

Bright Ideas!

Samples of Possible Common Core and TN Academic Standards to Incorporate:

As you read the activities, keep in mind the specific skills your students need to practice and master in the different grade levels and use them to guide your approach in how you present the activities and what you have the students do. We encourage you to add additional SPIs and Academic Vocabulary in your plans that are outside the specific ones listed as there are *many* which apply and are not listed below.

Technology: n. The practical application of knowledge. Technology is a body of knowledge used to create tools, develop skills, and extract or collect materials for practical purposes and the machinery and equipment developed from such scientific knowledge. It is also the application of science (the combination of the scientific method and material) to meet an objective or solve a problem.

Kindergarten:

- K.6.1. Students will use technology resources for solving problems and making informed decisions.
 - b. Use a step-by-step process for solving a problem.
 - 1. Order specific steps in the solution of a problem.
 - 2. Choose the proper steps in the solution of a problem.
 - 3. Choose and order the steps in the solution of a problem
- K.6.2. Students will develop strategies for solving problems in the real world.
 - Use the computer and technology resources as a learning tool.
 - Use multimedia software to express ideas and solve problems.
 - Use some method of storyboarding to create a presentation.

1st Grade:

- 1.6.1. Students will use technology resources for solving problems and making informed decisions.
 - c. Use a step-by-step process for solving a problem.
 - 1. Order specific steps in the solution of a problem.
 - 2. Choose the proper steps in the solution of a problem.
 - 3. Choose and order the steps in the solution of a problem
- 1.6.2. Students will develop strategies for solving problems in the real world.
 - A. Use the computer and technology resources to gather information on different ways to solve a specific problem.
 - B. Use developmentally appropriate software and/or tools to follow sequential directions and proper steps to solve a problem for a given simple task.
 - C. Express ideas, strategies use, and solution for a given problem and/or task.
 - D. Use some method of storyboarding to create a presentation on the steps used to solve the problem.

2nd Grade:

- 2.6.1. Students will use technology resources for solving problems and making informed decisions.
 - c. Use a step-by-step process for solving a problem.
 1. Order specific steps in the solution of a problem.
 2. Choose the proper steps in the solution of a problem.
 3. Choose and order the steps in the solution of a problem
- 2.6.2. Students will develop strategies for solving problems in the real world.
 - A. Use the computer and technology resources to gather information on different ways to solve a specific problem.
 - B. Use developmentally appropriate software and/or tools to follow sequential directions and proper steps to solve a problem for a given simple task.
 - C. Express ideas, strategies use, and solution for a given problem and/or task.
 - D. Use some method of storyboarding to create a presentation on the steps used to solve the problem.

3rd Grade:

- 3.6.1. Students will use technology resources for solving problems and making informed decisions.
 - c. Use a step-by-step process for solving a problem.
 1. Order specific steps in the solution of a problem.
 2. Choose the proper steps in the solution of a problem.
 3. Choose and order the steps in the solution of a problem
- 3.6.2. Students will develop strategies for solving problems in the real world.
 - A. Use the computer and technology resources to gather information on different ways to solve a specific problem.
 - B. Use developmentally appropriate software and/or tools to follow sequential directions and proper steps to solve a problem for a given simple task.
 - C. Express ideas, strategies use, and solution for a given problem and/or task.
 - D. Use some method of storyboarding to create a presentation on the steps used to solve the problem.

4th Grade:

- 4.6.1. Students will use technology resources for solving problems and making informed decisions.
 - c. Use a step-by-step process for solving a problem.
 1. Order specific steps in the solution of a problem.
 2. Choose the proper steps in the solution of a problem.
 3. Choose and order the steps in the solution of a problem
- 4.6.2. Students will develop strategies for solving problems in the real world.
 - A. Use the computer and technology resources to gather information on different ways to solve a specific problem.
 - B. Use developmentally appropriate software and/or tools to follow sequential directions and proper steps to solve a problem for a given simple task.

- C. Express ideas, strategies use, and solution for a given problem and/or task.
- D. Use some method of storyboarding to create a presentation on the steps used to solve the problem.

