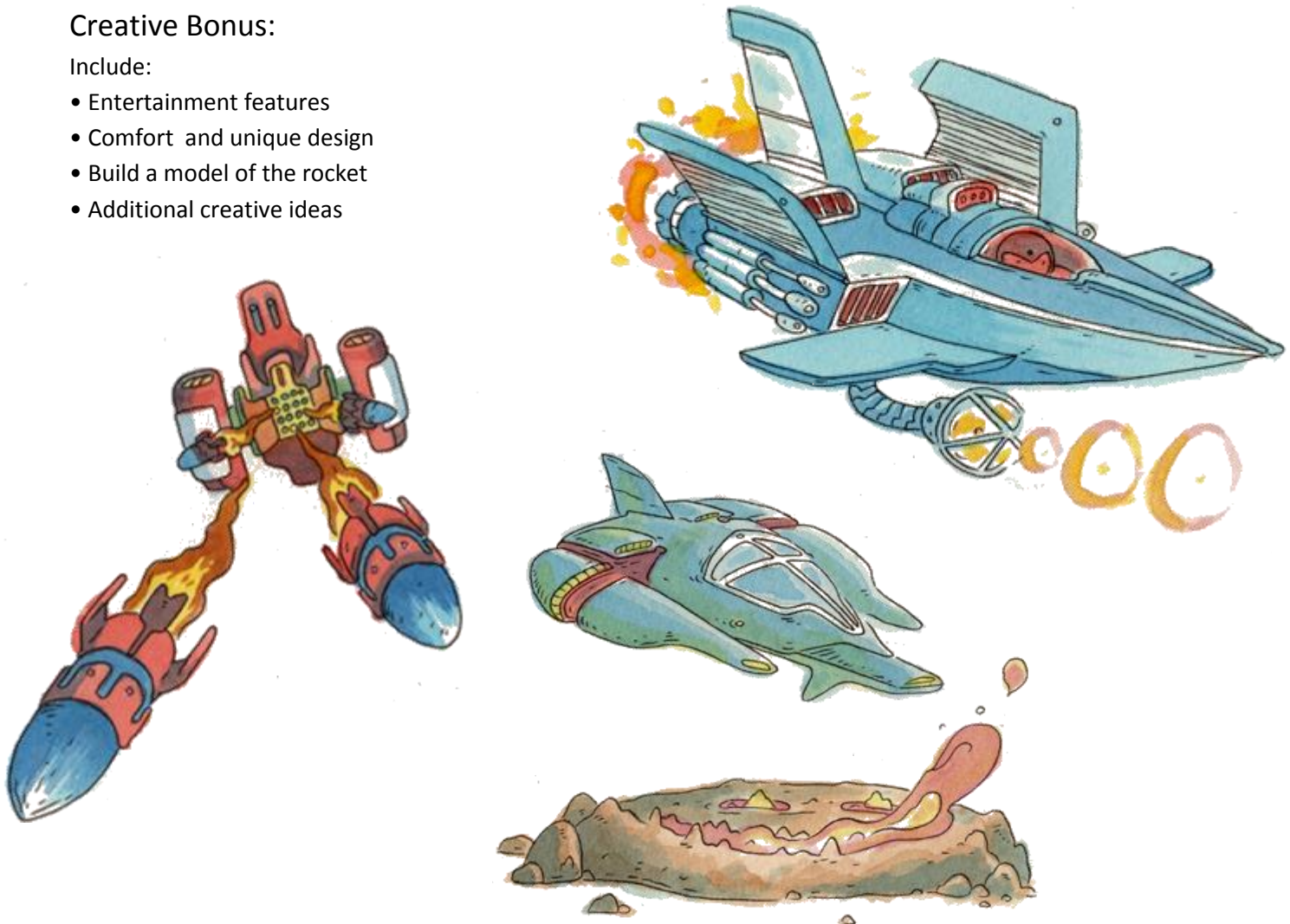
The rocket students create needs to contain the following:

- written description of the rocket
- A drawing or painting of the rocket with labels indication special features
- Rocket design must take into consideration communication, fuel, lodging of guests, medical facilities, the guests need for exercise, waste disposal, food storage or production, as well as safety features.

Creative Bonus:

Include:

- Entertainment features
- Comfort and unique design
- Build a model of the rocket
- Additional creative ideas



Flying High! Flying Free! Flags for Planets, You and Me!

Source Unit: Solar Travels

Students use their knowledge of the solar system to design a flag for one of the planets. This is an open-ended activity that allows students to use their creativity and to apply their knowledge.

Note: Many students may not be familiar with flags besides countries' flags such as U.S., MX, and/or the local state flag. While showing examples, discuss with students how some flags are very abstract and tell their story through colors and shapes only, while others include pictures and symbols.



Materials:

- 8-1/2 x 11 sheets of white paper and/or construction paper for the flags
- Magic markers, colored pencils, or crayons
- Images/Books about flags
- (Optional) Some dowel rods or skewers and tape to attach the flags

Tell students that some day, when people have begun to live on other planets or their moons, these worlds might develop their own flags. In this activity, students get to design a flag for their favorite, or assigned, world.

There are no rules yet for how to design a planet flag. The flag can just have colors and symbols, like many Earth flags do, or it might highlight some of your planet's most interesting places to visit.

For example, a Mars flag might have a red background, because the rusty sands of Mars look red from space. It could have some symbols representing weapons on it, because Mars was the god and planet of war in ancient mythology. Or, if they hope the planet's future will be more peaceful, they could put one of the red planet's most spectacular tourist sights on the flag, such as the giant volcano called Mount Olympus, which is almost three times



the height of Mount Everest, the tallest mountain on Earth.

If they ended up on a world with no solid surface to stand on (such as Jupiter or Neptune), they might also have to come up with a way to display their flag. Is a flag without a flagpole OK? What would be some ways to show the flag that don't involve having solid ground?

After student teams have chosen or been assigned their planet, suggest they look at the materials on the table, and discuss what kind of flag they want to make.

Note: Have enough paper available so that each student could make his or her own flag (just in case the kids don't all want to work together.)

Remind them about flags on Earth – not just flags for countries and states, but flags for cities, religious and civic organizations, and even sports teams. Have the students describe some flags they have seen. Can they tell you any flags that have astronomical symbols on them? (For example, the Alaska state flag shows the Big Dipper, with its pointer stars pointing to Polaris, the North Star. Alaska is the northernmost of the U.S. states, and thus the state where the North Star is seen highest in the sky.) Emphasize that, since there are no rules for planet flags yet, they can use their imaginations and knowledge to create the most interesting flag possible.

Challenge them with the goal that they want the other teams to be able to tell which planet the flag was for just by looking at it.

When everyone is done, ask each group to hold up their flag or flags and describe what is on them without naming the planet. Then have the other teams guess which planet the flag is designed for.

Sculpting the Screaming Meemies Meteorite

Source Unit: Asteroid Orbits

Monster Meteor Image Credits:

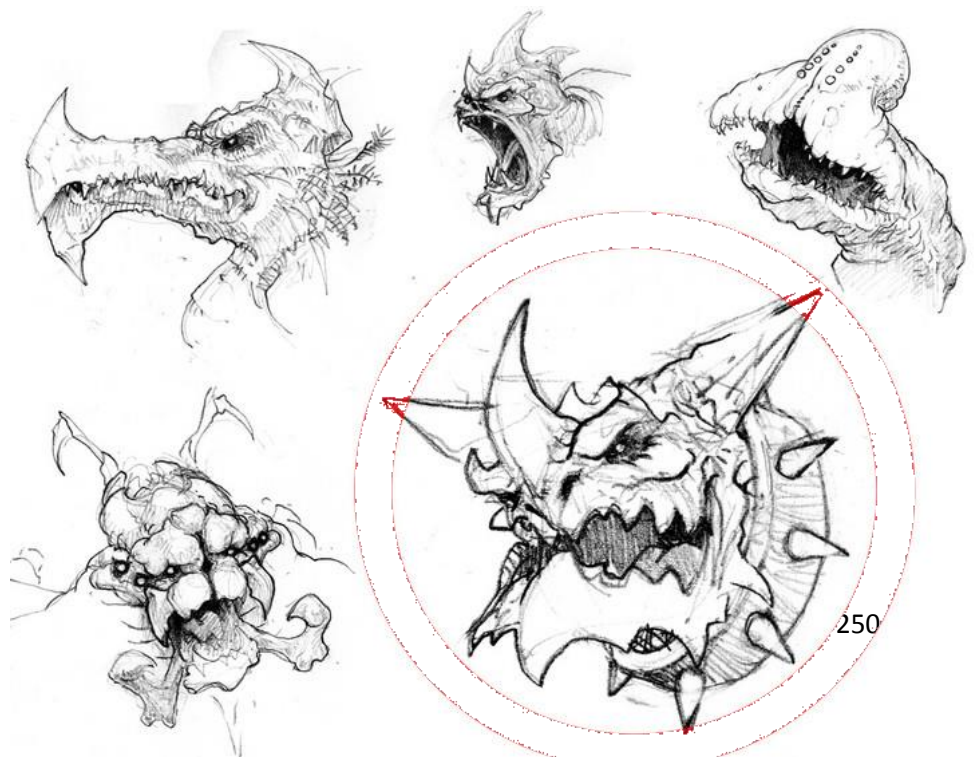
<http://www.miniaturestudio.net/tutorials/test-page-2/>. © 2010 - Jacques-Alexandre gilloy aka JAG All Rights Reserved.



Materials:

- Pencils
- Paper
- Ovenbake or modeling clay
- Tools for texturing (ex. toothpicks, plastic forks, etc. Be creative and look for anything with an interesting texture) Detailing tools can be as simple or complicated, as inexpensive or expensive as you decide. You can even make your own! And fingers work great.
- Aluminum foil
- Thin jewelry wire
- Wire cutters
- Scissors

Have students imagine a meteor was a living thing. After all, in stories shooting stars are often living beings shooting through space. What might a meteor look like as it shoots towards Earth? Is it a baby, curled up in a ball? Is it an interstellar fish? An intergalactic cat? Is it a monster? Does it have horns? What kind of expression might it have?



Excited, scared, screaming, triumphant, on fire? Does it have arms and legs or is it simply a rock with a crazy cratered face and a shooting flame?

1. We must above all know where we're going and to do this, there's nothing better than a small drawing.

2. For your group, start with a directed line drawing. It's important to note that even though you may use, "directed line drawing", it's rare that you want to give your students just one option, most of the time you'll end up with many drawings on the white board. Look at pictures and brainstorm together what a screaming, flying, rocketing meteor can look like, and create sketches up on the board.



3. Give lots of examples! Draw a few different ones; some realistic, some silly, some animated, then talk with students how you could change the flame, the shape, the expression, the number of horns, that sort of thing. Should the tongue stick out like a dog with its head out the window? This technique works well, as you want the children to learn to draw but also want them to be as individual as possible.



4. When a person's face shows emotions, the eyes, eye brows, and mouth all move in specific ways. This movement is called facial expressions. Have students come up to the front and make faces, holding them for a certain emotion, while you sketch them, showing how facial features interact to form expression.

5. In the process of drawing on the white board, always incorporate mistakes. **Always.** Laugh at your “mistakes”, tell the kids to expect them and then show them how to turn mistakes into something else. It’s critical that you show your artistic side, no matter what you privately think of it, and inspire your students.
6. Have students sketch out their own drawing. Inspiration can come from the illustrations on the board, an illustration in a specialized book, or students can make up an entirely new drawing, or several, all on their own. They may want to look
7. After instructions are given, the paper handed out and the children are engaged in their project, begin a ten-minute quiet time. This is their time; the chance to reflect on their work, the opportunity to lose themselves in their art, and perhaps the most important of all, the permission *not* to speak to their best friend.

Now, once the page is full of sketches, have students take their favorite 2D drawing and turn it into 3D art with clay! The available time or the difficulty of such or such detail can factor into the decision and they can also choose the best drawing. Or the worst.

Make sure to stress how forgiving modeling clay is, it’s okay to make mistakes, sometimes it even turns out better. With groups new to clay, don’t worry about warning of improper techniques, simply show the kids the basics and teach them that if something isn’t working, they can figure out what it is and change it. calm teacher= calm students

1. Have students main masses, keeping an eye on global shape, with no consideration (yet) for details.
2. Have them continue to refine the general shape, give more detail to the surfaces, work with the nose and brow and give each appropriate texture.
3. Some more smoothing with fingers or a clay-shaper, and have them add the eyes: a ball in each socket, which they can



begin by modeling the

the shape of part the

shape with a more precise tool. The ball becomes the eyeball plus the eyelids.

4. By successive additions, they can refine the main masses: jaws, brow, cheekbones, skull, horns, then the secondary masses: eyes, ears, teeth and veins, folds, buttons, flames, etc.
5. A good technique consists in turning the model to check the symmetry of the masses: a difference which students didn't see in the first place can be quite obvious once the model is upside down. In the same way, they can also look at it from below or above, in particular to compare cheekbones and brow.
6. Have students add additional details like the flames, craters, texture, little wrinkles and lines that follow the folds and the expression, etc.

Creating Textures:

Giving texture to a figure is one of the greatest challenges in creating a realistic piece. Whether the texture is fur, feathers, folds, or warts, the interest is in the details. Students should experiment with direct etching, using the tools of the trade, perhaps etching fur or feather lines with a needle held so it drags along the surface, rather than gouging. The process can be tedious, but the act of creating these details teaches students a great deal.

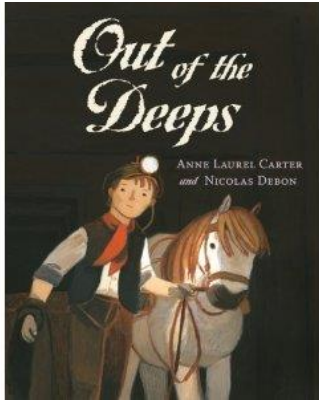
Note: During the sculpting process, if aspects need support an armature [an inner skeleton of stiff jewelry wire or wadded aluminum foil in the limbs and body] can be added for support. Think of wire armatures as crude, sturdy skeletons for the portions of your sculpture that should be reinforced (e.g. thin limbs such as an arms outstretched, or legs in standing figures). The foil armature is used to reduce the amount of clay needed to complete a bulky figure and has the added advantages of reducing curing time and making the figure stronger. For bulky figures (eg. a toad or rabbit), it is best begin with a well compressed ball of aluminum foil pounded into the general shape of the final form, then build the clay over the armature. A combination of the two kinds of armatures can be used.

Image Credit: <http://drawinghowtodraw.com/stepbystepdrawinglessons/wp-content/uploads/2010/04/Cartooning-Army-expressions-bigger.png>. All Rights Reserved.



Coalfaces

Source Unit: Mining Meteors



You may want to introduce this project by reading a book related to mining with the students. Some examples, in children's literature, are *Out of the Deeps* by Anne Laurel Carter (Author), Nicolas Debon (Illustrator) or *Boy of the Deeps*.

The goal of this project is to put a human face on the energy issue by having students view photographs of coal miners. These monumental portraits reveal the human essence of the people within the work. Few students will ever have the chance to tour a mine or meet a miner, but through art and photography the

many faces of coal mining can easily be seen.

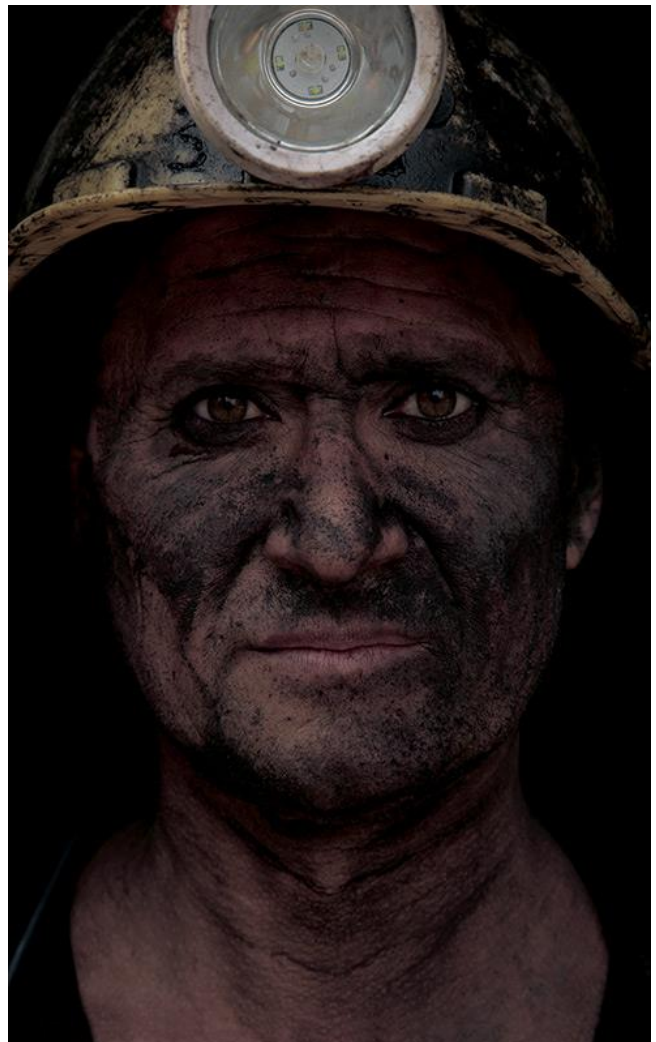
<http://www.guardian.co.uk/artanddesign/gallery/2010/feb/13/photography-ukrainian-miners?intcmp=239> & <http://www.glebkosorukov.com/> These images form part of a series of 100

stunning portraits taken by photographer Gleb Kosorukov of Ukrainian miners as they finished a six-hour shift in the dark world underground.

