BUILDING STORIES

DAY ONE

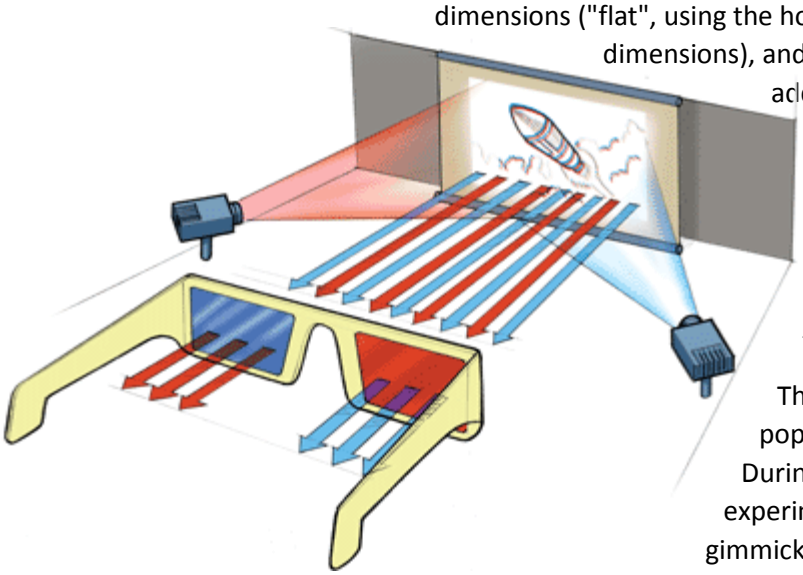
It's time to start an adventure and create our own 3D 'pulp fiction'! We're crafting characters and then crafting tales with 3D settings and flippable 'story boards' that will keep 'bored' far from these stories! Students will truly be able to visualize their stories as they literally build them.

But first of all, there's a question.

WHAT IS 3D?

3D means three-dimensional, i.e. something that has width, height and depth (length). Our physical environment is three-dimensional and we move around in 3D every day.

If something is 2D, a common example is a piece of paper, you can only measure the width and height. The image, or object has only two dimensions ("flat", using the horizontal and vertical (X and Y) dimensions), and if turned to the side becomes a line. 3D adds the depth (Z) dimension.



The term "three-dimensional" also is sometimes used to describe a physical item such as a sculpture or mobile, which could be described as three-dimensional art, in comparison with a two-dimensional painting.

The terms 3D and 2D first came into popular use because of the film industry. During the 1950s, Hollywood filmmakers experimented with 3D movies as a marketing gimmick. These movies were filmed with a

variation on the stereoscopic dual-camera (two-camera) setups. They were expensive to produce and required viewers to wear special glasses to experience the 3D effect. Only a few of these movies became lasting classics, most in the horror/suspense genre, such as *House of Wax*, *Creature from the Black Lagoon* and Alfred Hitchcock's *Dial M for Murder*.

A second wave of 3D films in the 1980s had similar results. The earliest video games, meanwhile, also had 2D graphics, but in the 1980s and 1990s, rapid advances in computer processing and memory made more realistic images possible. By the 21st century, computer-generated imagery (CGI) could create 3D and 2D effects for big and small screens alike. In 2009, James Cameron's film *Avatar* pioneered a new wave of cinematic 3D by combining cutting-edge CGI and digital filmmaking technology. Soon, many of Hollywood's big-budget effects films were following suit (some more successfully than others according to viewers and critics.)

In real life, there is another crucial difference between 3D and 2D vision. Three-dimensional vision contributes to depth perception, or the ability to estimate an object's distance. This fact has been humorously pointed out on the science fiction television series *Futurama* because one of the show's main characters, Leela, has only one eye. Despite being the pilot of an interstellar space ship, Leela often complains that she has no depth perception. Ironically, Andre de Toth, the director of the famous 3D film *House of Wax*, also had only one eye, and he could not see in 3D.

3D VISION?

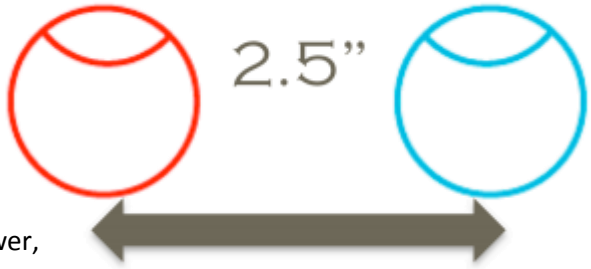
In order to see things in **3D** each eye must see a slightly different picture (which is why people with only one working eye have trouble seeing in 3D). This is done in the real world by your eyes being spaced apart so each eye has its own slightly different view. The brain then puts the

two pictures together to form one **3D** image that has depth to it.

The mode of 3D presentation you are most familiar with are the paper glasses with red and blue lenses. The technology and science behind 3D, or stereoscopic, movies is actually pretty simple. They simply recreate the way humans see normally.