5th Grade:

- 5.6.1. Students will use resources, ex. technology, for solving problems and making informed decisions.
 - Determine the usefulness and appropriateness of information and conclusions and apply critical analysis to resolve conflicts and validate information.
 - Use software programs with audio, video, and graphics to enhance learning experiences
 - Use appropriate software and/or techniques to express ideas and solve problems including the use of word processing, graphics, databases, spreadsheets, simulations, and multimedia.
 - Use a variety of data types including text, graphics, digital audio, and video.
 - Use communication tools to participate in projects
 - Use a graphical organizer and/or outliner to categorize, make connections, and visually display relationships (cause and effect, Venn Diagrams and hierarchical organization).
- 5.6.2. Students will employ techniques and technology in the development of strategies for solving problems in the real world.
 - c. Use appropriate techniques to express ideas and solve problems, ex. the use of word processing, graphics, databases, spreadsheets, simulations, and multimedia.
 - d. Use a variety of data types including text, graphics, digital audio, and video.
 - e. Use communication tools to participate in projects

6th Grade:

- 6.6.1. Students will use resources, ex. technology, for solving problems and making informed decisions.
 - Use technology in self-directed activities by sharing products for defined audiences.
 - Create a document using a word processor to share results and conclusions with the audience.
 - Create presentations related to projects.
 - Integrate acquired technology and engineering applications skills, strategies, and use of the word processor, database, spreadsheet, draw, paint, constructions and/or utility programs into the project.
 - Compose essays or reports using a word processor.
 - Create charts and graphs, ex. use a spreadsheet.
- 6.6.2. Students will employ technology in the development of strategies for solving problems in the real world.
- 6.6.3. Students will demonstrate knowledge of the relevancy of technology and development to life-long learning and daily living.

7th Grade:

- 7.6.1. Students will use resources, ex. technology, for solving problems and making informed decisions.
 - Use technology in self-directed activities by sharing products for defined audiences.
 - Create a document using a word processor to share results and conclusions with the audience.
 - Create presentations related to projects.
 - Integrate acquired technology and engineering applications skills, strategies, and use of the word processor, database, spreadsheet, draw, paint, constructions and/or utility programs into the project.
 - Compose essays or reports using a word processor.
 - Create charts and graphs, ex. use a spreadsheet.
- 7.6.2. Students will employ technology in the development of strategies for solving problems in the real world.
 - a. Demonstrate knowledge of the relevancy of technology to future job skills, life-long learning, and daily living.
 - 1. Discuss uses of technology at home.
 - 2. Compare technology of the past with the present.
 - b. Use technology resources (e.g., calculators, videos, tools) for self-directed learning, problem solving and extended learning activities.
 - 1. Describes more than one problem-solving method.
 - 2. Selects an appropriate problem-solving method.
 - 3. Generate a desired outcome using a problem-solving method.

8th Grade:

- 6.6.1. Students will use resources, ex. technology, for solving problems and making informed decisions.
 - Use technology in self-directed activities by sharing products for defined audiences.
 - Create a document using a word processor to share results and conclusions with the audience.
 - Create presentations related to projects.
 - Integrate acquired technology and engineering applications skills, strategies, and use of the word processor, database, spreadsheet, draw, paint, constructions and/or utility programs into the project.
 - Compose essays or reports using a word processor.
 - Create charts and graphs, ex. use a spreadsheet.
- 8.6.2. Students will employ technology in the development of strategies for solving problems in the real world.
 - a. Demonstrate knowledge of the relevancy of technology to future job skills, life-long learning, and daily living.
 - 1. Discuss uses of technology at home.
 - 2. Compare technology of the past with the present.

- b. Use technology resources (e.g., calculators, videos, tools) for self-directed learning, problem solving and extended learning activities.
 - 1. Describes more than one problem-solving method.
 - 2. Selects an appropriate problem-solving method.
 - 3. Generate a desired outcome using a problem-solving method.

HS

- 5.9 understand the impact of developing technology on the world.
- 6.7 Understand the relationship between brain, sensory perceptions and behavior and analyze advertisements for the use of sensory information.
- 10.2 Recall prior cultural advances that occurred as a result of inventions and innovations.