After viewing the images students will then create their own portraits, of themselves as a miner, or simply of a miner.

A portrait drawing of a coal miner should include a headlight and a coal-smudged face. A full body portrait may also include a jacket and tools.

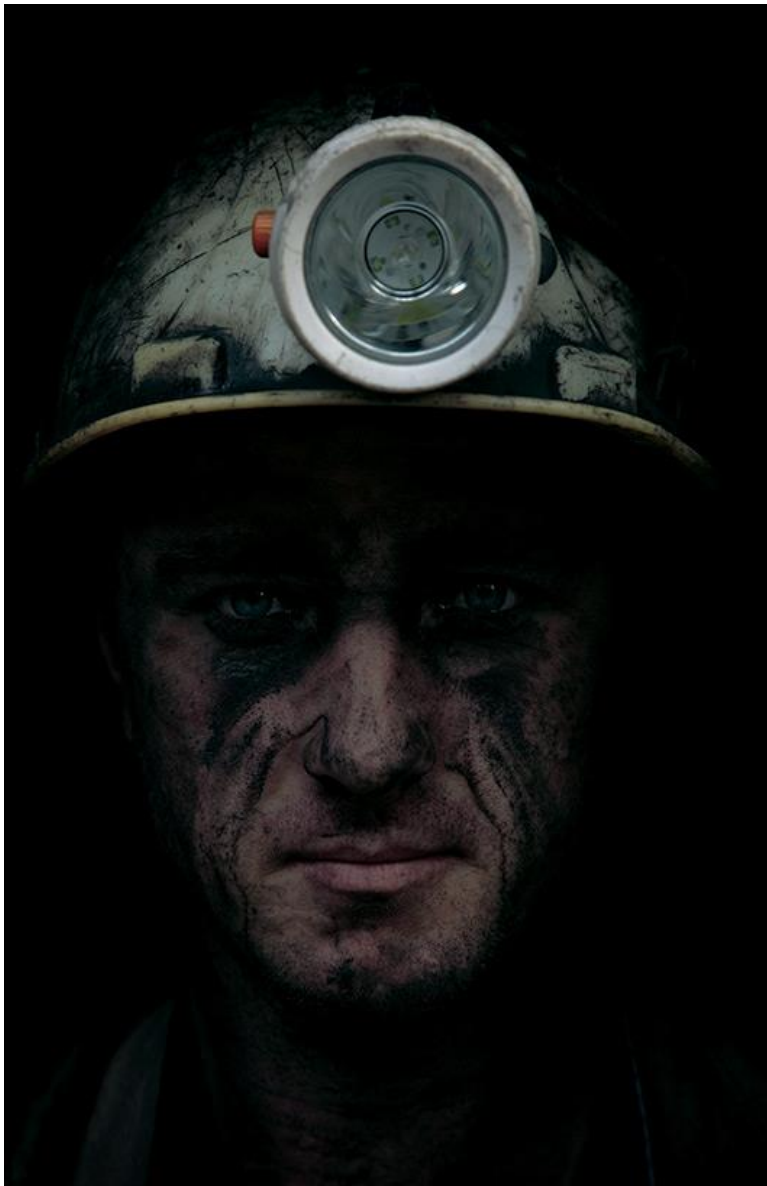
There are several different mediums that will work well for this project and produce fantastic results, such as oil pastel, chalk pastel, or charcoal. Mediums can be combined for even more interesting results. The best medium might be chalk pastel or charcoal. Most children really seem to enjoy the process of "painting" with their fingers. Step out of your comfort



zone and try mediums you may not think you like, kids don't care and they enjoy the process and it's rarely about the results. As it should be, right?

Sample, using charcoal and chalk or oil pastel

1. Pencil sketch first (guided drawing of miner's face and light)
2. Finish with charcoal on top of the pencil lines.
3. Have students use chalk or oil pastels to add color to their portrait's eyes
4. Protect the art by spraying it with a fixative or using sheet protectors



Drawing Portraits

The letter "U" technique which works pretty well and has a 75% success rate. The other 25% drew their letter U's very small and required lots of one-on-one to fit their features into their heads. Cute, but it does take up a lot of teacher time.

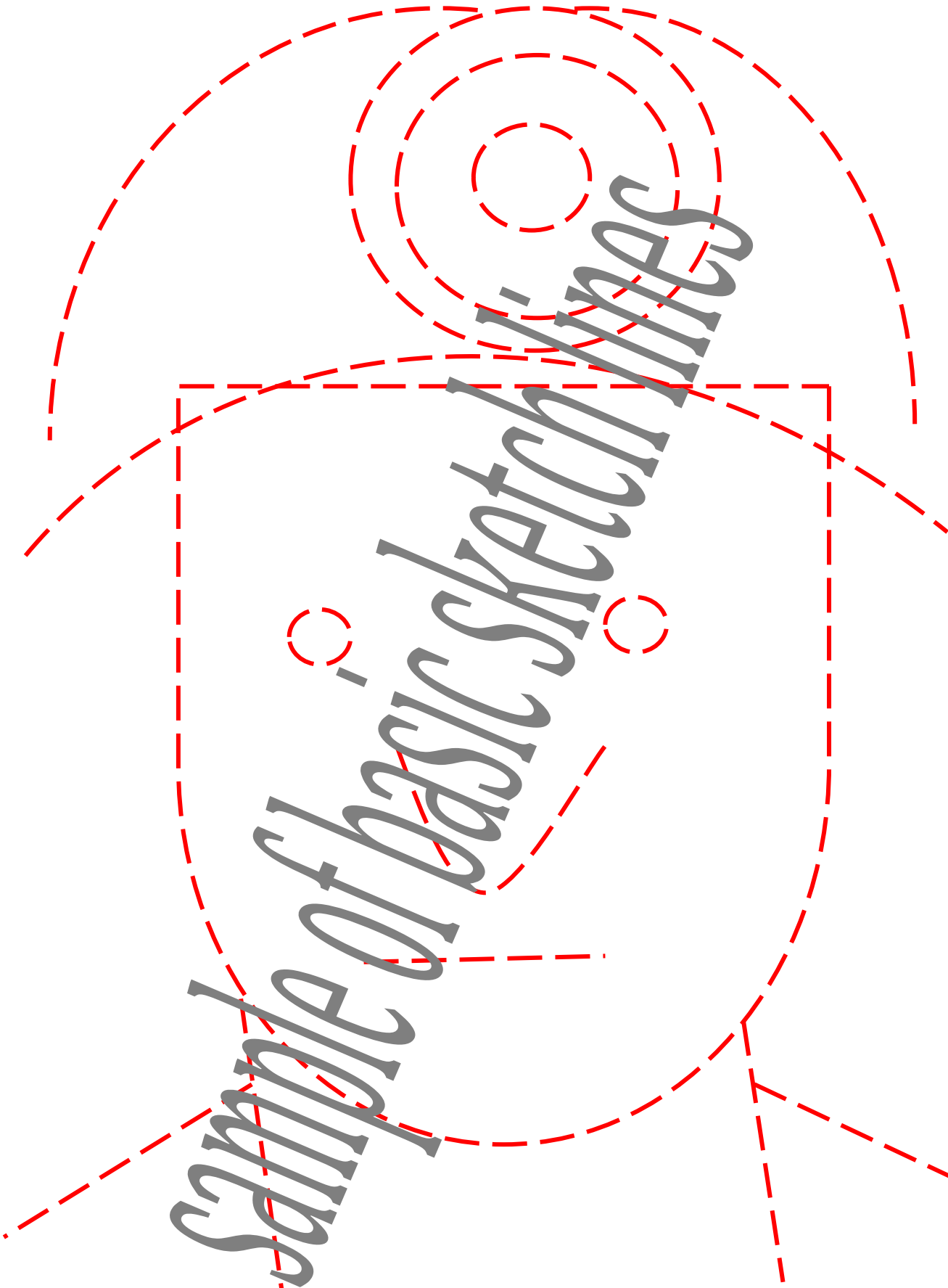
The Mirror Option:

You don't have use mirrors for self-portraits with younger kids because it really isn't necessary to get the features exactly right. As you move towards upper grades, this becomes valuable. Though every age group the students usually have a blast looking at themselves and checking out their teeth, freckles, etc. You may want

Templates

Use templates with portrait lessons for Kinders and even first grade students. They establish a face on which every child can draw features. It eliminates frustration when a child draws his head too small. Little kids really do draw small and if they do, it makes it hard to paint or color or really do much else. Templates are fast and when you have limited time, there is no better way to speed things up than to use templates.

Sample of basic sketches



Sweet Desert Dessert!

Source Unit: Desert: Unit One



Have students create their own cactus cupcakes or sugar cookies. Follow the tutorial found at this link to learn how. <http://alanajonesmann.com/2013/04/diy-house-plantcupcakes/#more-3106>

I can't see you!

Source Unit: Desert: Unit One

Ask students what they know about camouflage? Have them brainstorm what colors are used in the camouflage they have seen. Have them reflect why those particular colors are important.

Camouflage is the art of not being seen, practiced by predators, prey and plants. Color might help an organism blend in with their environment - even when - even when the organism itself cannot see in color. Body shapes can make them appear to be some other object common in the same surroundings. Patterns might sometimes make an animal more noticeable, but they can also help disguise outline. The tiger's stripes and the giraffe's patches make them almost impossible to detect in dappled light. Camouflage occurs also when they blend in with their environment by resembling something else, like a stick insect looking like a twig. Camouflage is not just brown and green. It can be all different colors.

When animals are hard to see, it increases their chance of survival in an already harsh environment. Camouflage patterns are different for each animal and they are purely custom made. Furthermore, camouflage patterns are different for the particular surroundings that an animal gets used to.







Vanishing Act: Camouflaged Collage

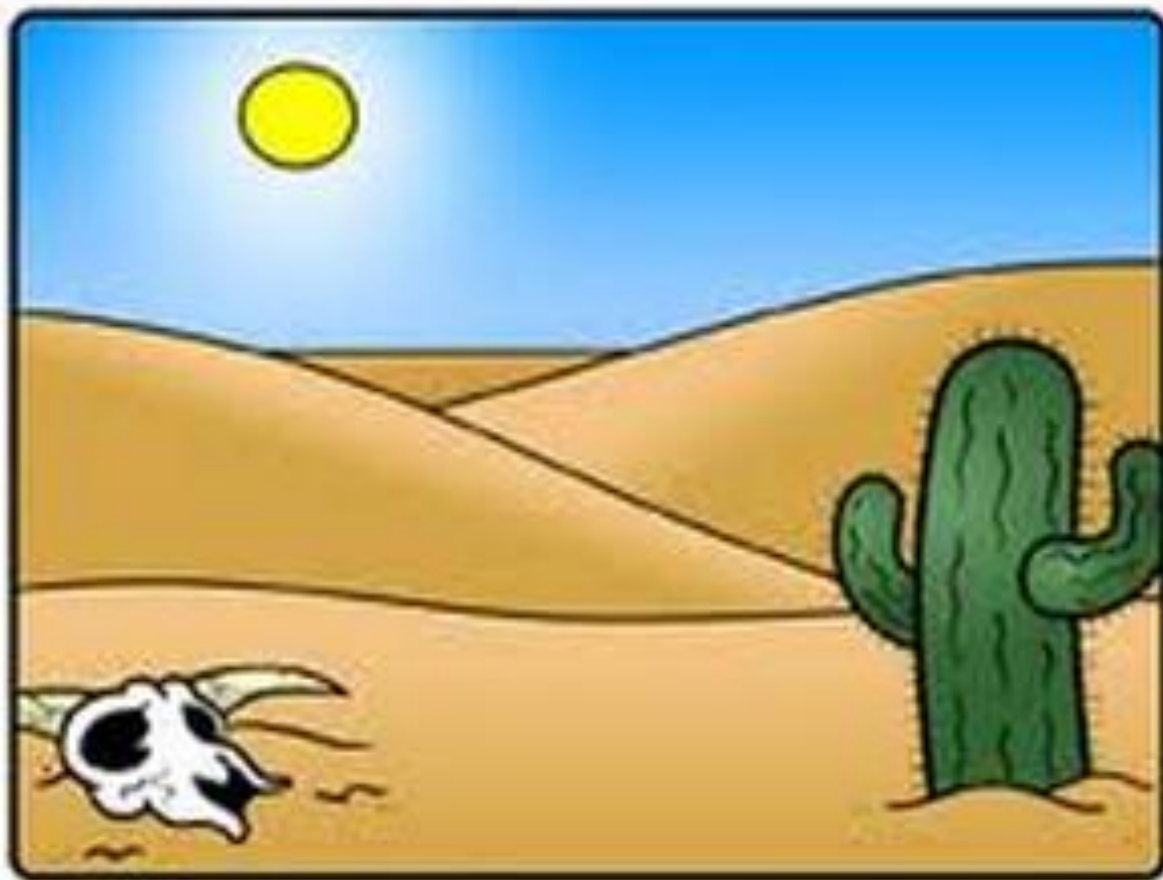
Source Unit: Desert: Unit One

Materials:

- Glue
- Paper
- Scissors
- Images of animals
- Regular and colored Sand (option)
- Collage materials and scraps

Students will design and make collages using different materials of an animal camouflaged in its environment with labels.

Extension: What colors should we wear to stay hidden in the desert? Have students draw pictures of different outfits that would be appropriate during the day or night in the desert. Then compile the pictures into a book to make a clothing catalog for desert travelers. Have students write descriptions for the clothing and why they think it would be important.



Rain Sticks

Source Unit: Desert: Unit Two



The legend behind the Indian rain stick points to supernatural intervention; the hope is to mimic the soft splash of raindrops in an effort to remind the "spirits" or "Great Spirit" that the people of Earth have need for a drenching rain for their crops, animals and thirst.

Construction

- Native American cultures in the southwest of North America built their rain sticks from hollowed-out, dried cactus tubes, pushing cactus needles into the core to form an obstruction. Small pebbles were then placed inside and the ends of the cactus tube sealed. Flipping over the stick simulated the sound of a gentle shower of rain.

Modern Uses

- The rain stick remains in use today in Native American culture and is present for both sale and use at powwows and other tribal gatherings. It has also been adopted by non-indigenous cultures and is often utilized as a soothing tool for meditation and music production.

Things You'll Need

- Cardboard Tubes
- Duct Tape
- Hot Glue
- Small nails
- Filler materials

Instructions

Use a pencil to draw a spiral beginning at one end of a cardboard tube and ending at the other. Don't follow the natural seam.

Hammer nails that are 1/4 inch shorter than the tube's diameter at 1/2-inch intervals along the spiral.

Cap one end of the tube. If it didn't come with caps, cut a piece of cardboard the same size as the hole and hot glue it securely to the end.

Put some un-popped popcorn, beads, dry beans, pebbles, seeds, gravel, rice or other dry filler into the tube.

Cover the open end with your hand and test the sound by turning it upside down.

Experiment with the amount of filler for a sound you like. When you're satisfied, put a cap on the open end.

Cover all of the nail heads with contact paper or masking or duct tape.

Decorate your rain stick. Try paints, torn paper or corrugated wrapping.

Tips & Warnings

- Empty paper towel rolls are the easiest, but 2- to 2 1/2-inch postal tubes (24 inches long) make the best rain sticks. Make sure to get the plastic caps that go on the ends. You can also use carpet tubing, which you may need to drill before putting in the nails.

Visit these links for additional ideas on rain sticks

<http://www.danyabanya.com/DIY-rainsticks-rain-stick-maker/>

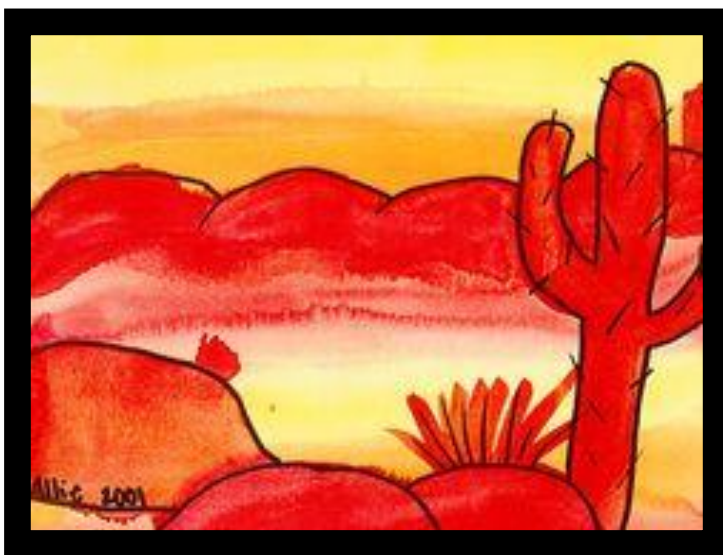
<http://www.enchantedlearning.com/crafts/music/rainstick/>

Desert Day, Desert Night: Warm and Cool Colors

Source Unit: Desert: Unit Two

This is an easy lesson to do with any grade level. Starting with a black oil pastel and a piece of white paper, have the children draw two versions of the same desert scene, ex. rolling hills, rounded mountains, cactus, rocks, animals, and finally, a sun/moon with concentric circles. Encourage the children to press hard with their oil pastels.

Now, bring out the watercolors. Students will create two scenes, one day time desert and one of the desert at night. Cool colors (green, purple, blue, grey, etc) turn it into a desert scene at night, warm colors (red, yellow, orange, brown) turn it into a daytime desert.



Note: Create gorgeous stars with watercolors by having the students sprinkle salt on the wet watercolor paint of their sky. DO NOT let them brush it around with their brush, it needs to sit until it dries (absorbing moisture all the while) and then the can be brushed off by hand, leaving beautiful splotchy stars behind.