Stereoscopic: Concerned with, or relating to, seeing space three-dimensionally as a result of binocular disparity.

Since your eyes are about two inches apart, they see the same picture from slightly different angles. Your brain then correlates these two images in order to gauge distance. This is called binocular vision - ViewMasters™ and binoculars mimic this process by presenting each eye with a slightly different image.

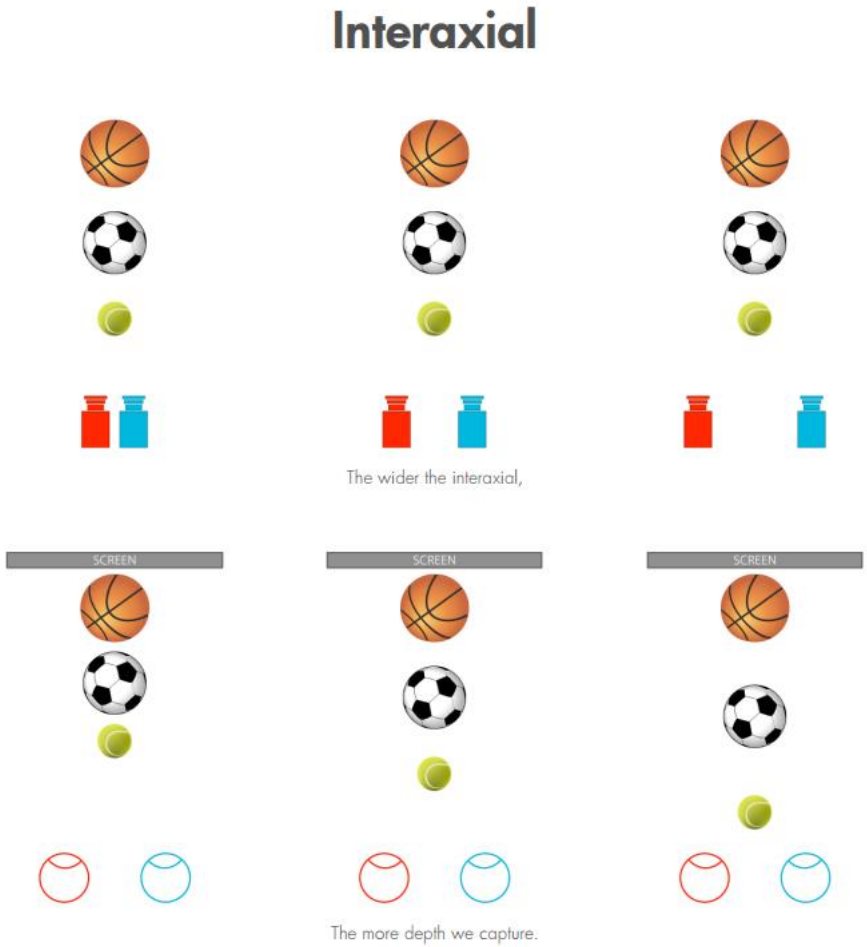


If you've ever used a ViewMaster™ or a stereoscopic viewer, you have seen your binocular vision system in action. In a View-Master, each eye is presented with an image. Two cameras photograph the same image from slightly different positions to create these images. Your eyes can correlate these images automatically because each eye sees only one of the images.

When shooting a 3D image, two cameras are used to capture separate images of the same object from slightly different angles at one fixed viewpoint.

Interaxial: The distance between the left and right camera is called the ‘interaxial’. By adjusting the interaxial distance between cameras, we are able to dynamically increase and decrease the depth in a scene.

When played back on a plano-stereoscopic display, the left image is shown only to your left eye and the right image only to your right eye. Your brain then fuses these two images to give you a perception of depth.



A 3D film viewed without glasses is a very strange sight and may appear to be out of focus, fuzzy or out of register (and gives some people a headache). The same scene is projected simultaneously from two different angles in two different colors, red and cyan (or blue or green). Here's where those cool glasses come in -- the colored filters separate the two different images so each image only enters one eye. Your brain puts the two pictures back together and now you're dodging a flying meteor!

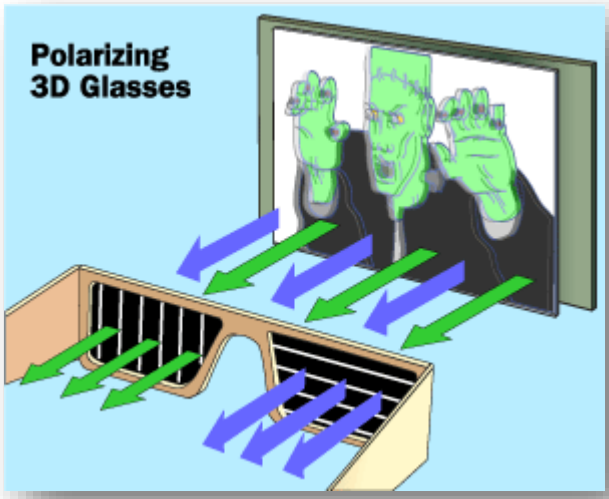
3D glasses make the movie or television show you're watching look like a 3-D scene that's happening right in front of you. With objects flying off the screen and careening in your direction, and creepy characters reaching out to grab you, wearing 3-D glasses makes you feel like you're a part of the action - not just someone sitting there watching a movie. Considering they have such high entertainment value, you'll be surprised at how amazingly simple 3-D glasses are.