Samples of Possible Academic Vocabulary to Incorporate:

For the Academic Vocabulary we encourage you to use as many of these words as possible, not simply pick one or two. The more words we can introduce in a setting that makes sense to our students, the better. We encourage you to add additional SPIs and Academic Vocabulary in your plans that are outside the specific ones listed as there are many which apply and are not listed below.

Kindergarten:

- | | |
|------------|-----------------------------------------|
| ● Pattern | ● Human |
| ● Tools | ● Basic needs (food, clothing, shelter) |
| ● Compare | ● Wants |
| ● Contrast | |

1st Grade

- | | |
|------------|-----------|
| ● Sequence | ● Past |
| ● Predict | ● Present |
| ● Property | ● Future |
| ● History | |

2nd Grade

- | | |
|----------------------------|--------|
| ● Similarities/Differences | ● Edit |
| ● Draft | |

3rd Grade

- | | |
|---------|----------|
| ● Tools | ● Effect |
| ● Cause | |

4th Grade

- | | |
|--------------|------------|
| ● Prediction | ● Contrast |
| ● Compare | |

5th Grade

- | | |
|-----------------|-------------|
| ● Prompt | ● Hyperbole |
| ● Visual Image | ● Model |
| ● Point of view | |

6th Grade

- Cause and Effect
- Criteria

7th Grade

- Impact
- Property

8th Grade

- Sequence

- Similarity
- Design Constraint

- Function

- Human Impact

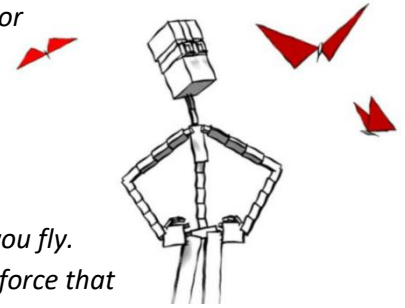
Bright Ideas!

“Science does not know its debt to imagination.”

~ Ralph Waldo Emerson



Introduce the topic by having students watch a short video such as GROSSE PLÄNE by Irmgard Walthert <http://vimeo.com/47716621> [When the construction of an apple vending machine proves to be particularly challenging, this junior inventor learns to think outside the square and work with what's on hand.]



And, Der Traum vom Fliegen - Dream to Fly by Sascha Geddert

<http://vimeo.com/12185106> [Just dreaming about flying doesn't make you fly.

Precise observation, persistence and courage are necessary to tackle the force that drags you down.]

Have you heard the saying “If you can’t find it build it”? Inventing -- building something new or making something better -- is often thought of as a purely creative act. In fact, invention demands much more than a vision. It requires previous knowledge and new information; the ability to observe, analyze, and identify problems; and the utilization of critical-thinking skills to find appropriate and workable solutions. The invention process reinforces both the cross-disciplinary and higher order thinking skills, including valuing evidence, comprehending and critiquing and demonstrating independence in exploring learning.

"Throughout history, inventions have helped people discover new worlds, build communities, develop resources, increase productivity, cure diseases, ease burdens, and enjoy life to the fullest. ... New inventions lead to new technologies, create new jobs, and improve our quality of life."

--The U.S. Patent Office

Who, Me? An Inventor?

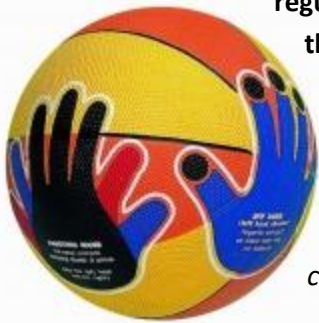
Yes! People from every corner of the world, of different ages, with different levels of education invent by identifying problems, pursuing ideas, and developing new solutions. The key to inventing is identifying a need and devising an original solution.



Maybe a better question is, "Is there anyone who isn't an inventor?" Everyone has the capacity for invention. We all solve problems through inventive thinking, whether it's figuring out a way to prop open a window, stay dry in a rainstorm, or build a playhouse from scrap materials. Creative problem solving, improvisation, flexibility, and tinkering drive the inventive spirit.