Cute and Creepy!

Source Unit: *Surviving the Swamp Part One*

Have all students draw/paint and design a new swamp creature (where does it live, what is it called, what/who does it eat?).



With a balanced blend of cute and creepy, have students take inspirations such as Tony DiTerlizzi and Chris Ryniak and use some paper clay and their sculpting

skills to bring their own swamp critter to life!

Option: Then they'll trade! Other art students, after trading out (at random may be best) take those monster drawings and in turn create monster figures. Or choose an inspirational artist's image from a book, ex. Tony DiTerlizzi's, or the following pictures and try and recreate it, still answering the questions, where does it live, what is it called, what/who does it eat?.

Materials:

- Aluminum foil (to create support armatures/structures)
 - Wire (to create support armatures/structures)
 - Clay (many options are available, such as polymer clay (aka Sculpey), air dry clay, paper clay, etc)
 - Acrylic paints
 - Paint brushes
 - Paper (to plan out designs and answer questions)
 - Pencils
 - Images for inspiration



An armature is a fundamental part of a sculpture. In very basic terms it is the skeleton or support structure that will hold their clay as they sculpt the figure. Start out by building up the forms using materials like insulation foam and tinfoil. Once they have a pretty good under-structure, they can start applying the clay.

Sample Paper Clay Recipe:

Paper clay can be bought or you can work with students to create a **VERY STRONG clay-like substance** using paper from a shredder (or, another option, buy a big block of recycled paper insulation from a home depot type store. One giant block of paper insulation costs around \$11.50 and you can make tons projects out of it.)

- Mix up some papier-mache paste (made from a box of Art Paste – , ex. Elmers Paper Paste, which can be purchased very inexpensively. It comes in a little box and mixes to make 4 quarts! It lasts forever, doesn't spoil, and it harmless and non-toxic.)
- And you need some premixed joint compound.
- Stir together six cups of your art paste goo, and 1 cup of joint compound until smoothly blended. Then begin to add in dry cellulose insulation (paper insulation). Keep adding and squishing it to break down the paper fiber. Hand lumps to kids to knead some more until it resembles a paper-clay.
- You can then squish it, or mold it over an armature, and/or make figurines. It costs next to nothing for the sheer bulk of clay you can make.

Option: Whispering Wisps

- Have students create their own version of the will-o-the-wisps (Look at other authors interpretations, such as Tony DiTerlizzi's explanation and illustrations in his book *Arthur Spiderwick's Field Guide* for inspiration), what they really are, and illustrate their tales. And/or students will sculpt their drawing of the will-o-the-wisp (or other monster) out of glow in the dark clay, or using glow in the dark paints. (Inspiration will be given by showing the work of artists such as Álvaro Herranz of Fuego Fatuo <http://diterlizzi.com/home/friday-fan-art-39/> &

https://www.etsy.com/shop/FuegoFatuo/sold?ref=shopinfo_sales_leftnav)



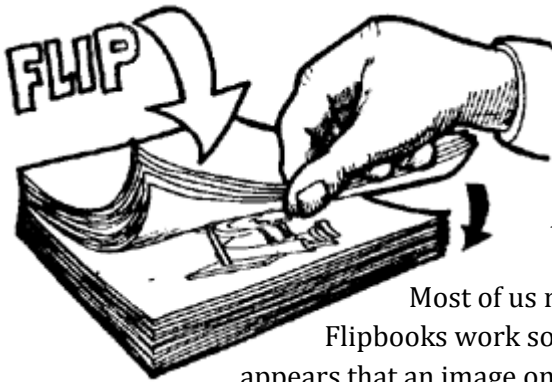
Further inspirational samples of Chris Ryniak's Monstrously Cute Swamp Monster Sculptures





Survival? We're Flipping Out

Source Unit: Mountains, Part One



The fact is that animation, whether a flip-book or full-length Disney movie, is simply telling a story by finding the right sequence of pictures and words. That is a powerful skill for kids to master. Before any animator, filmmaker or video artist begins a project, he or she first does a storyboard to lay out the sequence of actions.

Most of us remember being shown a flipbook as children. Flipbooks work so that, when the pages are “flipped” through, it appears that an image on the page is actually moving. A series of still pictures viewed in quick succession creates the illusion of movement, whether it is actors dancing across the silver screen, a horse galloping, a tree growing, a rocket taking off, a cat chasing a dog, a volcano, someone dancing with their mp3 player, a fish getting caught on a line, or a man running on paper.

Flip books offer the most versatility and creativity in hands-on animation projects because they are not limited in length or materials, as is the case with some other techniques. They're inexpensive to create with common materials and require no viewing devices. Most important, the process used to make a flip book forms the basis for all of the more sophisticated animation techniques, including filmed animation.

Watch the ‘animatic’ or storyboarded version of *Le Roi a Froid* with students at <https://vimeo.com/29976775>. You can watch the number of frames click by in the bottom right hand corner to see how many ‘flip pages’ or storyboard sheets the animator had.



For a flip book you first need a story, maybe one as simple as a dot moving from one side of the page to the other, or as complicated as a truck that seems to disappear in traffic. A flip book simply takes a storyboard and inserts the intermediary steps needed to create the illusion of motion. The basic rule is, if it will flip, it will work, so try index cards, Post-it notepads or other "flippable" media.

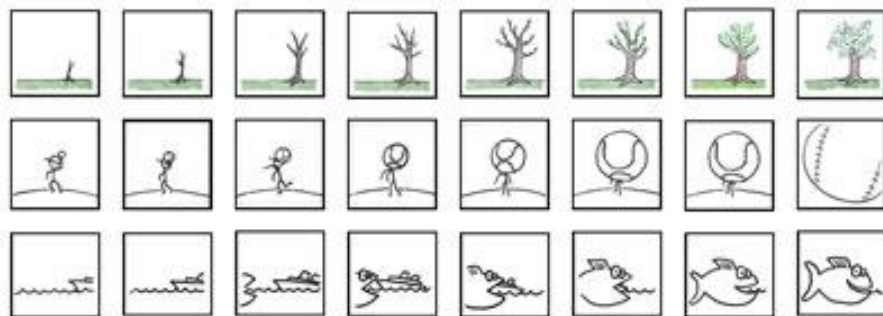
Materials

- Post-it notes, index cards, or an old paperback with wide margins
- Pencil
- Markers or other drawing tools

11. Have students look at a terrific example of a simple animation in motion, and explain the idea to them aloud.
12. Ask students to think of a simple movement that they would like to portray, such as
 - A boy doing jumping jacks?
 - Two people running toward each other?
 - A cat chasing a bird?
 - An erupting volcano?
13. Start simple and have kids do several flip books to get the feel of what's possible. The first time, have them use the basic compositional forms of drawing that they're already used to, like dots, lines or circles, so that they focus on placement and sequence rather than the detail within the object. Or try two simple objects, perhaps two arrows starting on opposite sides and crossing each other.
14. Now, move on to other ideas on how to tell a story, a story of survival. Perhaps they could look back at our past adventures and draw a person sinking into quicksand, a camel with a shrinking hump crossing the desert, a monkey in the rainforest, an alligator chasing them through a swamp, or a thirsty traveler looking for lemonade...or look ahead to our mountain adventures and have someone scaling a snowy cliff.



15. Provide students with small pads of paper (or a pile of sheets of paper, all the same size, which they can tape or staple together at the top to make a pad) to use as their "film." Students



will need at least 25 pages for their flip book. The more pages they have, the nicer it will be, so don't be afraid to encourage them to go for 40 or 50 pages. The pages don't have to be large. Small strips or squares are best. You want something that is easy to hold in their hand and flip with their thumb.

16. Small pre-purchased notepads and notebooks can be great for flip books. Sticky note pads in the traditional two inch square size are perfect. And as a plus, they can be easily taken apart and re-aligned together. If you don't have little note pads, you'll have to cut small pieces to size.
17. Next, have students determine how the action, or the motion of their subject, will start and end.
18. To make a picture look like it's moving, it's necessary to draw the same thing, but with a little change on each page to indicate the movement. Suggest students draw their first and last

pictures before we start. The action will begin at the bottom of the book and move to the top. Also, if their last drawing doesn't match the top drawing, don't worry. Just discard it. [Beginners should keep things simple. Stick figures, ants, or bouncing balls can all be worthy flip-book stars.]

19. For drawing those middle pages, 'draw or trace the next drawing on the next blank page on top of the drawing they just did. Work from the bottom page of the pad toward the top page. It is very helpful if the pad paper is thin enough to see through slightly. Then they can see the previous drawing. If not, they can flip the upper page every so often to compare the drawings.'
20. Remind students to draw their scenes as close to the unbound edge as possible so the action is easy to see when the pages are flipped.
21. Tip: When drawing, push down hard with your pencil to create an indentation on the next frame. Use this as a guide to help you reproduce parts of your movie that don't change, like background scenery.
22. Make gradual changes from frame to frame. The more similar each frame is to the previous, the smoother the action in the final movie. (To tell a long story, some people use the margins of an old paperback so they'll have hundreds of frames to work with.)
23. Tell students to keep drawing until the movement is complete. Ideally, there should be some twist to your story to give it drama, or humor, as in the very very abbreviated samples shown. [Play. Watch. Enjoy. Language not required..]
24. When they're done drawing, they can add color to their images. They may not want to add color to everything in their story, but they may want to add it to one aspect to add emphasis or draw attention to something, ex. the bouncing ball, the flower blooming in the desert after rain.
25. Once the "story" is mapped out, ask students to thumb-flip the pad forward and backward to show their own mini-movies. As you flip your book from back to front, your image should appear as if it's moving. Don't worry if the motion is a little choppy. Determining how much movement you draw from page to page comes from practice. A great hint to remember is that the faster your object moves, the less drawings you'll need, and the slower it moves, the more drawings you'll need.
26. Tip: For help and fun animations go to Robert Truscio's Flip Book Animation tutorial page: <http://home.comcast.net/~bobtruscio/drawings/FLIPBOOK.htm>

Students must illustrate the path taken to get to the witch's candy cottage, and then show the path the children take out of the forest. Have the students draw the map as if they are looking down on the forest. Teach students the importance of a map key and the compass.

Questions you might ask as you draw: Discuss the journey that Hansel and Gretel took to get to the witch's house.

- Where did Hansel and Gretel's journey begin?
- Where did they go to next?
- How far do you think they travelled? Why do you think that?
- What direction do you think they travelled? Why do you think that?
- List the events of the story in sequence.
- What kinds of trails did Hansel & Gretel leave? (ex. breadcrumbs) How should we mark those?
- Where does the witch live? Do you think she's far away or close to Hansel & Gretel's house?
- What kind of dwellings do the people live in?
- Are there any mystical creatures that live in the woods?
- Is this a fictional or factual (real) land? Could it be based off of somewhere real?

Now that you have created sample map(s) on the board and discussed different techniques they are ready to be divided into small groups or to work as individuals for the following project.

Option: Use manila paper to give the map an older look. Each one may look different and unique to the student.

Instruct students that they want to create a map of the forest they became lost in. Encourage creativity.

Objects/obstacles that may be met along the way could be included on the map. E.g. trees, a bridge, rocks, a gate, etc. (These could either be directly drawn onto the map or a legend could be drawn



and color coded.) What were the sequence of events in either their version of the story, or the original? What will be the purpose of their map? Are they the witch trying to keep people away? Or help people

find her? Are they Hansel & Gretel trying to find their way home? (Which could be the witch's cottage or their father's home, all depending on the twists your version takes!) What style are they going to use?

As the students work, encourage them to use the language of direction, e.g. up, down, left and right to describe the maps they are drawing.

- *Where do you start in your map?*
- *In which direction do I travel next?*
- *How far will I travel in that direction?*
- *If I couldn't see your map what directions would you give me next?*

Ask students to describe their maps to a buddy using this language.

Option: Combine watercolor paints and colored pencils for this activity. A general rule can be: small areas=colored pencils, big areas=watercolor paints.

Encourage students to paint either water or land first. If they paint the land first, use the drying time to color in any small details in the water, houses, etc.

Then, when land paint is dry, paint the water. The trick is to not let wet paint and wet paint come together or they will bleed into each other and edges won't be sharp, unless they want them to bleed!

Encourage students to use more than one color for the water. Try mixing blues with greens or even purples to achieve an interesting color. The same is true for painting the land.

Green and brown are not the only colors! Encourage each child to think up their special color palette.

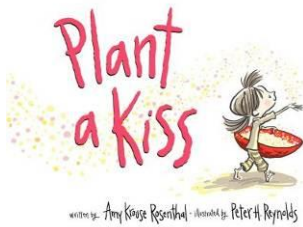
Plant a Kiss & Watch it Grow!

Source Unit: Sweet!

Children must wonder why adults say some of the curious things that they do—for instance, the phrase planting a kiss.

What might happen if you really did?

Read the book, *Plant a Kiss*, or another similar story about spreading kindness and love, sharing and caring, with your students.



Before reading, ask students what might happen if you planted a kiss. How would you do it? What would it need to grow? After reading, have a discussion about kindness, generosity, and how every person has the potential to affect big change.

Unexpected gifts have a magic all their own. Plant a Kiss Day is in April on the 29th, but this is one day that can be celebrated any time.

Your student's mission is to go out in the world and spread a little color, connection, caring, art and magic by "planting kisses" in their own creative ways. One of the ways we're going to do is with a pen, paper, & paint. **But what might be some other ways to "plant a kiss?" List the student's ideas on the board.** Planting a kiss can be simple, free (smile at someone), expensive, silly, serious or anything you want it to be. Spreading love and joy, kindness & caring, is easy! For even the simplest acts of kindness and magic can change the world.

Introduce the art medium of pen and ink and watercolor to students. It is very similar to, if not the same one used by Peter H. Reynolds in *Plant a Kiss*.

Materials:

What you'll need:

- watercolor paper (construction paper or printer paper does not work well for this project, heavyweight cheap watercolor paper works great. It's fine to use the cheapest you can find.)
- Black waterproof markers/pens

Planted a kiss?



Planted a Kiss.



- Liquid watercolors or Pan or cake watercolors
- Medium size all-purpose brushes
- Water containers
- Option: table salt
- Option: stickers (heart shaped and/or others)
- Option: Glitter & Glue to add a bit of sparkle
- Option: Kisses Candy

Creative thinking is the fuel for getting things going. Dreaming about the project is a huge part of the process. The actual 'doing' requires following through on the dream, but the dream is the rough sketch. For most artists, many projects require several rounds of rough sketches before the final version is complete. Friends often will weigh in with ideas and opinions that help evolve a piece. Encourage students to ponder and conjure the vision, and talk about their ideas (perhaps they want to do a series of pictures, a card with an image of them planting the kiss on the outside and a surprise inside, a single image of the kiss in bloom, or some other idea), but eventually nudge them to "prove their groove."

Once they have a vision in mind of what their project may look like, encourage your students to draw the basic shapes in pencil but to leave the small details for the marker. Many children will try to draw the entire picture with pencil and may take a very long time. In order to have children finish in a reasonable time, suggest this strategy:

Big shapes in pencil

Small details in marker

Have students keep in mind, that the closer you are to the bottom of the page, the larger the object should appear. The closer you are to the top of the paper; the smaller the object should appear.

Using watercolor paints, have students add in splashes of color. They may want to color their whole image, painting the background first. Or they may want to use color like in our story, where it highlights certain aspects. Students can use many different shades to paint their image, not just green for fields and blue for sky. Think about the daylight hours: is the sun setting? They could paint their clouds purple and pink.

Option: A Heart to Resist Technique

This is an incredibly simple resist technique, with beautiful results.



Before students set out to create their watercolor paintings, have them place heart stickers on their watercolor paper. (You can use any shape of sticker, of course, but these go great with *Planting a Kiss*.) As students work let them know it's perfectly fine to wash paint right over the tops of their heart stickers as they paint and let colors bleed into each other, ex, perhaps hearts rising into the sky?

Let the pages dry **completely**. Then, have students peel away the heart stickers (which come off easily) to reveal a white heart in the midst of golden, blue, or rainbow hues paint.

Another Option: Have students tear the large sheet of watercolor paper into smaller sections against a metal edged ruler. This, opposed to cutting watercolor paper, makes beautiful naturally rustic edges.

Plant One, On Me!

Have students package up a "kiss" (ex. 2 individually wrapped truffles, box(es), tag, & art) and pick a person to plant it on. Include a note on the little tag attached instruct the recipient to keep a kiss for themselves and share the other with someone else, ex. "One for you, and one to share!", or "Keep one kiss and pass one along. Let's spread the Kindness in honor of Plant a Kiss Day!" For even the tiniest (and tastiest) acts of kindness can change the world. Plant a seed...and let it grow!



Design your balloon!

Source Unit: Going Up!

Inspire students with a video showing a plethora of designs from rockets to elephants, monster trucks, and even the Old Lady Who Lived in a Shoe, such as this...<http://vimeo.com/4399471>

If we're setting off like Professor Sherman, we need our own hot air balloons! A hot air balloon is an incredibly personal representation of style, personality, image, performance and more. Deciding what your own balloon should become can involve limitless design possibilities - it can be as simple or complex as desired. Not sure where to start? Not surprising! But that's all right, it all begins with the balloon.

Choosing the Shape

To begin with, what is the preferred envelope style that you might want? Most hot air balloons are designed using a shape which minimizes the stress on the fabric.