The reason why you wear 3-D glasses in a movie theater is to feed different images into your eyes just like a View-Master does. The screen actually displays two images, and the glasses cause one of the images to enter one eye and the other to enter the other eye. There are two common systems for doing this:

Although the red/green or red/blue system is now mainly used for television 3-D effects, and was used in many older 3-D movies. In this system, two images are displayed on the screen, one in red and the other in blue (or green). The filters on the glasses allow only one image to enter each eye, and your brain does the rest. You cannot really have a color movie when you are using color to provide the separation, so the image quality is not nearly as good as with the polarized system.

At Disney World, Universal Studios and other 3-D venues, the preferred method uses polarized lenses because they allow color viewing. Two synchronized projectors project two respective views onto the screen, each with a different polarization. The glasses allow only one of the images into each eye because they contain lenses with different polarization.

Think of the polarizing filter as a barred window: light oriented (polarized) vertically passes between the bars and reaches your eye, while light oriented horizontally can't get through the bars and gets reflected away. With the "bars" over each eye pointing in different directions, each eye picks up a different image, and your brain interprets the two images as a single 3D image. Unlike the red-blue glasses, this image can contain any number of colors.



EXPERIMENTAL?

This experiment is based on the principle used to make the first 3-D movies. Hanging objects are illuminated by two projectors (or very strong flashlights, but that doesn't usually work as well). One projector has a red filter, the other has a green or blue filter. On the screen, each object produces two shadows-one from each projector. Where an object blocks the red light, there is a green shadow; where an object blocks the green/blue light, there is a red shadow.

Materials:

- 2 slide projectors or overhead projectors
- 1 red and 1 blue color gel* (e.g. www.mutr.co.uk CS6020A and CS6020B)
- Interesting objects (opaque, translucent and transparent)

Per student

- 3D glasses template
- 1 small square of red and 1 small square of blue color filter approx. 40 mm x 30 mm (the same filters as you used with the projectors)
- Tape
- Scissors

Make viewers containing red & green filters: the left eye looks through a red filter, the right eye looks through a green or blue filter. Through the red filter, the red shadow looks dark; through the green/blue filter, the green shadow looks dark. Each eye sees a differently placed shadow of an object. The brain combines these two shadows and sees a single, fused image in 3-D space. Thus, all the objects between the projectors and the screen are reproduced as shadows floating in space between the viewer. Did it work?

Remember! Red goes over the **LEFT** eye, and blue (cyan) goes over the **RIGHT**. Tape the lens to the frame, and take care not to tape over the lenses themselves, or you'll get a fuzzy image.

Extensions:

- Try this with unusual objects such as a metal grill tray or something that itself produces light.
- Look at other 3D images on the web and in books. Which effect seems more real?

Tips: We've found interactive whiteboard projectors, slide projectors and overhead projectors are good strong light sources for this activity; flashlights or lamps are not very effective. Remember that projector bulbs can get very hot and the color filters may melt if placed in front of them for too long.

Colored filters from educational catalogues produce the correct shade of red and blue light. These filters can also be cut up and used for the students' 3D glasses.

Make your room as dark as possible to get the full effect of the 3D shadows.

BRAINSTUFF—DID YOU KNOW?

To say 3D has made a comeback would be an understatement. The onset of 3D televisions, networks, and gaming systems has brought theatre thrills to the comforts of home. But how does 3D impact our eyes?

Many people who go to see a 3D movie get a headache about 20 minutes into the movie (some even get eye fatigue & nausea too!) And even if you don't get a headache, you may notice that your eyes don't feel right. It could be anything from excessive tearing to an achiness that makes you take off the glasses and rub your eyes every 10 minutes. Have you ever wondered what causes this problem? Here is one possible answer.

"One of the biggest problems with 3D is the "convergence/focus" issue. A couple of the other issues -- darkness and "smallness" -- are at least theoretically solvable. But the deeper problem is that the audience must **focus** their eyes at the plane of the screen -- say it is 80 feet away. This is constant no matter what.

But their eyes must **converge** at perhaps 10 feet away, then 60 feet, then 120 feet, and so on, depending on what the illusion is. So 3D films require us to focus at one distance and converge at another."

This is a nice, succinct summary of the problem. You can understand the problem in the following way. Hold your hand about three inches away from your nose and look at it. Two things are happening.