From the minds of children

Kids are known for being imaginative, but when it comes to inventors, they might not be the first group that comes to mind. But that doesn't mean there aren't plenty of pint-size inventors. Kids have invented a lot of things we use every day! **If there is space available have students try a variety of shots with a regular basketball into the basket. Wouldn't it be nice if there was a "Built in Coach" that came with basketballs? How would they create one?**



In 1994 Chris Hass was just nine years old when he invented a basketball that could teach players where to put their hands when shooting. He came up with the idea for his invention after watching his friends miss easy shots. The basketball has hands painted on it to show the correct position for a player's hands for the best chance at success. He developed his idea for an Invention Convention competition

*that was held at his school. Even though he didn't win, his teachers encouraged him to get a patent. Today, his invention is sold around the world. **How could you change it up? What about 'righties' and 'lefties?***

Now they have ones for men, ones for women, and some for kids? Why might

they want to make it different? How about for other sports, how could this idea be helpful or used in racket ball, baseball, tennis, Ping-Pong, golf, volleyball, or other sports equipment?



MEN'S



WOMEN'S



YOUTH

What is your student's theory of how popsicles came about? What if you didn't have a refrigerator? Write their ideas down on the board. See who gets closest to the actual events. How old was the person that invented it?

Popsicle lovers everywhere have an 11 year-old boy to thank for this tasty treat. Frank Epperson from San Francisco, California accidentally invented the Popsicle in 1905. He had made a drink for himself by mixing flavored soda water powder and water, which was popular at the time. By accident he left his drink, with the stir stick still in the glass, on the front porch of his house

overnight. Well, that night the temperature fell below freezing, which didn't happen often in the city. The next morning, Frank went to get his drink but found a hard lump of ice where the liquid once was. The stir stick became a handy handle and Frank enjoyed the frozen drink.



The years passed and Frank grew up. In 1922 Frank thought it was time to do something with his invention. For the first time, the Popsicle was served to guests at a large party. It was an amazing hit and people wanted more.

Frank knew he was on to a good thing and applied for a patent his invention, calling it "Ice on a Stick". He was awarded a patent in 1924. He changed the name to Epsicle Ice Pop and started selling the ice pops for a nickel each. Later, he changed the name again to Popsicle. Can you imagine a world without Popsicles?

15 year old Jack Andraka invents new method of diagnosing cancer, thus saving the lives of millions of people around the world...



...and it is 168 times FASTER, 26,000 times CHEAPER, 400 times MORE SENSITIVE, and has a 99% SUCCESS RATE!

Source - Forbes Magazine

What about medical discoveries and inventions? What do students think? How are medical discoveries made? Those are all done by adults, right? Surprisingly, wrong! Innovation doesn't care how old you are.

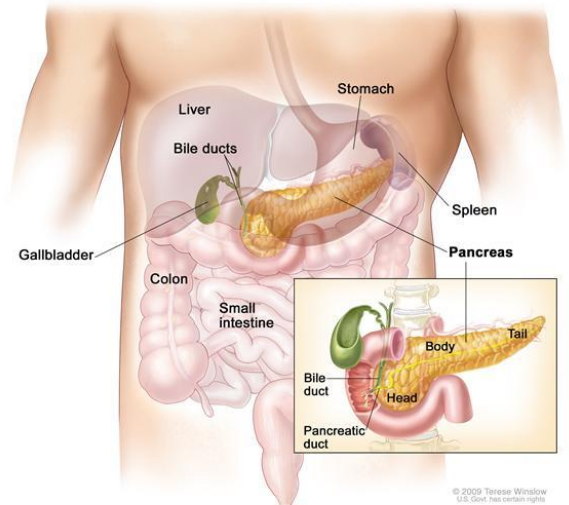
Scientist Jack Andraka recently won the world's largest high school science competition for his development of a new, cheap and accurate test for detecting pancreatic cancer . . . at 15!