In the early days of upper atmosphere research using helium balloons it was common for the balloons to burst when they neared their intended float altitude. These failures were traced to the shape of the balloons

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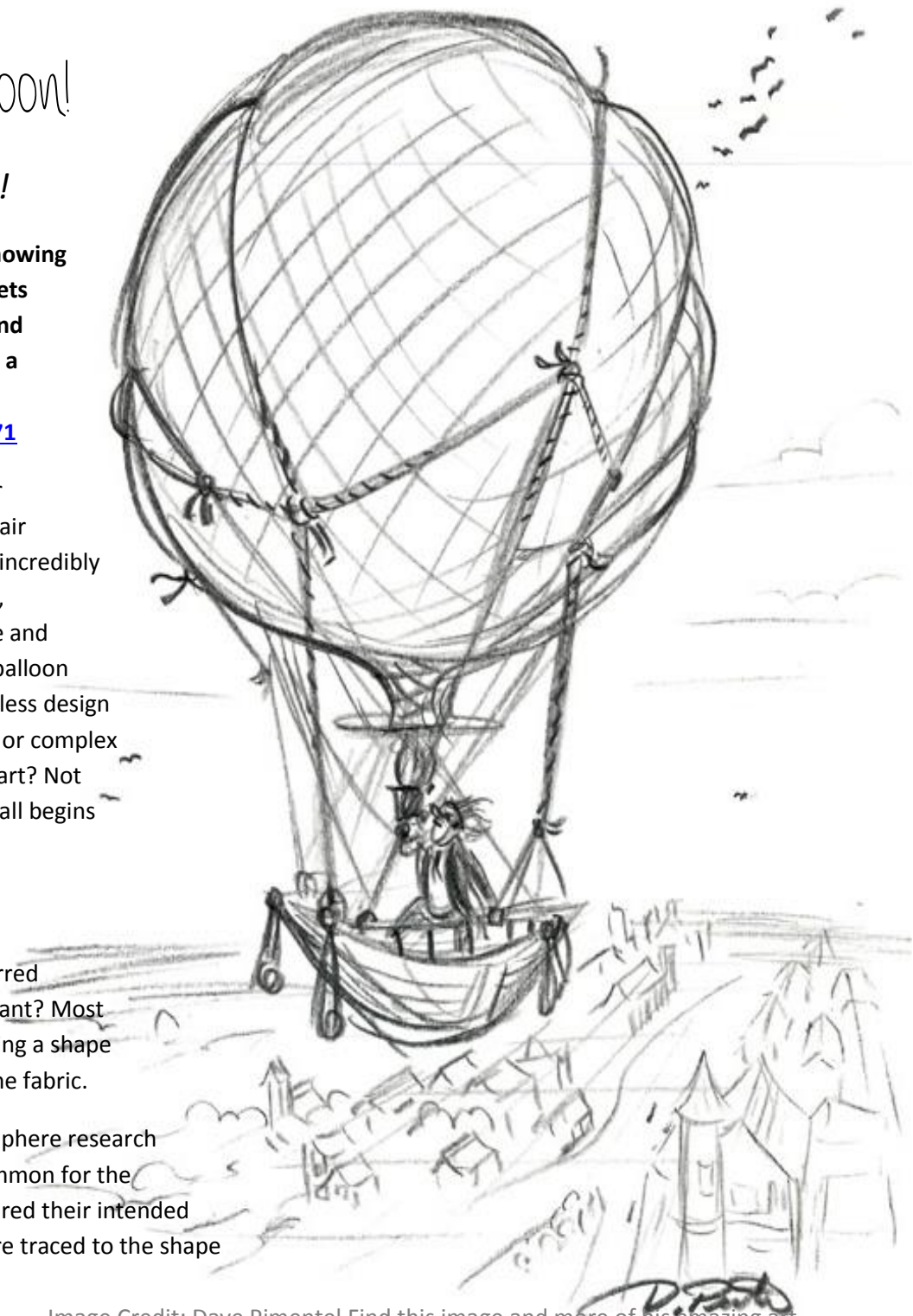
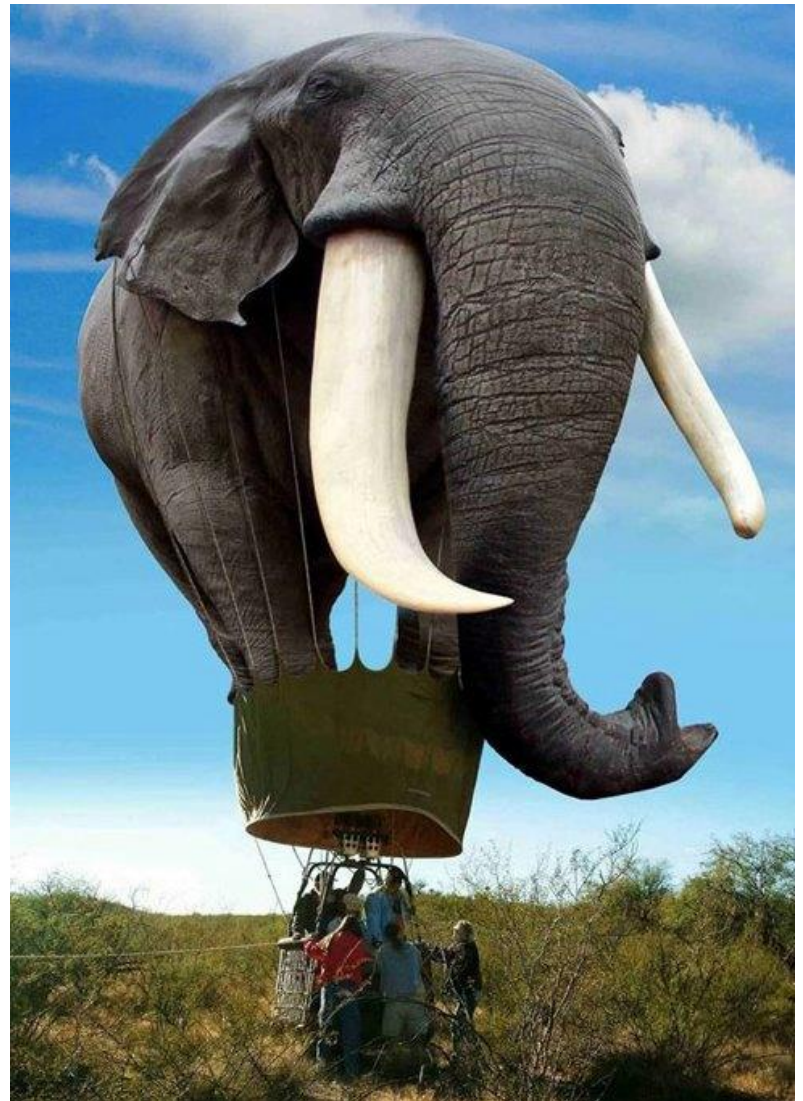
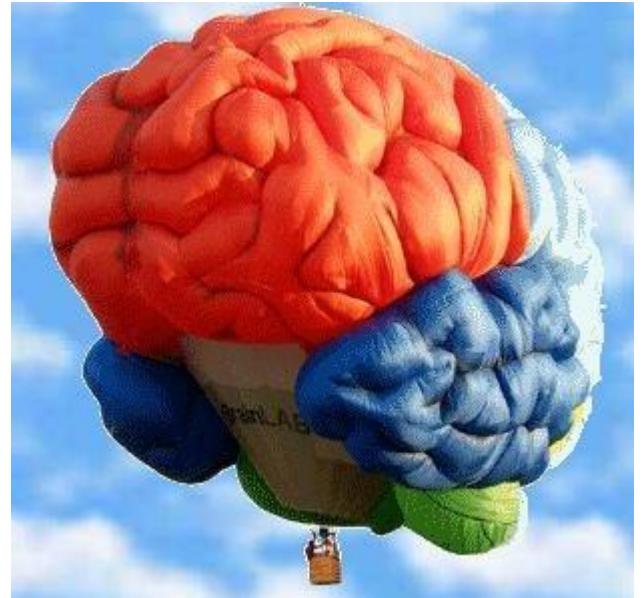


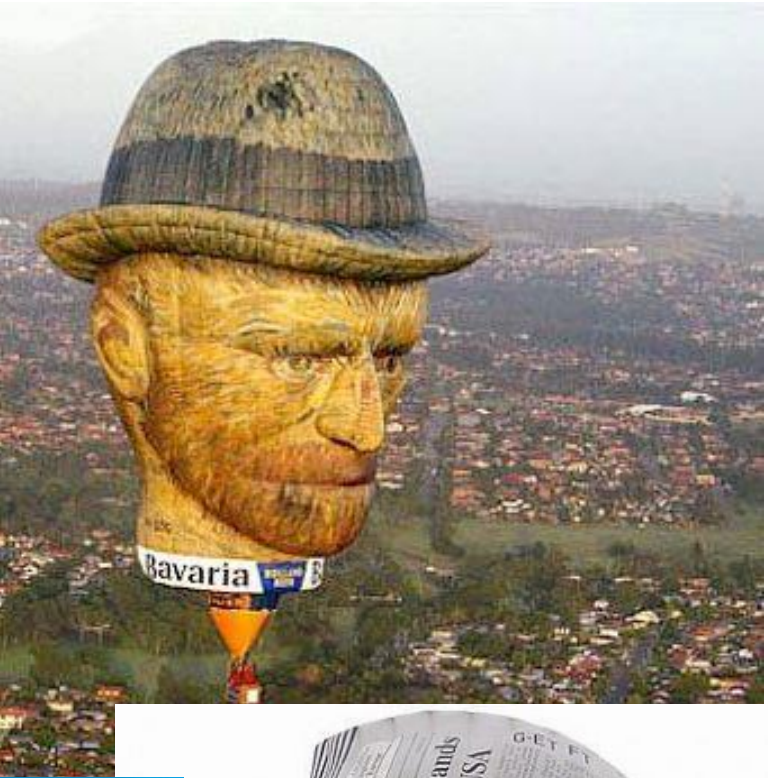
Image Credit: Dave Pimentel Find this image and more of his amazing art at <http://drawingsfromamexican.blogspot.com/2010/07/hot-air.html> All Rights Reserved! Copyright 2010.

loading the thin material until it ruptured. The US military commissioned a company called General Mills to devise a shape which minimized the fabric stress.

A design that is similar in appearance to one of the mainstream manufacturers' models might serve as a reasonable starting point - but students should feel free to customize to their heart's extent- even if it's very unique, a little oddball, or even close to full-blown crazy. Check out the 3-gore design in the chart, or these pictures of real-life balloons!

You should consider the number of gores you'd probably like (8, 12, 16, 18 & 24 are common numbers of gores), the shape of the gore (bulbous, semi-smooth, or flat to any degree), and the orientation of the different panels comprising each gore (horizontal, vertical or diagonal). Quickly draft a 3D rendering of what the balloon will look like based on your design preferences. Tip: **For help with how to draw a basic hot air balloon go to and watch:** <http://www.drawingnow.com/tutorials/view/how-to-draw-a-hot-air-balloon/>







12-gore Half-Gore construction



16-gore Flat Panel construction



20-gore Half-Gore construction



3-gore Extremely Bulbous!



8-gore Bulbous



16-gore Semi-Bulbous



24-gore Semi-Bulbous



18-gore Zig-Zag Bulbous



18-gore Zig-Zag Spiral Bulbous

Rising High! Choosing Your Colors

Source Unit: Going Up!

Art and design influence so much of the world around us, and such creativity can lead to a career.



Before that balloon was born, an artist had to make all those decisions about what it looked like.

Any type of artwork or logos can be integrated into the design of your envelope, whether inlaid or overlaid (appliqué). Inlaid cuts of any angle, curvature or complexity can be added to change fabric colors within any panel at any location in the envelope.

Painting directly on the fabric is sometimes useful for smaller accents, and is a technique often used to add detail to special shapes

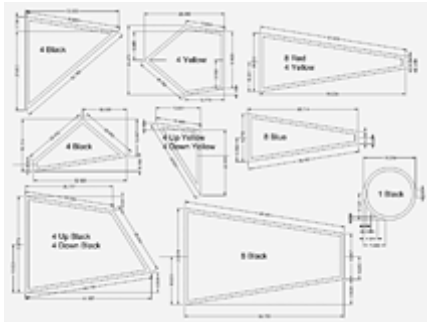
Each student must create three separate balloon designs and complete one original drawing of their final balloon concept, using Sharpies, colored pencils, crayons, and/or colored markers; and an autobiographical worksheet

Discuss with students the difference between coloring a balloon and designing one. Have them use symbolism and imagery to tell something important about themselves, "There are a trillion things that make you you!" Be quick to praise a storytelling burst of creativity, and just as quick to have students push their ideas further, and not be satisfied with just a pretty color



scheme.

Show students examples of color scheme swatches from books or cards.



The developed pattern dimensions for an inlaid parachute design



Sewing the center panel of the parachute



...And the finished product!

Design your Wicker Basket Gondola.

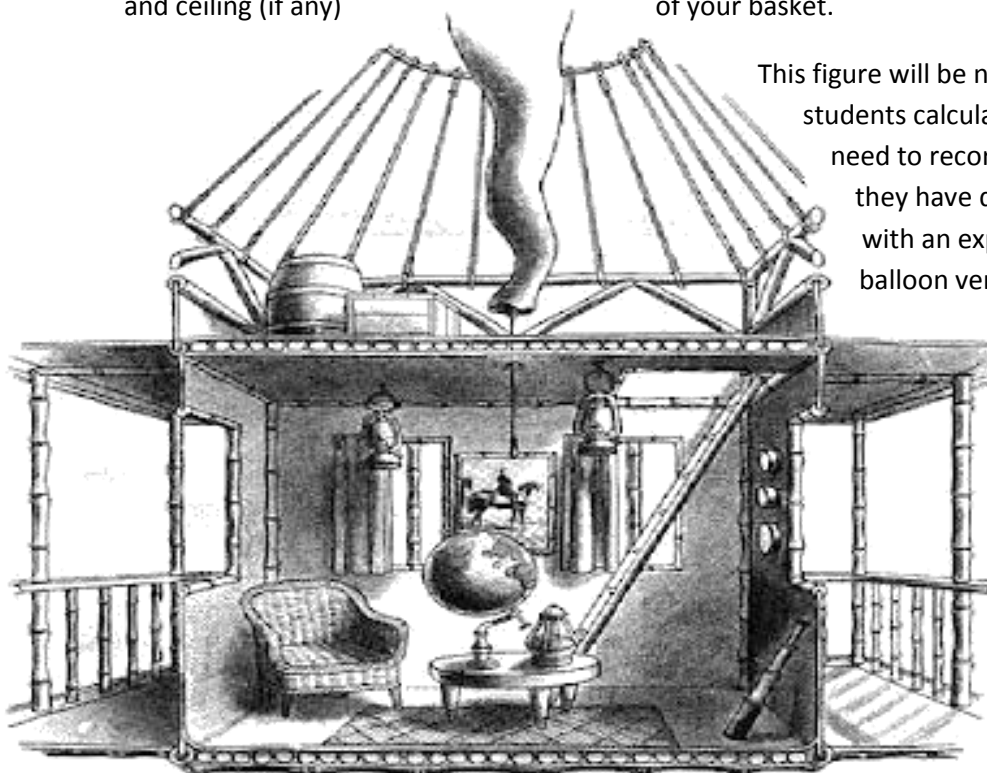
Source Unit: Going Up!

What was Professor's reasoning for his basket? Who was his inspiration? (page 41 in the novel) What ideas was his basket built with? Remember Professor Sherman had two floors, an open air attic for storage and a porch wrapping around his basket. **What was his basket made of? Why did he choose those materials? P. 41.**

Students don't have to get this elaborate, though it is rather fun, but they need to make room for their passengers, supplies and equipment. Also keep in mind comfort, such as beds, chairs and entertainment. How will they handle laundry? Going to the bathroom? Taking a shower or a bath? (They could use wipes!)

What will the furniture be made out of? What did the professor make his out of? Why? P. 43-44 in the novel. Everything was chosen for the idea of...

Using graph paper provided by your instructor, create a front view of your gondola showing any rooms, stairs, furniture or other designs you decide to add. Now calculate the square footage of the walls, floor and ceiling (if any) of your basket.



This figure will be needed for later, so be sure have students calculate this accurately. They will need to record in their journal what balloon they have decided to use in your travel with an explanation of why they chose this balloon versus the other balloon options.

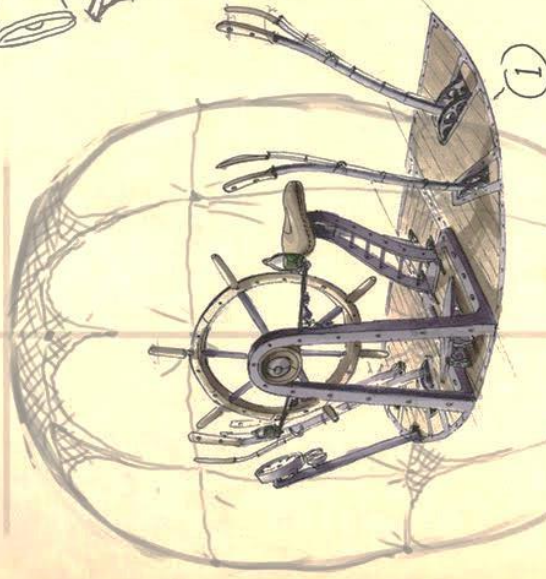
Also include the drawing of their basket gondola with the square footage calculations.

What did the professor use for ballast? What will the students use for ballast? P. 43 in the novel

Samples of Artist Renderings of imaginary Hot Air Balloon Designs follow.

Mortal Engines - Hot air balloon design

The hot air balloon is a small but still functional vehicle with all amenities as a big sailing boat. I wanted the design to feel amazing yet believable.



Wheelhouse, and levers are simple and has a very mechanical design. The overall feeling should be functional.