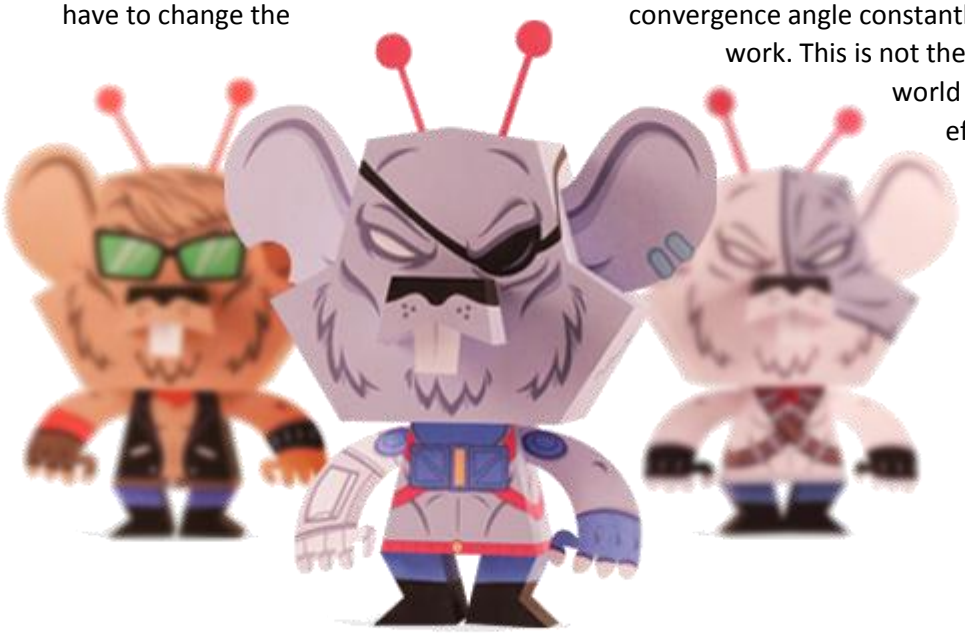
- First, the muscles that control your eyeballs are rotating your eyeball so your pupils are pointing toward your nose. If you were to look at someone who is looking at his/her hand three inches away from his/her

face, the person would look cross-eyed. **The point of convergence is the distance of the object away from your face.**

- Second, the muscles that control the lenses in your eyes are manipulating the lenses so that you can focus on something so close to your face.

That is completely normal. Anytime you look at anything in the real world, the muscles controlling the convergence point of your eyeballs and the muscles controlling the lenses are working in harmony. The two distances are the same.

In the 3D movie however, you have to do something different. The focal length is constant, as mentioned in the quote. Your eyes have to stay focused on the plane of the screen. Meanwhile, you have to change the convergence angle constantly to get the 3D effect to work. This is not the way the system expects the world to be, and it takes extra effort. And sometimes that effort makes your brain hurt.

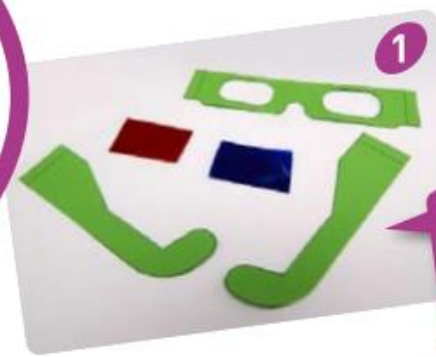


3D Shadows

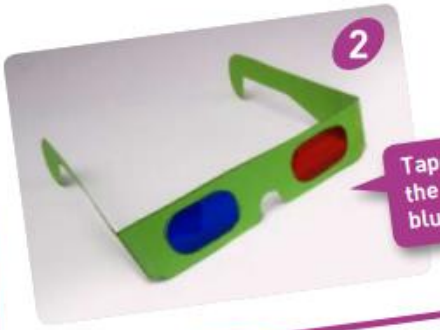
Think you knew all about shadows? Think again. These coloured shadows will really grab you!

www.sciencemuseum.org.uk/launchpadeducators

Grab this stuff...



Cut along all the lines on the template till you're left with this...



Tape red plastic to the left eyehole and blue to the right.

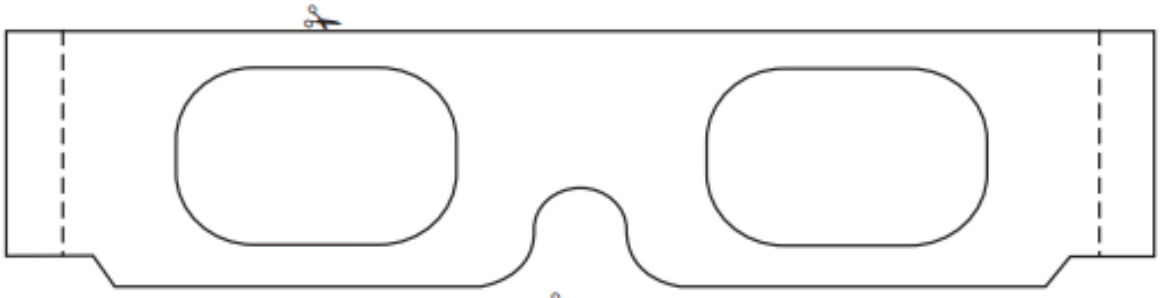
Stand in front of the red and blue slide projectors and put on your glasses.