Pancreatic cancer has a survival rate of less than 5% and is typically very hard to detect. Jack's invention could drive the survival

rate to over 50% and allow early detection, an amazing improvement which could save many lives. It gives nearly perfect results of detection of actual cancer or saying patients who have other symptoms and may have been diagnosed incorrectly are cancer free. It can also be used to effectively monitor how effective a cancer treatment is. And it only costs 3 cents! Over 26,000 times cheaper than the average test which costs nearly \$800.

This invention may also be able to be used—with testing and tweaking—to accurately detect other forms of cancer, test cancer treatment effectiveness, look at cancer drug resistance, allowing personalization of cancer treatment and making it so doctors don't have the conventional guess and check style of treatments. And it may not only work for cancers but also other diseases (e-coli, AIDs, STDs) and help with our food and water safety.

Read the story in his own words in the interview with Forbes. He discusses the roles of mentors, inspiration, research, the endless rejections (199!) and answers questions such as: Was your discovery



easy? Did the innovation come in a flash...then the details worked out? Who or what encouraged you to take this challenge on? And of course, "What's next for Jack?"

<http://www.forbes.com/sites/johnnosta/2013/02/01/cancer-innovation-and-a-boy-named-jack/>

Watch Jack talk about his discovery/invention here. <http://talentsearch.ted.com/video/Jack-Andraka-Detecting-pancreat> Some of the language is technical but interesting!

What Else Could I Do With This?

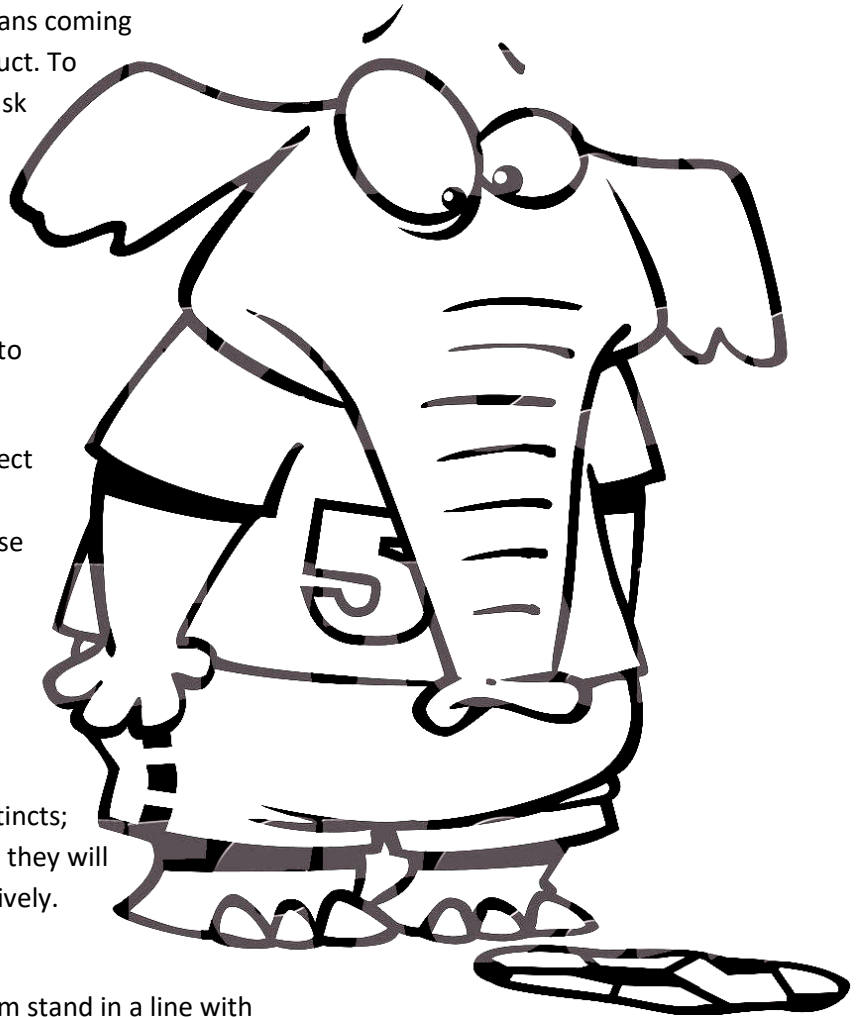
Ask kids this seemingly simple question: What's an invention? Kids are likely to say it's a new machine or product. But sometimes, inventing means coming up with a new use for an existing product. To encourage flexibility in kids' thinking, ask them to think of ordinary objects in a new way. Bring 5 random items (kitchen or office objects are good) **including a page from an old telephone book** and place them in the center of the group. Explain the game to the audience and/or players.