Wheelhouse
1

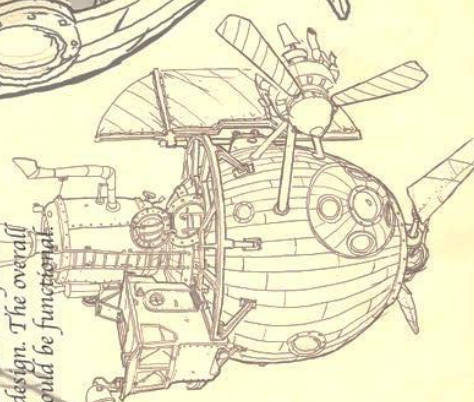
Rudder is made out of sail from sailingboats and is always colorful with some patterns to show how you are, like the old knight had their family marks.

Crew cabin

Engine

Galley and dining
This space also works as the relaxing area.

Kitchen area



Project: Mortal Engines
Interior design - general layout

Way Above Water Basket Weaving

Source Unit: Going Up!

Tutorial found at: Craft Passion

<http://www.craftpassion.com/2011/05/easy-basket-weaving.html?pid=554#picgallery> Copyright 2013. All Rights Reserved.

Have students become apprentice basket weavers before they leave for Krakatoa! Before we can be trusted to construct large wicker baskets for hot air balloons we must make miniature baskets and become seasoned weavers! We may need those skills later to escape the volcanic island!

This is a wonderful technique to make basket. With this method and concept, basically students can build any shape and size basket that they want. Here, it is shown in three shapes: triangle, round and square, but you can create a rectangle, pentagon, hexagon, heptagon & even octagon with just a little tweak in the design. The height can be modified to suit their preference. One thing they have to take note is that the sum of the “fingers” on the frame must be odd number. Have students take a closer look at the template, especially the square basket, they should notice that one of the sides has 1 extra “finger” than the other 3 sides.

To make faux wicker baskets, like hot air balloon baskets, use jute twine and they come out very sturdy and rigid!

Note: Students can use any material to weave the frame of the basket, as long as they are “weave-able”, not too bulky and in long soft strips, eg: twine, yarn, fabric strip, ribbon, rope, glossy paper strip, plastic, raffia etc...

Material:

1. Thick Cardboard or paperboard, non-corrugated (around 1/6” thick).
2. Felt for bottom and base (optional)
3. Weaving material, example: twine

Tools:

1. Sharp scissors (able to cut thick cardboard)
2. Hole puncher
3. Tapestry needle (#13)
4. Clothes pin
5. Craft / Tacky Glue



6. Pen or pencil

7. Ruler

Download the [basket weaving template](#) (templates for a triangle, round and square) in pdf format or use the following page. *Print it and enlarge 200% to get the size in the example.*

Have students trace their chosen design on thick cardboard.

After tracing the template on the thick cardboard, use a pair of strong and sharp scissors to cut the template out.

Punch the holes with a paper hole-puncher.

Trace base on felt (if desired), cut 2 pieces.

Get the rest of the tools & materials ready.

Option: Brush a layer of tacky glue on the bottom of the basket, press & stick the felt onto it. Repeat the same to adhere the felt to the base. Snip the edge of the felt follows the grooves between the fingers.

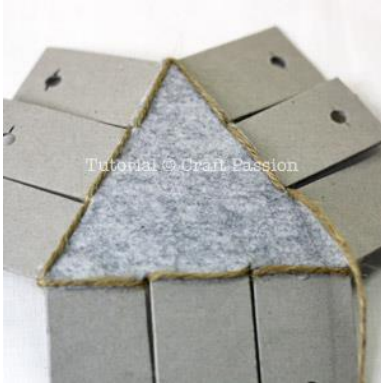
1. Being to weave over and under around the fingers of the frame.



2. Push the twine into the grooves of the felt that you have just snipped.
3. Keep on weaving over and under the fingers until the end of first round.



4. When begin the second round, you will notice that you are weaving in the reverse side of the first round. Both sides should be fully wrapped after you finish the second round.



5. Continue weaving and push the twine down to make them closer to each other. This will avoid gaps in between and will also hide the cardboard away. As you go higher, the frame will stand up vertically and form the side of the basket.



6. Continue until you just over the level of the holes. Allow a long length of twine for rim stitching later.



7. Put on clothes pin and allow some room for rim making.



8. To make the rim, insert another type of twine (ex. white cotton twine) through the space between the clothes pin by using a tapestry needle. Since the length is quite long, divide the twine in half and work both ends from middle.

9. Keep going round by round. Be careful on the corners and arrange them neatly.



10. Lay the twine until it fully covers the top portion of the basket.



11. Secure the rim by stitching the original twine through the holes.



12. Stitch again from the opposite direction to form crisscross pattern.



13. When reaching the corner, pierce through the gap and make another stitch there.



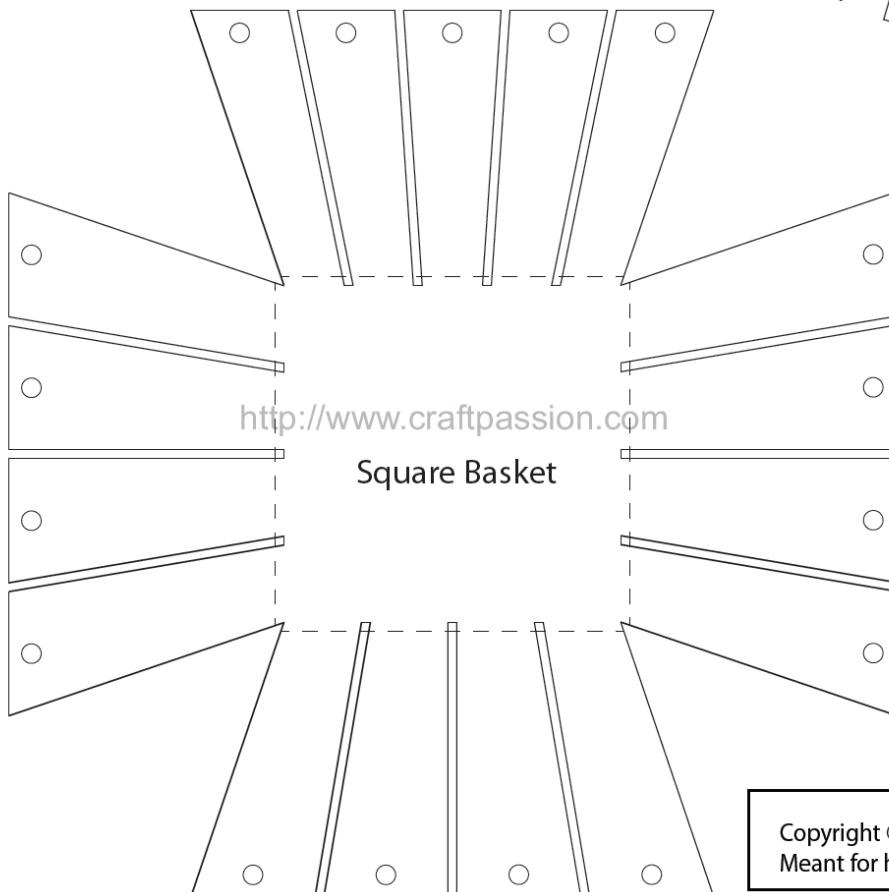
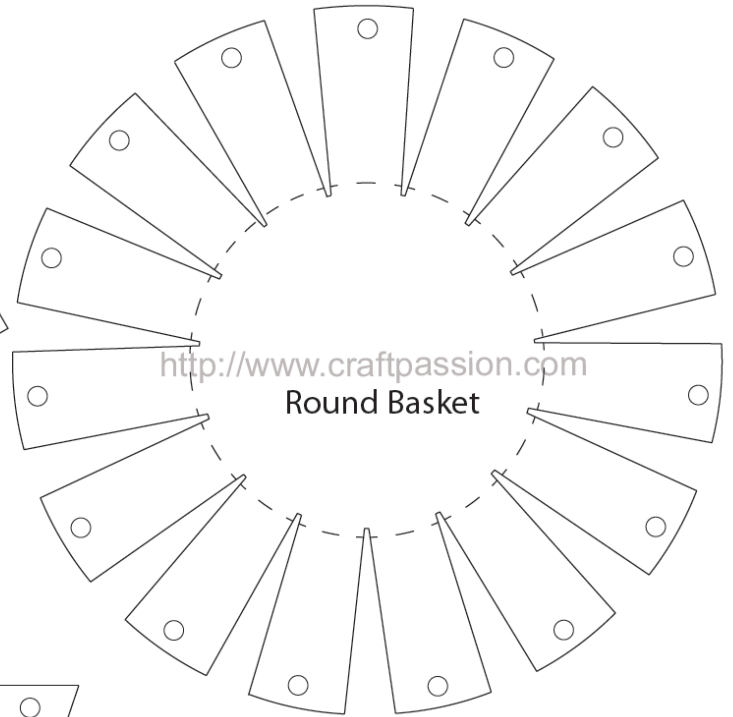
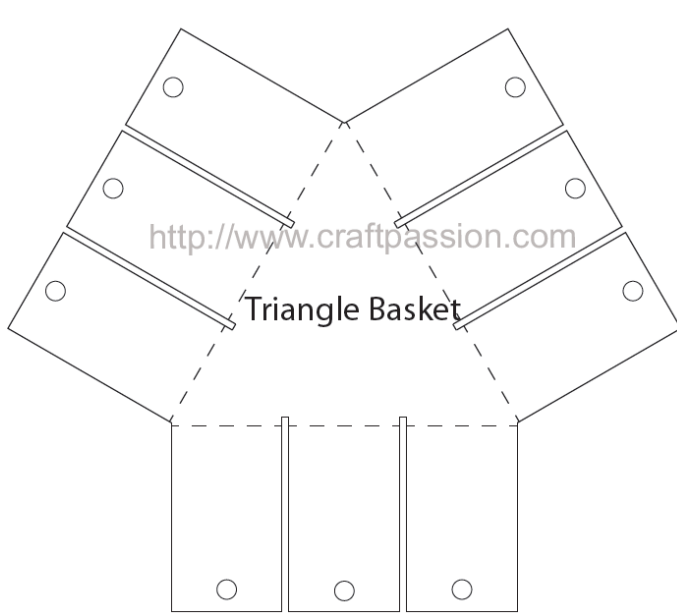
14. Hide all ends into the braid to neaten up the basket. The basket is ready to be used.



Easy Basket Weaving Template

[detail tutorial @ <http://www.craftpassion.com/?p=11533>]

Enlarge 200%

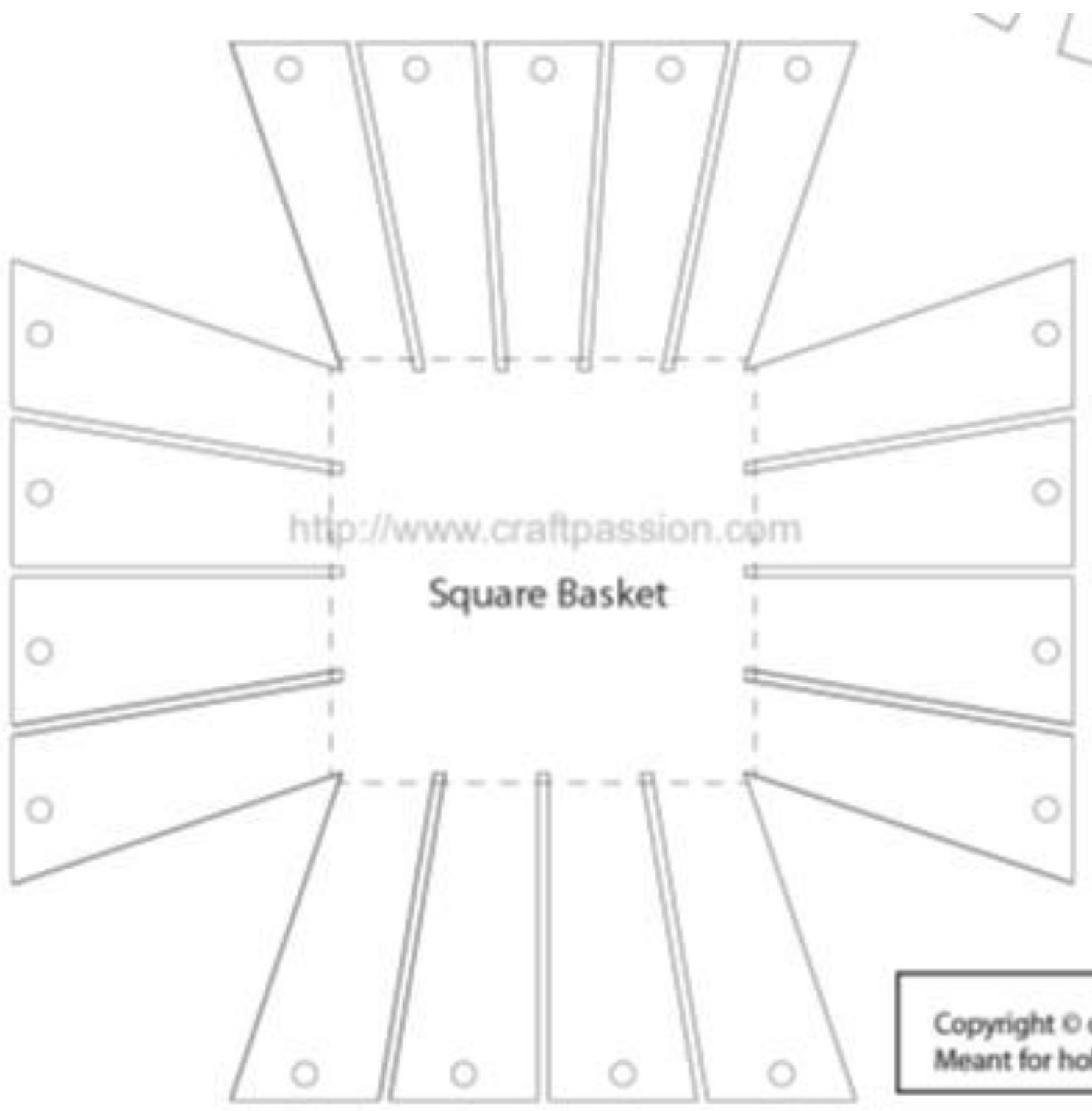


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Round Basket



painting with paper"

Source Unit: Making Our Great Escape

Let's see what we see when we see the sea scene upon arriving!

Discuss: Explain the system of family names on Krakatoa. How many families are there? How many people are in each family? What are the children called?

Who was the first person to inhabit the island? How did he get there? How did the other families come to make their home on Krakatoa?

Does Mr. F. explain what the families told their relatives when they left San Francisco? Is it believable that they could leave without some explanation? Could your family move to an island without telling others where you were going?

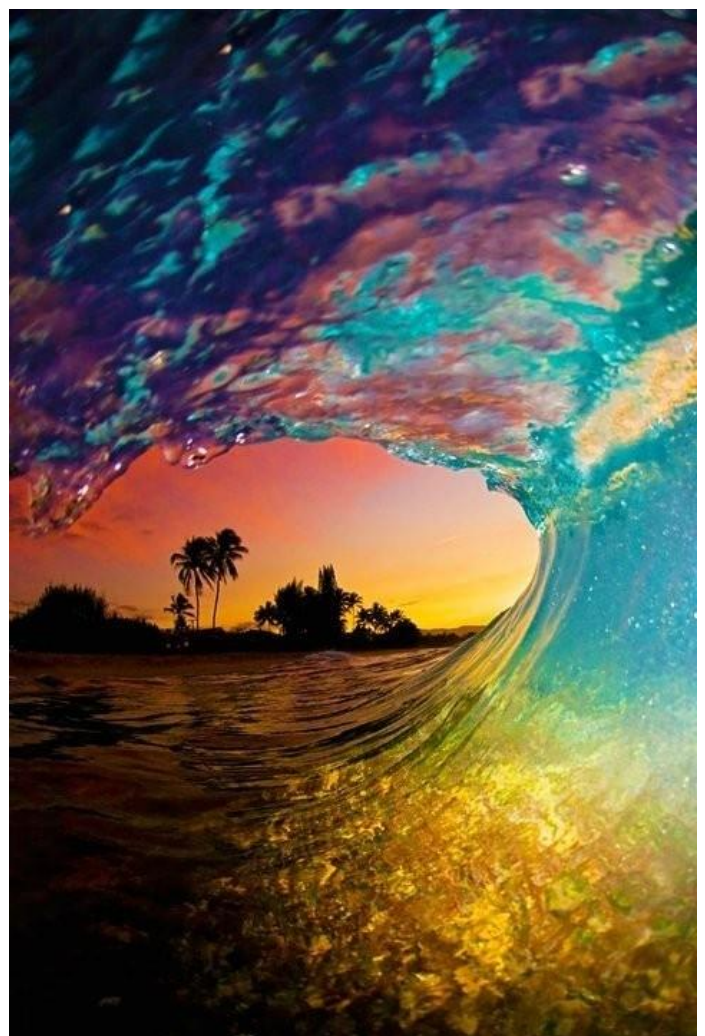
Each family was required to bring two things to be chosen to live on Krakatoa. What were they, and why were they important?

For how many years did the families live on Krakatoa? If you were a member of one of the families, how would you feel living on this island?

What might it have looked like on the island every day? Can we imagine it?

Landscapes are works of art that depict different views of natural land. This can include mountains, fields, and forests, just to name a few. Landscapes often include a body of water in their compositions. When we think of landscape, we think of the natural world.