Hold your hand in front of the projectors and look at its shadow through your glasses.

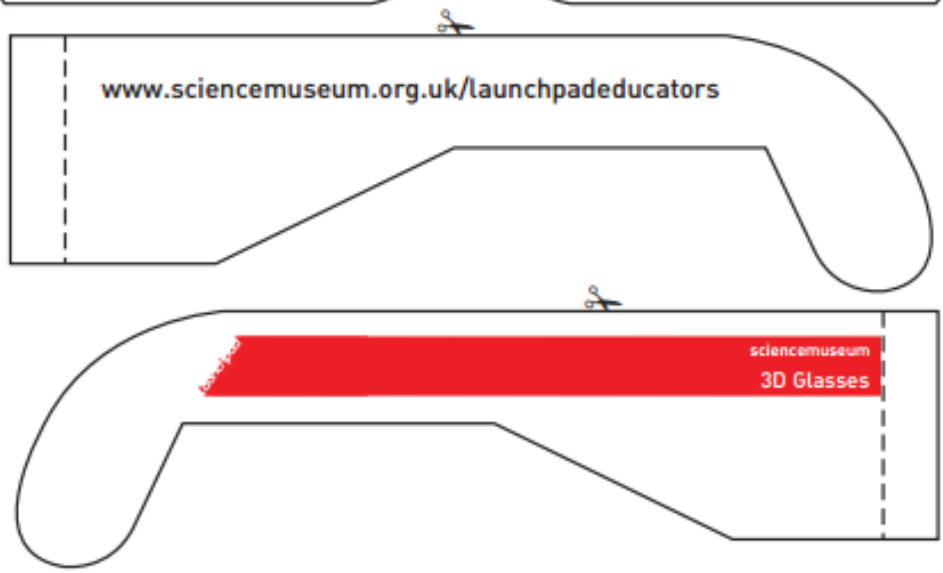
If it doesn't look amazing you've got your glasses on the wrong way. D'oh!

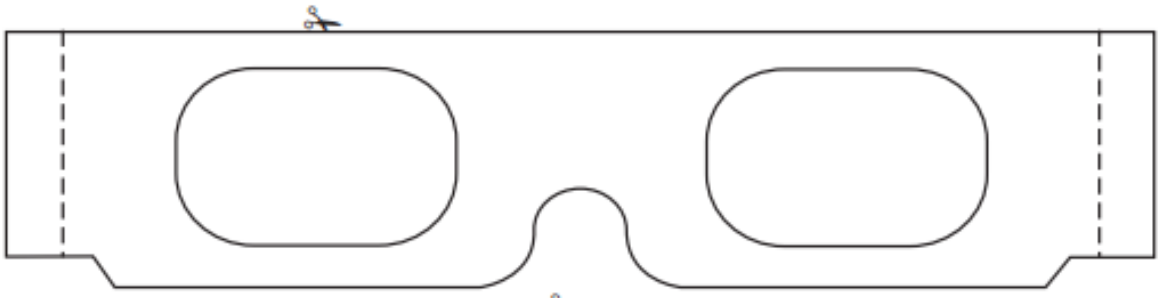
Duck!

launchpad



1. Cut out the glasses, including the eyeholes.
2. Tape the arms to the frame and bend the hinges.
3. Place the glasses face down, then stick a piece of coloured plastic to each eyehole – blue to the right eye and red to the left eye.
4. Wear your glasses while you are looking at objects that are lit up with strong red and blue lights. Move your head from side to side to see the 3D shadows.





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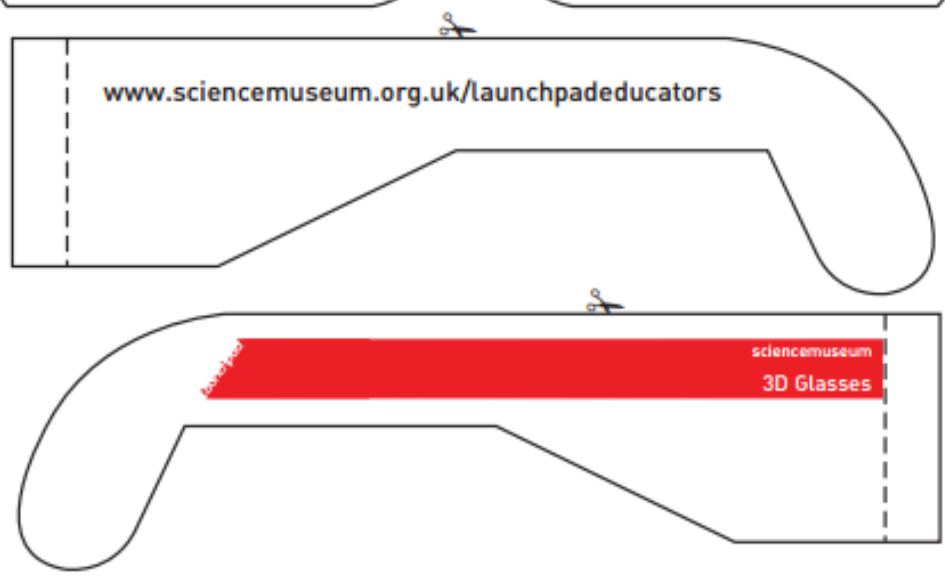