Artists typically create landscapes of places they've visited like the countryside where they spent a summer vacation, or something more familiar like a rural area near one's home. Sometimes artists make landscapes of places they've never seen before or areas they invented in their mind, which is what we're going to do. Taking Laura Parker and Megan Coyle's landscape collages for



inspiration students will create Krakatoan collages and include the Professor's balloon arriving in the sky.

Materials:

- Papers of all kinds, ex. torn magazine papers, construction paper, copy paper, tissue paper, wallpaper samples, old photographs, sheet music, bits of tinfoil, ribbon, crossword puzzles (make great windowed buildings) paper bags, newspapers, old maps, found papers, etc
- Glue sticks
- Acrylic matte varnish (Liquitex)
- Brushes
- Backing material: While a paper or cardboard backing is the usual choice, the backing can be anything you consider will work well, like cardstock or thick watercolor paper.
- Consider adding embellishments. While not essential, embellishments can take the collage up a notch by adding depth, interest and sparkle. Use ribbons, buttons, beads, string, feathers or fabric in the paper collage.
- Display artist's sample collages from these pages and/or photographs of islands, nature-related storybooks, and/or landscape art examples for students to look at and be inspired by. Ex. Do a search online for National Geographic Island photos.

Tip: Create an example of the project before the lesson. Even if you choose not to share the work with students, a lot can be learned if you create an example.



Collage means "to glue" in French and is created using torn We're going to use torn magazine papers, sheet music, bits of foil, ribbon, crossword puzzles (make great windowed buildings) paper bags, newspapers, old maps, found papers, etc. as our "palette of paint" working the image by adding and subtracting tonal values of paper until we create the desired effect. Words, phrases, and imagery from the magazine papers appear almost magically between the edges of the torn paper adding to the meaning of the pieces students create.



Torn paper collages are made using small pieces of paper which are glued onto a surface to create an image. In this case we'll be making landscapes using old magazines, which will provide the colorful palette they'll need. They can also go black and white by using newspapers, old sheet music, etc. By cutting the paper into shapes depending on color and texture, she pulls the paper away from the context of being associated with magazines or



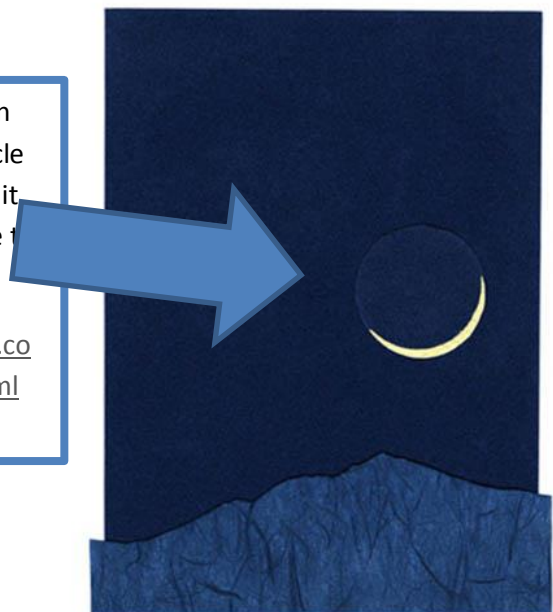
whatever they originally were.

How do you start a collage?

Each student's collage will begin with a sketch, or multiple sketches, from which they choose their favorite. Depending on the subject matter, the sketch may be a rough sketch or a more detailed one. The final collage may look a lot different than the sketch that but using a rough

Fun way to create a moon shape in the sky! Cut a circle out of the paper and glue it down off center to the hole to create a moon!

http://www.stardogstudio.com/collage_landscapes.html



sketch gives the student an idea of the composition.

Create the background first. An image children select for inspiration may help with some basic direction in colors, composition and proportions, but they shouldn't expect to duplicate it. It's simply to provide a starting point, which they can then take in any direction.

Next students should comb through magazines (and every other kind of paper available) looking for specific colors and different textures and tearing or cutting out the main colors you will be using e.g. sky, sea, beach, land, houses, balloon, people, etc. Students should cut out different shapes of color depending on the shape of the highlights and shadows they want to include in the collage. Then glue down the different pieces of paper on top of the drawing. Have them use a glue stick so they can easily go back in and move the pieces around before the artwork is complete.



They may want to fill in the background of their sketch first, or move back and forth with gluing down pieces of paper in the background and foreground. Have students block in the large color shapes first and then work on adding in more detail with smaller strips of paper, shaping the figures and details as they go along.

Once part of the landscape or sky is in place, they'll find it's easy to begin working on the other areas as well. Larger pieces can be used for the background, with smaller pieces added on top. Torn paper collages can involve a lot of layering, so encourage



students to just keep adding paper and details until they feel it's finished.

Option: You may want to have students assemble the pieces before they glue them. Although optional, it's recommended that in experienced artists, once they have everything they want to put on their collage, spread it to design the



<http://www.flickr.com/photos/lacapretta/6900394236/>. Powhatan First Grade Auction Project. Hand painted paper collage, 2012.

collage before proceeding. They can lay it out on a large surface like a table or floor. Build the items in layers, starting with the background and moving forward. This should give them a good idea of what their end product will look like before they commit to any gluing, but it also slows down the process and makes it less organic.

Discuss how literature can give artists ideas for art making. How did literature give them ideas for art making? Ex. *The 21 Balloons*. Help students make connections between the story, their art, and their own experiences.

Discuss the benefits and drawbacks of using collage when compared to other art materials students have used.

What can collage do that other mediums can't? Sample answer: When you paint a picture, every brushstroke of acrylic, oil, or watercolor paint you put down is more or less permanent. It sticks to the page or canvas, and you're stuck with that mark until you can paint over it.

Collage is much more flexible than paint. It involves a lot of layering, and even if you use paint with your collage, you can always peel or cut back previous layers. It's almost like an "undo" button on your computer. You can easily "undo" previous layers or sections.

How flexible a collage is depends on the materials you use. Making collages out of magazine strips with a pair of scissors and glue stick is pretty flexible as an acid-free glue stick lets you peel back previous layers pretty easily. You can also pull up different sections and move them around if need be. The type of glue you use can determine this flexibility. If you use a strong glue, it will be more difficult to peel off other layers. A glue stick is a pretty temporary type of glue – it's not very permanent and doesn't strongly adhere to objects like superglue or craft glue would.

Flying High: Making 21 Balloons!

Source Unit: Making Our Great Escape!



<http://papermatrix.wordpress.com/2012/02/25/mobile-001-balloon/>

In honor of the children of Krakatoa's airy-go-round and the islander families' amazing escape from Krakatoa have students practice their math skills and create these tiny balloons to construct their own Imaginary-Go-Round!

During the activity Discuss:

- Despite the dangers of living on a small island with an active volcano, why do you think the Krakatoans chose not to leave? How much time did the citizens of Krakatoa expect to have to prepare to leave the island?
- According to Mr. F, what were some of the reasons why the Balloon Merry-Go-Round could not be seen from either Java or Sumatra?
- Explain the physics of F-1's explanation, on p. 122, about why flying over the volcanic crater means a short trip for the Balloon Merry-Go-Round.
- Why would "sulphurous fumes" be emitted from a volcano?
- Describe the effects of volcanic activity on the waters and islands nearby.
- Describe the flying platform, the invention that the citizens of Krakatoa designed to take them away from the island, and tell how it worked. Why wasn't it ever tested? Would you trust an untested balloon?
- Why was the balloon platform so bright and attractive in contrast to the Balloon Merry-Go-Round?
- What factors influence the lifting power of balloons? How did Mr. F. explain the total weight the balloon could lift?

- How did Mr. F. explain the way in which the balloon could lift off the ground in ten minutes?
- Each family member was given a responsibility in keeping the balloon afloat. Why was this balloon better suited for a quick escape than a freighter?
- What was meant by a “family parachute”? Describe one and tell why it was important to have?
- What was involved in keeping the huge platform level? Why were the children given this task?
- How were the parachutes in the escape balloon similar to the sailboats in the Balloon Merry-Go- Round?
- Was the flying platform a success? Reread the getaway scene. What words did the author use to create the excitement and danger they found as the platform hovered over the volcano’s crater?
- Where was the platform when the island blew up?
- Why couldn’t the families jump off the flying platform in Belgium so that Professor Sherman could land the platform in the English Channel?
- Why was it necessary for Professor Sherman to stay with the flying platform? Why was it necessary for a family to stay with him? Which family volunteered to stay with him? Were you surprised? Why or why not?
- Where did the last family parachute? Find it on the map. Find the places the other families jumped and mark them on the map.

Materials:

- Colored printer paper
- Template
- Scissors
- Glue
- Tweezers
- String or fishing line (for hanging)
- Small beads

For each balloon cut two sheets in the colors students prefer. You print the template on colored paper and cut the forms out by hand with scissors.

All strips are joined already and you only need to weave as described below. When you weave tight the shape of the arms will make it 3D and close the form by itself. You only need a little glue to fix it when you have done all the weaving.. Use the glue stick to fix the strips at the edge when finished.

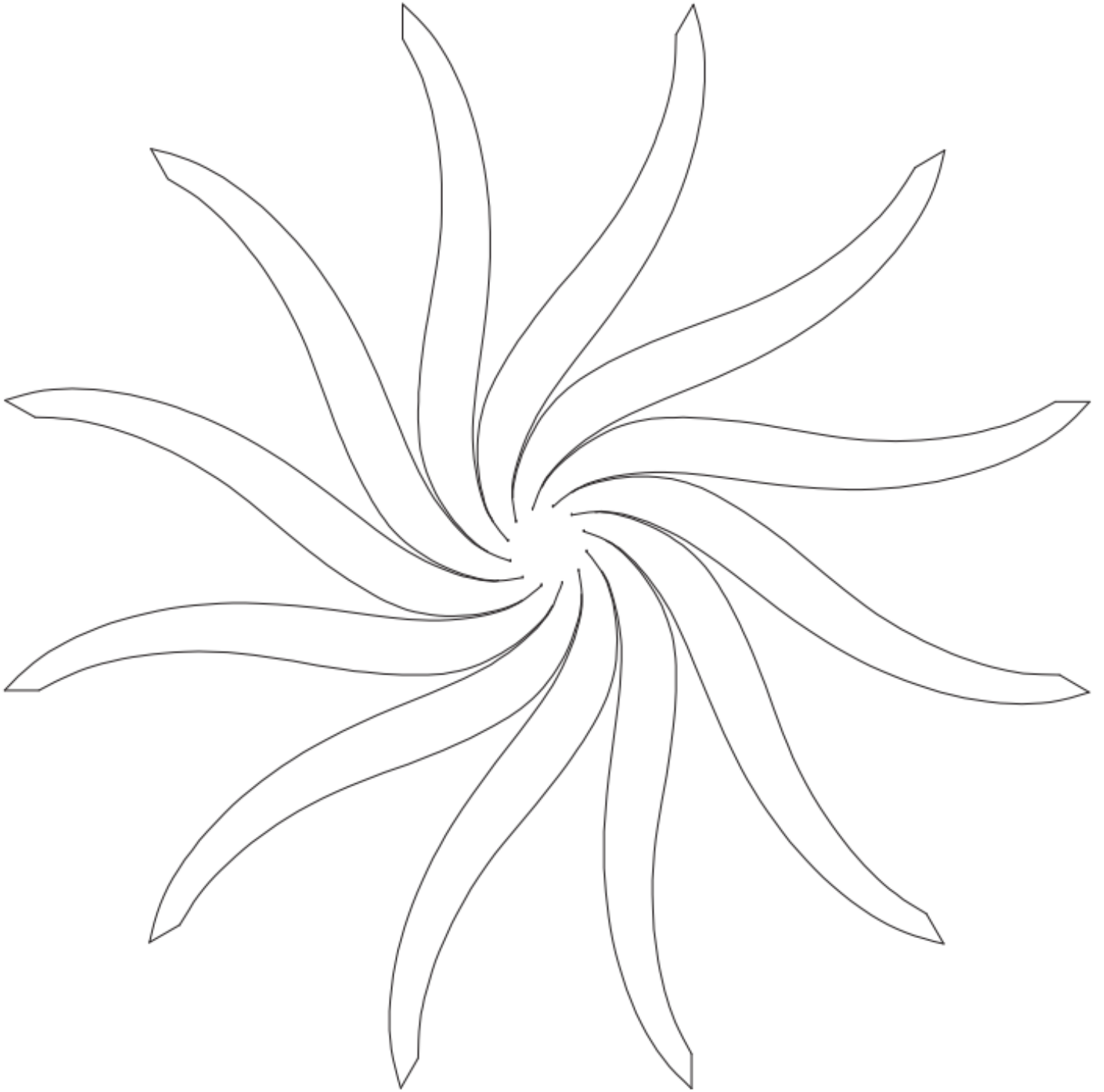
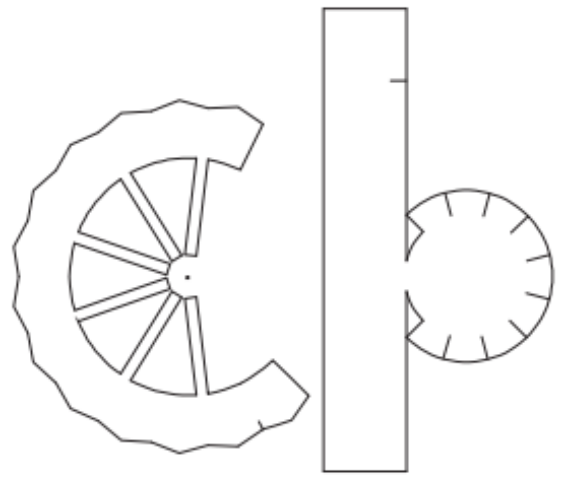
In general you should NEVER use glue while weaving. Only for fixing the last row. When gluing as you go along, however tempting, you lose the opportunity to line up for a pretty result. This is why the paper clips are so important.

To weave: Place one form on top of the other, same center, so that the arms swirl in opposite directions. Now take one arm from the upper form and put it behind one from the lower form. Turn everything a

little and do the same with the next set of arms. Work your way around the center, till you have made all 12. And then make the next row. After the third row you start using paper clips to keep the arms together. This is because the balloon starts going 3D and will unwind if you do not. Weave firmly and tight. Use a pair of tweezers to weave the last tiny squares.

For the basket: Choose the basket pieces from the same color as the top center of the balloon. Make the small circular basket by gluing together bottom and sides. Form a circle from the wheel like shape and fix to the small basket as shown on the pictures. Now smear glue on both inner side of 'wheel' and outer side of lower edge of the balloon. Press gently together. Any inaccuracy will be fairly hidden. To hang the balloon make a small hole in the center of the top and fix a piece of string tying a pearl or like to the end inside the balloon.

This can be challenging yet it is a very forgiving project. If students make a wonky little balloon—the mistakes add to the charm. To help you, you can find an extended and a condensed version of the video tutorial here: <http://www.youtube.com/user/PaperMatrix> With a bit of training weaving a small balloon takes about 15 minutes.



SOAP BUBBLE PRINTS

Source Unit: Bubbleology

Normally, blowing bubbles with a drinking straw is taboo for kids. Not this time! In fact, that's half the thrill of making these marbled prints.



Materials:

- Store-bought or homemade bubble solution (see Step 2 for homemade recipe)
- Copier paper or light-colored construction paper
- Plastic drinking straws
- Newspaper or plastic tablecloth
- Several shallow disposable containers, such as aluminum pie tins

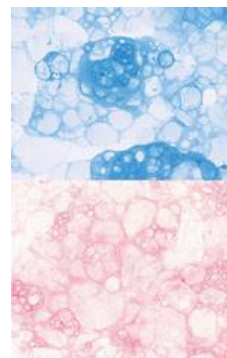
Instructions:

1. Cover your work surface with a thick layer of newspaper or a plastic tablecloth.
2. Gather several shallow disposable containers, such as aluminum pie tins. In each, blend 1 cup of store-bought or homemade bubble solution with 1/2 cup of tempera paint. (To make your own bubble solution, mix 3 cups of water, 1 cup of dish soap, and 1/4 cup of corn syrup.)
3. Set out your paper (try copier paper or light-colored construction paper) and several plastic drinking straws. For



younger children, pierce a small hole halfway up the straw with a pin; this will help prevent accidental swallowing of the paint but won't interfere with the bubble-blowing process.

4. Now for the fun. With one end of the straw submerged in the bubble solution, the kids blow until bubbles mound up in the container.



5. The best time to take a print is just as the bubbles begin to overflow. Gently touch the paper to the bubbles and then lift to see your print, repeating until the paper is sufficiently covered.
6. Blow more bubbles as needed. For a different effect, try printing one color over another.



Options:

Partner Art

For the beginner bubble blower

This art project works best when two people are working together.

Materials:

- Tempera or poster paint in 3 or 4 colors
- White or light-colored construction paper
- Bubble solution
- Bubble wand or drinking straw
- 3 or 4 small containers
- A teaspoon and cup

1. This is fun, but can be messy! Spread newspaper around the area and have students wear an old T-shirt.
2. Pour about one cup of bubble solution in each container. Add one teaspoon of paint to each container. Stir gently until mixed.
3. Take turns blowing bubbles while your partner “catches” them on paper. As they break, you’ll get a design of brightly colored splotches! For darker colors, add more paint.