DAY ONE K-8 STANDARD ALIGNMENT

K

- K.G.3. Identify shapes and objects as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
- K.G.4. Analyze and compare two- and three-dimensional shapes and objects using informal language to describe their similarities, differences.

These standards will be met and reinforced as we explore the uses of 3D technology in movies and compare the experiences of 2D to 3D. Students will be asked to compare the experience of looking at shadows and images without their 3D glasses and then with the 3D glasses and state whether they see any differences and if they do, what changed and how would they describe it, etc.

1

- 7.1.1 Recognize that living things have parts that work together.
- 7.T/E.1 Explain how simple tools are used to extend the senses, make life easier, and solve everyday problems.

These standards will be met and reinforced as we explore how our eyes see regularly, how our eyes see 2D objects, and what happens in our eyes and brains when we use 3D glasses to look at specialized '3D' images. We'll explore the purpose of 3D technology as well as 3D glasses and why we need them and what problems they solve and what problems they cause.

2

- 7.Inq.1 Use senses and simple tools to make observations.
- 7.T/E.1 Explain how simple tools are used to extend the senses, make life easier, and solve everyday problems.

These standards will be met and reinforced as we explore the uses of 3D technology in movies and compare the experiences of 2D to 3D. We'll explore the purpose of 3D technology as well as 3D glasses and why we need them and what problems they solve and what problems they cause.

Students will be asked to compare the experience of looking at shadows and images without their 3D glasses and then with the 3D glasses and state whether they see any differences and if they do, what changed and how would they describe it, etc.

3

- 7.T/E.2 Recognize that new tools, technology, and inventions are always being developed.
- 7.T/E.1 Describe how tools, technology, and inventions help to answer questions and solve problems.

These standards will be met and reinforced as we explore the uses of 3D technology in movies and compare the experiences of 2D to 3D. We'll explore the purpose of 3D technology as well as 3D glasses and why we need them, why we want them (why do students think that people want '3D'?) and what problems they solve and what problems they cause. We'll look at why some venues prefer to use the

polarized light method (ex. They can use more colors in their film) and why others prefer the two color lens style (ex. Cheaper to make?)

4

- 7.10.3 Determine whether a material is transparent, translucent, or opaque.
- 7.10.2 Investigate how light travels and is influenced by different types of materials and surfaces.

These standards will be met and reinforced as we explore the different techniques used to make images appear 3D including the materials used to make 3D glasses. We'll discuss why colored translucent material has to be used or polarized materials (and what happens when light is 'polarized') and how those materials influence our eyes and brains and what we see.

Students will be asked to compare the experience of looking at shadows and images without their 3D glasses and then with the 3D glasses and state whether they see any differences and if they do, what changed and how would they describe it, etc.

5

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6

- 7.T/E.1 Explore how technology responds to social, political, and economic needs.
- 7.T/E.3 Compare the intended benefits with the unintended consequences of a new technology.

These standards will be met and reinforced as we explore the uses of 3D technology in movies and compare the experiences of 2D to 3D. We'll explore the purpose of 3D technology as well as 3D glasses and why we need them, why we want them (why do students think that people want '3D'?), and what problems they solve and what problems they cause (ex. Headaches, dizziness, increased cost of movie production, etc.)

7

- 7.1.6 Describe the function of different organ systems.
- 7.T/E.3 Compare the intended benefits with the unintended consequences of a new technology.

These standards will be met and reinforced as we explore how our eyes see regularly (and how our eyes and brains work together to form images), how our eyes see 2D objects, and what happens in our eyes and brains when we use 3D glasses to look at specialized '3D' images. Students will be asked to compare

the experience of looking at shadows and images without their 3D glasses and then with the 3D glasses and state whether they see any differences and if they do, what changed and how would they describe it, etc.

We'll explore the purpose of 3D technology as well as 3D glasses and why we need them, why we want them (why do students think that people want '3D'?), and what problems they solve and what problems they cause (ex. Headaches, dizziness, increased cost of movie production, etc.)