Twister Art

Source Unit: Twister

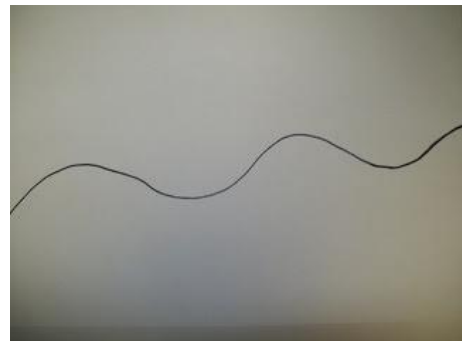
<http://artwithmre.blogspot.com/2010/05/line-design-w-shading-steps.html>

Line Design w/ Shading- The Steps

Another MNPS art teacher showed me this project several years ago, and I really liked it. I tweaked it a bit here and there, but it is basically as he showed me. The students LOVE IT! All you need is paper, Sharpie, and colored pencils!

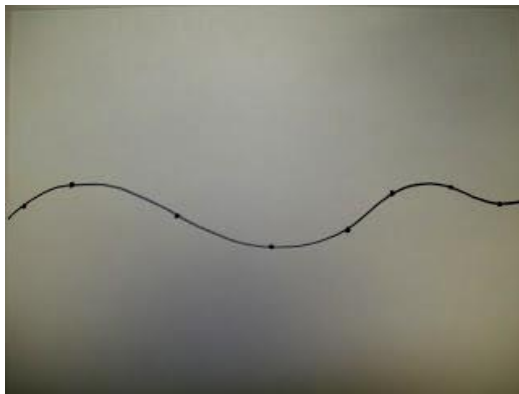


Have them start by



drawing a curve line across the paper. Tell students to think

rolling hill...not roller coaster!

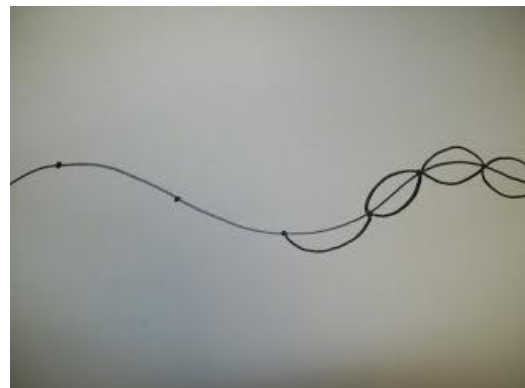


Add 8 dots across the line. They could be (should be) at different lengths apart. You need a dot at relatively close to the edges of your paper.

They will then start connecting the dots. The dots close to the edge will go off the edge of the paper to an imaginary dot.

You can not cross over any

lines. However, you can share a line as you begin going up and out. The lines should be taken off the edge of the paper as you extend outwards. Some sections may be pinched off as other sections grow larger...and that is totally ok.



Have your students go connect the dots across both sides top and bottom...then have them "camp out" at different points...this will cause some areas to balloon outward.

At the top of the page is a student's work that's a great example of what it should look like. The student should pick a group of colors they feel work well together. They will press harder in the corners of the shapes...and as they near the center get lighter and lighter. This is a great way to get them practice with pressure control!

Taste the Power



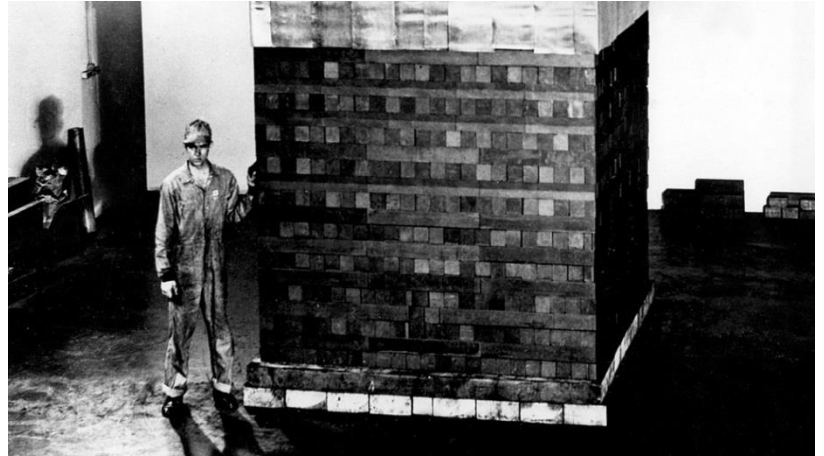
Source Unit: Wings of the Crane Unit Three

Challenge students to design their own nuclear reactor and build a 'model' of the layers of the CP-1 using materials such as Candy Blox and pretzel rods/sticks for the control rods. Or with other edible construction

materials such as wafer cookies, ex. chocolate might represent the uranium enriched blocks.

Note: Non-edible materials such as regular Legos, K'Nex, Keva, or other brands/styles of building materials may also be used/used instead.

Have students choose a color of Blox to represent each element, ex. yellow might be wood, green might be 'Graphite' and red or blue could be uranium.



Graphite bricks should form the base of the pile. Beginning with layer 6, alternate courses of graphite containing uranium metal and/or uranium oxide fuel should be separated by layers of solid graphite blocks.

The uranium containing briquettes, slightly richer in uranium, should be/were concentrated in the central area and surrounded on either side with graphite

Art of War

Source Unit: Wings of the Crane Part Five



Have students build paper versions of WW2 vehicles and trucks used during WW2. For example: The armored truck consists of little more than 40 pieces scattered across eight sheets of paper and is not a hard-to-build model. PDFs and links to instructions accompany this unit.

Bedford (truck with boxes) assembly: [Link To Photo](#)

Instructions: [WW2.Truck.Bedford.by.Papermau.Instructions](#)



LA JEEP

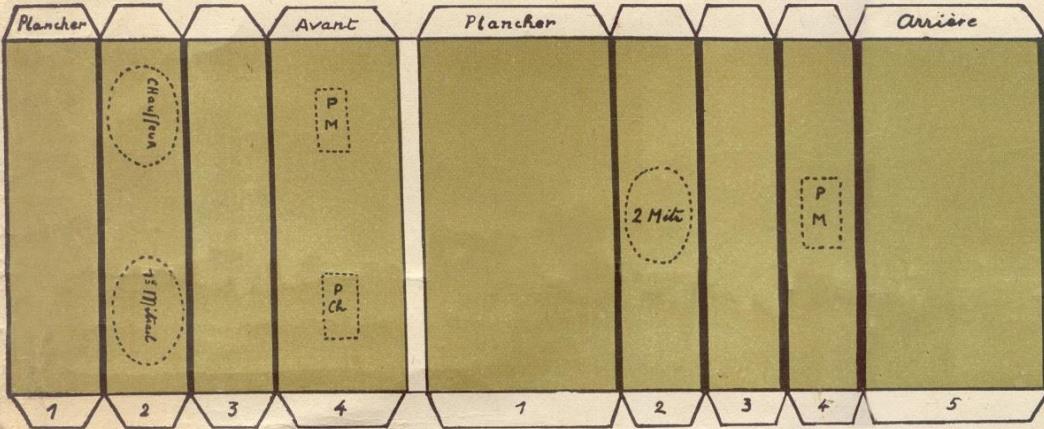
MODÈLE
DÉPOSÉ

Autorisation N° 93 du 8 Novembre 1944

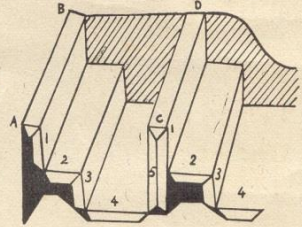
MONTAGE

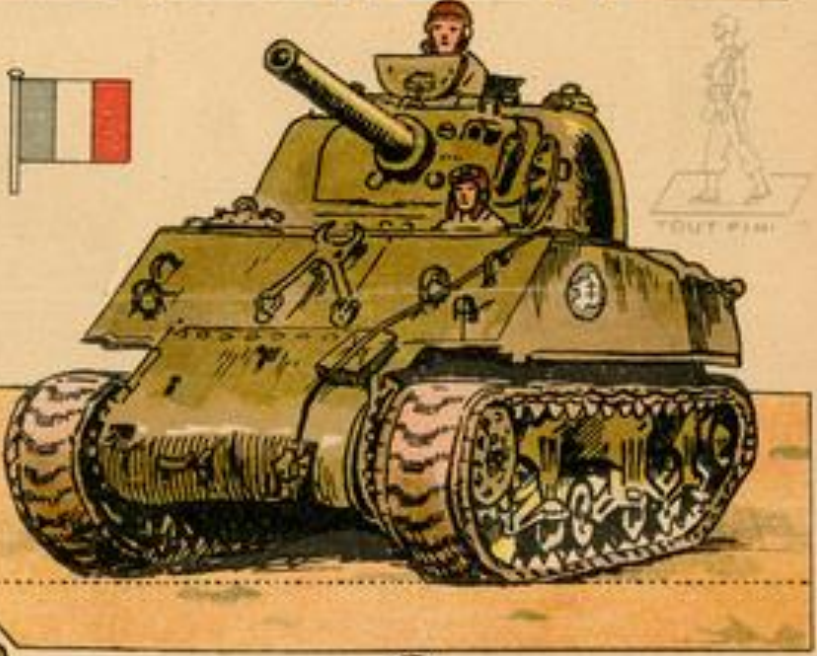
- 1° Découper chacun des sujets suivant le trait extérieur;
- 2° Plier suivant les pointillés;
- 3° Plier et coller les parties blanches à leur place respective;
- 4° Pour renforcer les roues, découper des cercles de même diamètre dans du carton fort et les coller à l'intérieur.

ATTENTION. — Chaque soldat a deux faces marquées : CH, CH, 1°M, 1°M, 2°M, 2°M- à coller l'une contre l'autre.



Schema du montage des planchers





It's a paper bird, no it's a paper plane!

Source Unit: Wings of the Crane Part Six

Do you like paper planes as much as we do? One the following pages is one for students to make courtesy of the great design team at **fishinabottle** - what an amazing job they have - making games and interactives every day. Thanks guys!

Students can also use the following as templates to create US planes from WW2.

Tip: For more amazing planes for students to build (including a model Flying Tiger), check out the free Paper models, templates, instructions, printables, construction guides and tips, & historical restorations by Phil Koopman Sr at <http://users.ece.cmu.edu/~koopman/airplanes/>

For an advanced origami model check out the video instructions on how to fold a WW2 fighter jet from a single piece of paper at: <http://www.theairplanequy.org/gallery.php>

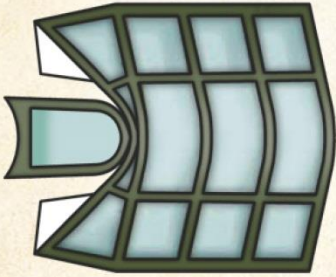


BATTLE OF BRITAIN

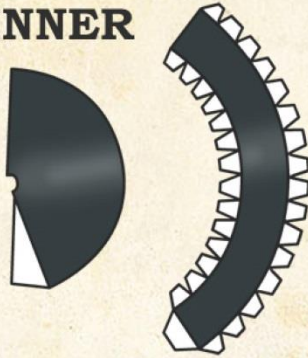
= 303 SQUADRON =

WWW.303SQUADRONGAME.COM

CANOPY

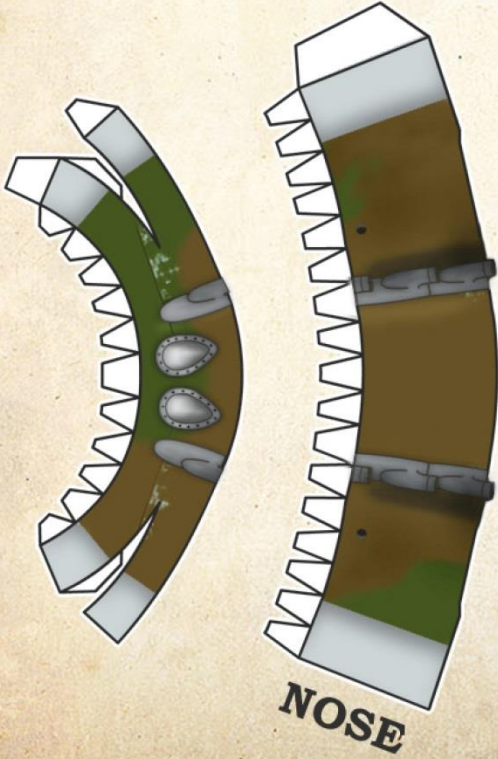
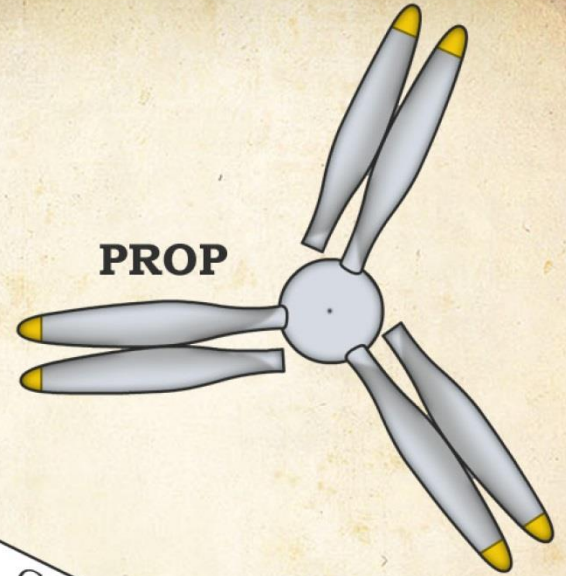


SPINNER

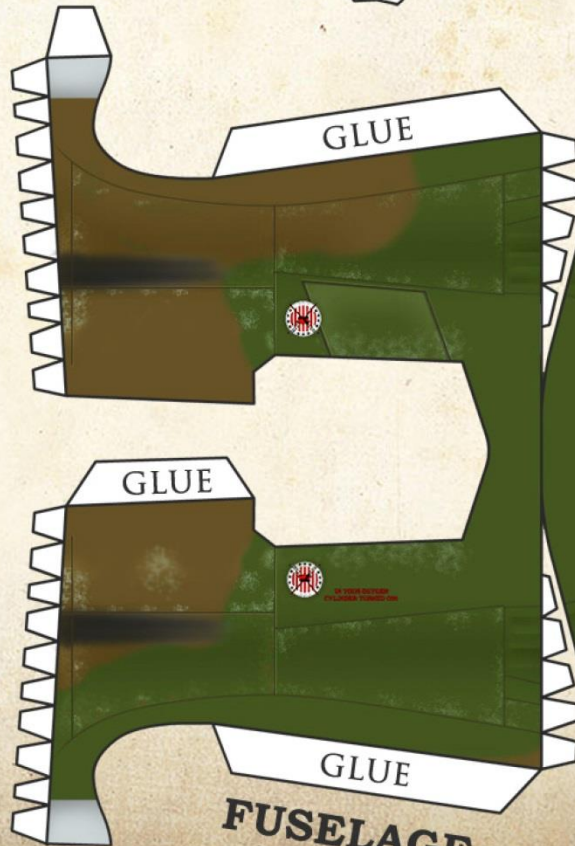


GLUE TO NOSE

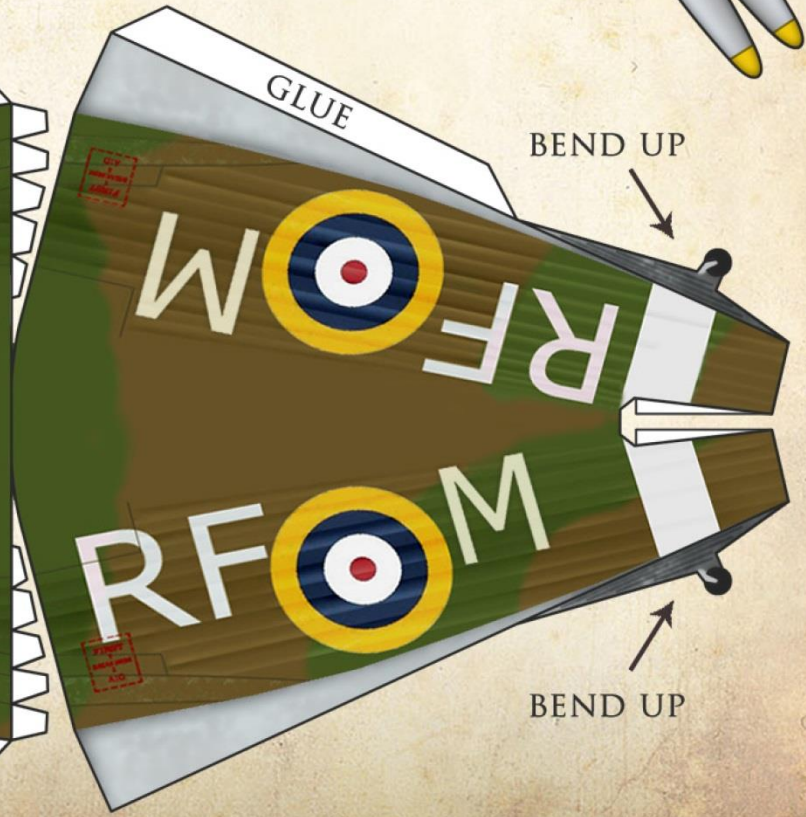
PROP



NOSE



FUSELAGE



BEND UP

BEND UP

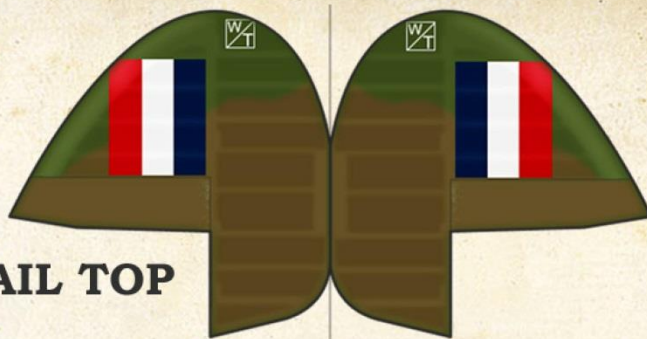
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TAIL TOP



FOLD



FOLD

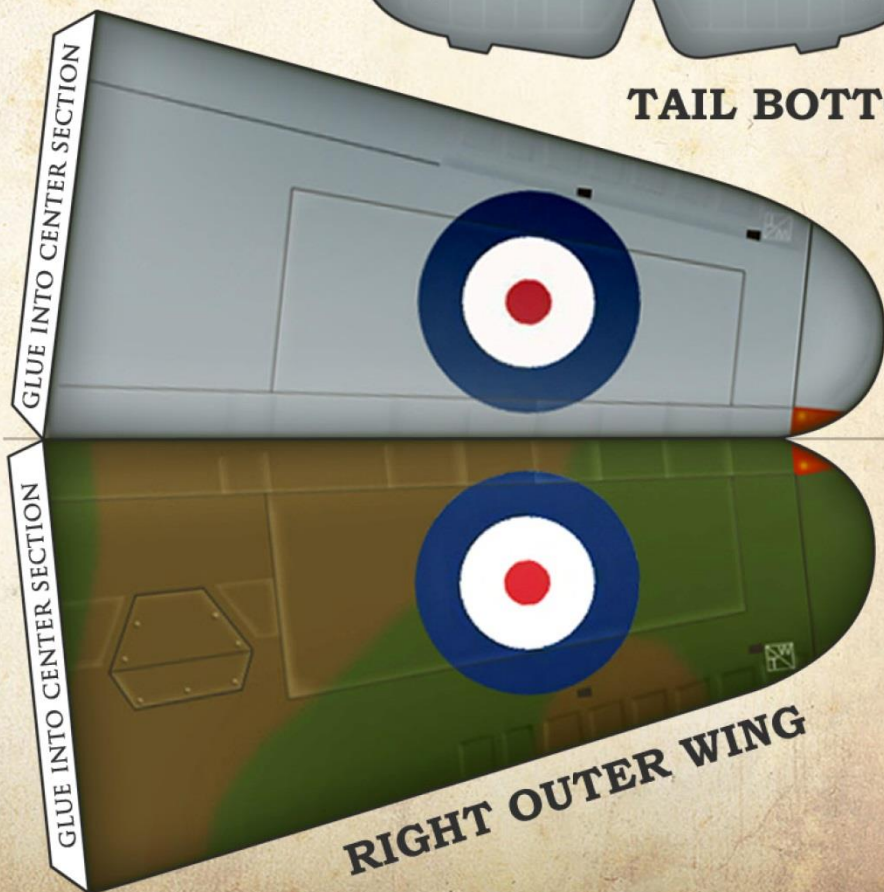
TAIL BOTTOM



BEND



LEFT OUTER WING



RIGHT OUTER WING

BEND

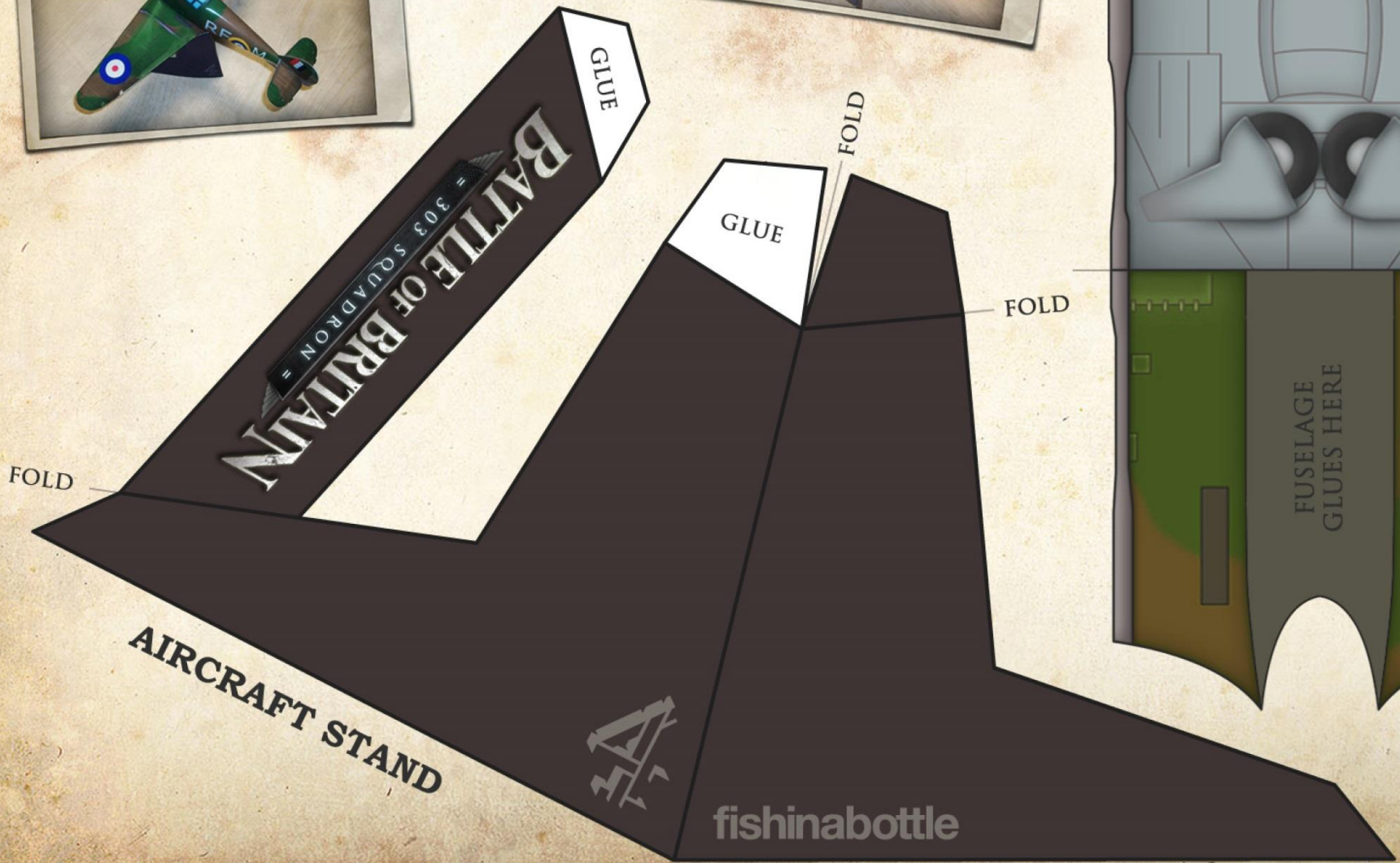
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CENTER SECTION



fishinabottle

fishinabottle



BATTLE OF BRITAIN

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ASSEMBLE TAIL
AS SHOWN

FORM AND
GLUE CANAOPY

BEND OUT
AND GLUE
TAIL WHEEL

CAREFULLY ROLL
AND FORM FUSELAGE

TYPICAL
CROSS
SECTION

ATTACH OUTER WINGS TO
CENTER SECTION

NOSE, PROP AND
SPINNER ASSEMBLY

eyes behind wires



Source Unit: Wings of the Crane Unit 7

Explore the accompanying PowerPoint of images by Dorothea Lange and Ansel Adams an/or the book *Impounded Dorothea Lange And The Censored Images Of Japanese American Internment Photographs of an Episode That Lives in Infamy* By Dinitia Smith.

Materials:

- Wire (thin and flexible but strong)
- Wire Cutters
- Cardboard
- PowerPoint
- Printouts
- Paper
- Stapler/staples
- Tape
- Pencils
- Pliers



Have students pick an image of a person from the PowerPoint or book. Then have them create portraits, using simple contour line drawings. A contour drawing shows the outlines, shapes and edges of a scene or person, but omits fine detail, surface texture, color and tone ('contour' is French for 'outline').



Students will be given their 'line' of wire to bend and shape to recreate their drawing in wire. Wire can be cut and bent into shapes with pliers to create three-dimensional 'drawings', often resulting in a work filled with flowing, curved lines. These wire sculptures can be attached to a two-dimensional frame or a flat surface, hung in the air, or be left free-standing, changing in appearance as a viewer moves around the room.



A rustic cardboard background provides stability and depth to this project (and can symbolic of the perception of people's disability.)

Option: Print out copies of the images and have students create their wire portraits over the photos, then tear the photo away. Having a base image to work from (this could also be their drawing) makes the process of transferring from two-dimensional to three-dimensional much easier.

Have students layer their drawing over the cardboard and staple the wire as they go - and then tear away the drawing or photograph from underneath when the wire version is complete.

Have them with their wire for a few seconds to get a feel for its flexibility: bend it, fold it, wrap it around a pencil, join the ends together.

Demonstrate how to make a circular form for the face. Loop the large piece of wire into a circular shape and then wind the ends around the circular shape until secure.

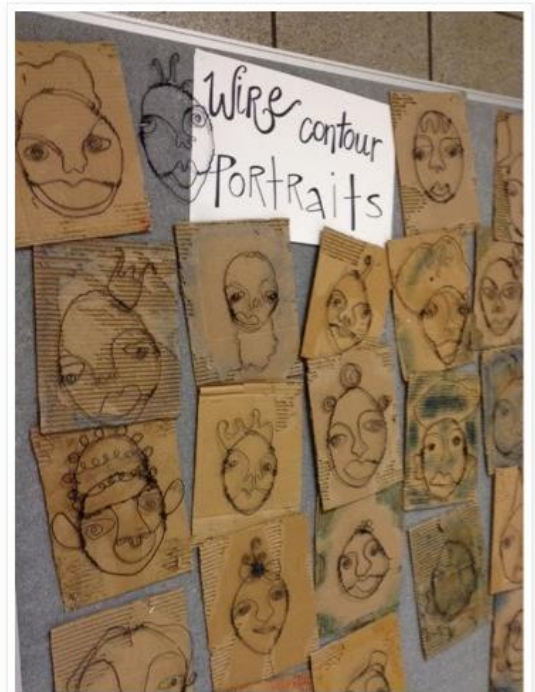
Stress the importance of making sure the wire is securely attached (If the attachments are not secure, their form will not be stable.)

Show students how to bend the circular shape into the shape of the face.

Next demonstrate how to create a nose shape by bending and twisting the wire.

Demonstrate how to attach all parts after creating the shape.

While the students are working have them think of all the parts of the face and list them on the board. Include the face shape, nose, eyes, eyebrows, lips, teeth, hair etc. Encourage students to add as much as possible to make it represent the person in the image. For



example, add glasses if they wear glasses, etc. Use a variety of lines like curly, zigzag, coil, spiral etc. Combine several pieces of wire for part of the face rather than just using one piece of wire.

Encourage the students to explore the materials and use their imagination in how they create their shapes. Don't worry about making a mistake, it can be easily unraveled!

Wire contour portraits images via: <http://beckermiddleart.blogspot.com/2014/01/completed-wire-portraits.html>

Wire sculptures completed by the students of Amy Bonner Oliveri from Allendale Columbia School, Rochester, New York, USA:



On the Grid!

Source Unit: *Me, Myself, & I*

Bring art into your classroom with self portraits. A portrait is another way to tell a story about oneself. Exploring the self-portrait encourage your young people to use the still image to communicate with their audience about how they see themselves.

Introduce this project by reading *Chuck Close Up Close* by Jan Greenberg with the students. This is an inspiring look at the contemporary artist who struggled with learning disabilities as a youngster, became a celebrated painter in the late 1960s, and later overcame paralysis to continue creating huge portraits in which the image is created by a multitude of small abstract units.

In this project students will overlay a working print with a numbered and lettered grid, using a ruler, and then reproduce the image block by block.



Materials:

- Assorted 6" x 8" photographs showing high contrast (Use high contrast digital photographs of the students - posterized) Note: If students' self portraits are to be used - digital photographs - it is suggested to take those previous to starting this project. If computers are available, students can manipulate them themselves using posterize filter or cut paper filter depending on software used to obtain a high contrast image

- 12 x 18 white drawing paper,
- Pencils,
- Rulers, Erasers,
- Sharpie Ultra-Fine Point Markers,
- Sharpie Fine Point Markers
- Optional: Alternative Media, ex. paint, chalk pastels, etc

If possible, show video *Chuck Close: A Portrait in Progress* (show segments if time does not allow the entire video).

Discuss video and biography of Chuck Close with

students. Why could he be considered a "personal hero"? Read bits and pieces of *Chuck Close Up Close* . Show images of Chuck Close's portraits - discuss his choice of subject matter and techniques - use of grid - How is scale/size important? (lots of images available online).

Option: Group drawing activity:

- Pencils and erasers

- 8" x 10" digital photos of person cut into 1" squares for a class of 30 (labeled on back 1-80)
- 4x4" paper

A mystery photo of a person, classmate, or instructor can be divided into 80 squares that are labeled on the back. Distribute the squares to the students -Have the students make enlargements of each square (1" squares to 4" squares) using graphite, labeling the same number on the back of the new square. When the pieces are collected and put back together, the person will be revealed.



Image Credit: Morning Bell. Article by Molly Beck. <http://www.sjr.com/blogs/morningbell/x394117771/On-the-grid>. Accessed 6/4/12.

Self-Portrait Project:

Demonstrate steps to draw 1" grid on 12" x 18" (30 x 46 cm) paper - demonstrate drawing 1/2" (1 cm) grid on photograph. Have students measure a grid using ruler marking at one half inch intervals on top/bottom and sides of photograph. Draw line on photograph with ruler. (Alternative method: Have 1/2" grids made using transparencies - tape transparency over photograph). Each 1/2 inch square will be transferred to each 1 inch square on the students' work. Label grids at top and side with coordinates as on a geographic map [alphabetically on one side, numerically across the top or bottom.

Then, have students mark a 1/2 inch border at top of 12" x 18" (30 x 46 cm) white drawing paper (This 1/2 inch (1 cm) border was used to organize coordinates). Measure grid at 1 inch intervals at top, bottom and sides of paper. Draw grid using ruler - being careful to insure lines are straight and exactly one inch apart.

Encourage students to concentrate on the value of a square in the photograph and replicate the value in the corresponding square on their drawing by using colored pencils, and drawing a design in each square to mimic Close's style. Review how to enlarge using a grid. - Observe each square one at a time assessing the different value scale. (Note: students may want to practice different values on scrap paper) Encourage students to make each individual square a small work of art, creating a canvas of mini-paintings, which when viewed from a distance are seen as a single image.

Demonstrate a variety of ways to get values using lines, patterns and textures. Some boxes might require lots of thick lines leaving very little paper showing. Other boxes have only a few thin lines. Up close, the portraits look like nothing more than lines and shapes, however from a distance the portrait pulls together and appears complete. Those who are most successful are able to "see" the value and not get lost in line or object. In this way, it becomes an exercise in seeing and perception.

Tip: Suggest students turn the photo and paper upside-down in order to be able to better focus on the shapes and spaces within the square and not be distracted by the all-over image.

After students finish their project discuss with students, what was the advantage of using a grid? What are some disadvantages?

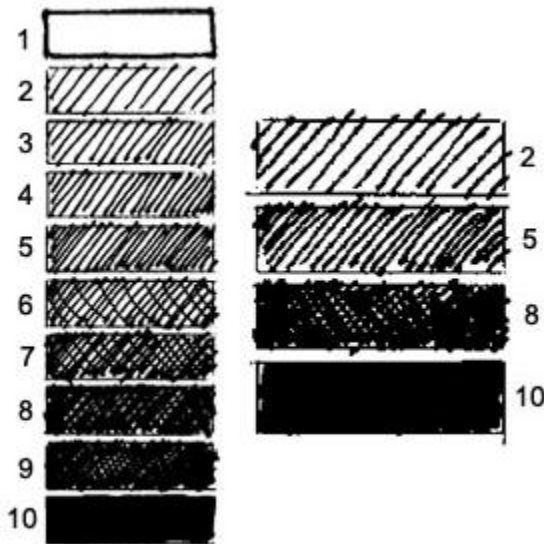
Background Knowledge

Value is the lightness or darkness of a color, as it has to do with the addition of white or black with the mixing of color. Sometimes called tone, value is an important concept for a painter, photographer, artist, or printmaker to comprehend. **Value** is defined as the relative lightness or darkness of a color. It is an important tool for the designer/artist, in the way that it defines form and creates spatial illusions, making things look round on a piece of paper. **Contrast** of value separates objects in space, while **gradation** of value suggests



Image Credit: Mr. Nesbitt.

<http://blogs.montague.k12.mi.us/dnesbitt/2008/03/03/chuck-close-style-self-portraits/>
Accessed 6/4/12.



mass and contour.

To summarize: If values are close, shapes will seem to flatten out and none will stand out from the others. If values contrast, shapes will appear to separate and some will stand out from the others. This works whether the colors are just black, white and gray, or whether hues are involved. Once you understand the concept of value, the task of using the full range of color tones to create an interesting portrait becomes easier.

Grayscale

To understand value it is best to start with a grayscale, which is concerned only with the different tones of black and white. If you pick a value of gray in the mid-range (halfway between black and white), then you can lighten or darken the original gray color to create new color values. At each end of the scale you will find the colors of pure white and pure black.

Tints and Shades

When you add white to a specific color, blue for example, the resulting color is referred to as a tint of the original color.

When you add black, the slightly darker color is called a shade. In this manner you can make a tonal scale of colors by adding different amounts of either white or black to the original color.

Tonal Range

When painting, or creating colors, artists and companies establish a tonal range by adding different amounts of black or white to one base color. When you color you can then place the resulting values of color side by side, so you can view the whole range of lightness and darkness at once. If they added their whites and blacks in equal amounts and increments, the result should be a gradient of steadily changing color. This is your tonal range.