2

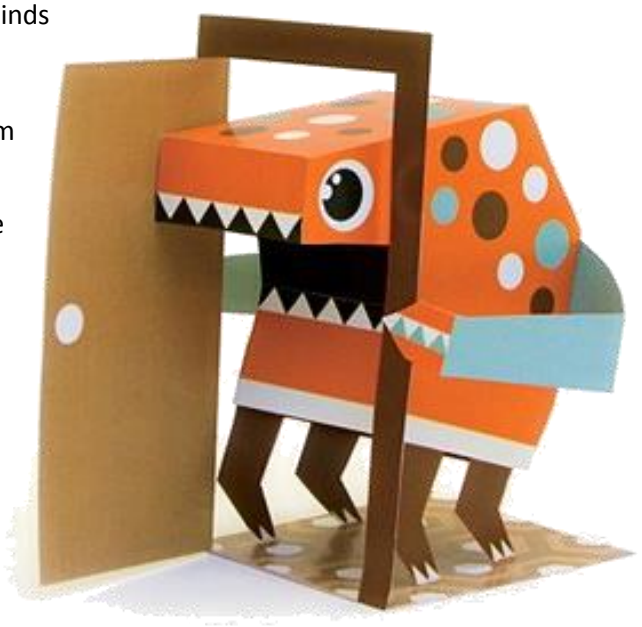
- 1.4.2 Explain polarization of light.
- 1.3.4 Investigate organs for perception of external stimuli.

These standards will be met and reinforced as we explore the different techniques used to make images appear 3D including the materials used to make 3D glasses. We'll discuss why colored translucent material has to be used or polarized materials (and what happens when light is 'polarized') and how those materials influence our eyes and brains and what we see.

Students will be asked to compare the experience of looking at shadows and images without their 3D glasses and then with the 3D glasses and state whether they see any differences and if they do, what changed and how would they describe it, etc.

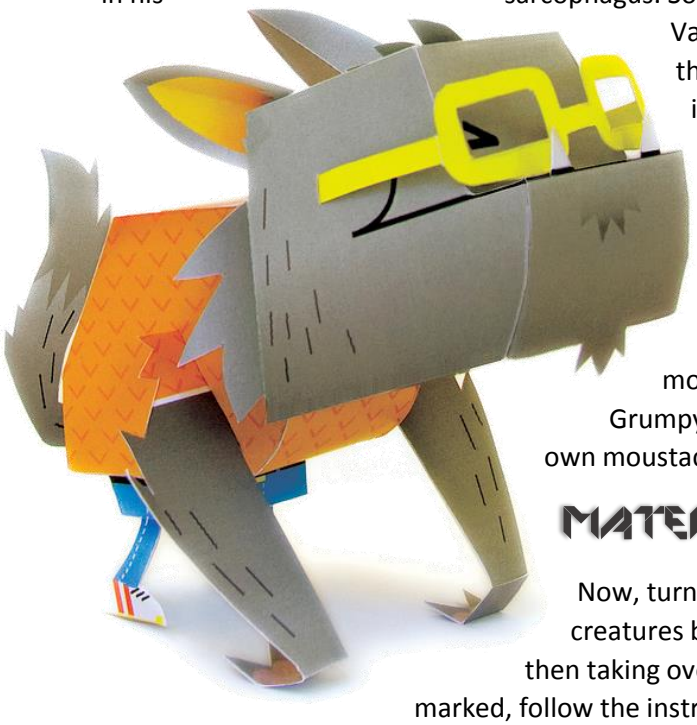
DAYS TWO, THREE, AND FOUR
IT'S ALIVE! IT'S ALIVE!

Okay, maybe not. But story characters sure come alive in our minds when we read about them on the page (we take them from 2D words and make them into 3D images in our minds) and even more so when they're our very own creations. And each of them have distinctive personalities.



Using paper templates and their own imaginations students are going to craft as many 3D paper characters as they want to populate their stories (and to set free from the pages of the book.) They can create an array of marvelous monsters and creepy creatures, cool, cute and crazy Droids and Bots, perky pups, or stealthy ninjas. They can even come up with their own using blank templates or their own wild ideas and some basic craft supplies.

Perhaps they'll make (and meet) Pharaoh Thoth Amon, who once ruled Egypt but is now a mummy who practices magic in his sarcophagus. Some, like Lil Vamp, may be inspired by a folktale but brought up to the modern day, but others, like Polyphemus, could be identical to their original source (in this case, The Odyssey). Or Zumbie the Zombie, who loves nothing more than a nice plate of brains and yams. NotSoScary, a little monster so useless at frightening people that he has to wear a scary mask. Yucky Chuck, the lunchbox creature born in the deepest depths of your school bag. Or Zeke, the monster under your bed, Nom Nom, eater of cities, and Grumpy Gramps, the hairy grandpa monster with his very own moustache collection.



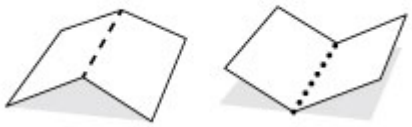
MATERIALS:

Now, turn two-dimensional paper into three-dimensional creatures by punching out shapes, folding and gluing them, and then taking over the world. Just cut out the templates, fold where marked, follow the instructions and glue all the corresponding numbered gray areas (or numbered gray areas to each other) in numerical order (1,2,3…) as directed in the instructions.

- Access to papertoy template books & sites such as *Papertoy Monsters, OiDroids Pop-out Papercraft Robots, Paper Monsters and Curious Creatures, Paper Pups, Djeco Pretty Woodland Animals,* the Billy Sweet Monster Collection by Togui, etc.
- Glue sticks (high quality)
- Tacky Glue

- Coloring materials (if using blank templates to design their own creatures)
- Scissors
- Option: X-acto knives—**for adult use ONLY**

There are typically two basic types of folds:



- Normal folds—or mountain folds—look like a mountain, or an uppercase A.
- Valley folds look like a valley, or the letter V.

It's incredible how something just minutes before was a flat piece of paper is now a complicated sculpture of maximum awesomeness.

Tips: Take care in punching things out, especially the pointy bits and thin sections. Pay attention to the directions, and glue in the designated order. You may need to glue several tabs at once.

The number of numbered tabs a monster or creature has is a good indication of the difficulty. The higher the number, the more difficult.

Days Two-Four K-8 Standard Alignment

K

- RL.K.3. With prompting and support, identify characters in a story.
- RI.K.3. With prompting and support, describe the connection between two characters.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

1

- RL.1.3. Describe characters in a story, using key details.
- RL.1.7. Use illustrations and details to describe characters.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

2

- RL.2.7. Use information gained from illustrations to demonstrate understanding of characters.
- RL.2.6. Acknowledge differences between characters.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

3

- RL.3.3. Describe characters in a story (e.g., their traits, motivations, or feelings).
- W.3.3.b) Use dialogue and descriptions (including actions, thoughts, and feelings) to show the response of characters to situations.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

4

- RL.4.3. Describe a character in depth.
- W.4.9 a. Describe a character in depth, drawing on specific details and evidence (e.g., from illustrations).

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

5

- RL.5.3. Compare and contrast two or more characters.
- RI.5.3. Explain the relationships or interactions between two or more individuals/characters.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

6

- RL.6.3. Describe characters, e.g., how they might and do respond to events or change.
- W.6.3 a) Introduce (and describe) a narrator and/or characters in a story.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

7

- RI.7.3. Analyze the interactions between individuals, e.g., in a story.
- RL.7.6. Develop and contrast the points of view of different characters.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

8

- RI.8.3. Make connections among and distinctions between individual characters.
- RL.8.3. Analyze how particular details (e.g., from illustrations) reveal aspects of a character.

These standards will be met and reinforced as students build their characters (basically working on their story's 'illustrations' and developing their story's cast of characters) for their story and begin to develop ideas as to their personalities, relationships, similarities and differences, interactions, characteristics, etc., based on their character's physical features and details on the templates, any provided background/backstory information from the template source, and their own imaginations.

ADDITIONAL FREE DOWNLOADABLE PAPERTOY TEMPLATES CREATED BY TOUGUI

BIKER MICE FROM MARS

YETI TIME!

THE HIPSTER VAMPIRE & THE MUMMY GUIDE

FAT BANKER

PIRATE BEAR!

Samples of Academic Vocabulary to Reinforce Days 1-4

K

- Observe
- Senses
- Compare
- Contrast
- Story
- Parts

1

- Character
- Setting
- Light
- Property
- Technology
- Illustrate

2

- Observation
- Distance
- Transform
- Discussion
- Events
- Depend
- Similarities
- Differences

3

- Cause
- Effect
- Opinion
- Character
- Setting
- Change

4

- Transparent
- Translucent
- Opaque
- Compare
- Contrast
- Relationship

5

- Personification
- Visual Image
- Theme
- Edge
- Traits

6

- Control
- Criteria
- Cause and effect
- Design
- Imagery
- Personification

7

- Relationships
- Function
- Intercepts
- Property
- Phenomenon
- Organ system

8

- Family
- Variation
- Sensory
- Details
- Element
- Human impact

Building Stories Week One Supply List

Day One

Materials:

- 2 slide projectors or overhead projectors
- 1 red and 1 blue color gel/ Color Effects Lighting Filters (e.g. www.mutr.co.uk CS6020A and CS6020B)
- Interesting objects (opaque, translucent and transparent)
- Interesting sample images of 3D films

Per student

- 3D glasses template
- 1 small square of red and 1 small square of blue color filter approx. 40 mm x 30 mm (the same filters as you used with the projectors)
- Tape
- Scissors

Days Two-Four

- Access to papertoy template books & sites such as *Papertoy Monsters, OiDroids Pop-out Papercraft Robots, Paper Monsters and Curious Creatures, Paper Pups, Djeco Pretty Woodland Animals,* the Billy Sweet Monster Collection by Togui, etc.
- Glue sticks (high quality)
- Tacky Glue
- Coloring materials (if using blank templates to design their own creatures)
- Scissors
- Option: X-acto knives—**for adult use ONLY**