One player begins by transforming object into anything else; no wrong answers; then player passes object to anyone else in circle, but not the adjacent player. Each person is encouraged to come up with an alternative use for the item. Encourage kids to be imaginative. No wrong answers.

Goal – Students learn to trust their instincts; take object even w/o an idea and trust they will create one and learn to think imaginatively.

Variation:

1. Have the players from one team stand in a line with their backs to the center of the room or stage.
2. Pick an object from the trunk and set it in the center of the room or stage.
3. Tell the players to turn around and face the item.
4. Have the players step out of line and use the item as a prop, creating various ways that the item can be used.



5. Stop the players when the ideas from the players slow down or stop (or within a certain specified time limit, ex. 60 seconds). Start over with a new item and a new team. The team that thinks of the most creative ways to use the objects wins.

Option: It doesn't have to be a competition. Usually, the main object of this game is comedy. Think of comedic uses for the objects.

Tips and Warnings for Players:

- The host can end the game whenever she wants.
- Allow other players to get their ideas out before stepping in with your own.
- Make yourself noticed by the other players when you step out of line so that no one else steps out.
- Do not use the item as it is meant to be used.
- Do not let a lot of time pass between players using the prop.
- Do not repeat the same idea. Try not to make the uses for the objects too similar or it will become repetitive

Big Mouth! The Tumblewing

To see air surfing, (aka walk-along gliding) the first time is breathtaking! As Alan Alda, hosting the PBS TV program Scientific American Frontiers said, "I've never seen anything like that!"

Encountering walk-along gliding is almost like stepping into a sci-fi movie, or a movie about magic, with objects hovering through the air without any apparent source of lift. Actually doing it yourself has the excitement of a video game and aerobic activity besides. Surfing on a wave of air has a Zen-like simplicity. A piece of cardboard from a pizza box and a page from a phonebook (are you really going to miss a page from the "attorneys" section?) are all you need to get this incredible and simple invention into the air.

What follows below are step-by-step, illustrated instructions for making and flying a tumblewing walkalong glider, a design **invented** by Michael Thompson. are many branches of walkalong gliding, but the Big Mouth Tumblewing is the easiest way to start. There are two qualities that make the tumblewing the obvious choice to start with. It is more stable and much slower than other walkalong glider designs.

Before you start, be aware that the step-by-step instructions below are not the only way to learn how to build and fly your first tumblewing. Phil Rossoni has created a good lesson on Instructables.com <http://www.instructables.com/id/Walkalong-Glider-Made-from-Phone-Book-Paper/> and several YouTube segments <http://youtube.com/watch?v=wIO4CTplrB0>.

Materials:

- Pages from a phonebook,
- Patterns

- Large Piece of cardboard
- A hallway
- Scissors
- Tape

Paper: The paper you make the tumbling out of should be lightweight but stiff enough to keep its shape. Phone book paper is stiff enough, light and easy to get, but it is not the only paper you could use. If you weigh identically-sized (8.5" by 11") pieces of paper and you get the following results:

KIND OF PAPER WEIGHT (GRAMS)

tissue paper	1.3
phone book paper	1.8
newspaper	2.9
glossy magazine paper	3.2
printer paper	4.7

Notice that tissue paper is much lighter than even phone book paper, but there is a point of diminishing returns when avoiding weight. Why? Why might tissue paper be a bad choice? Tissue paper is flimsy!

Cardboard: The cardboard "paddle" should be as big as possible when you are starting out.

The **smallest** paddle you want to start students off with is the top or bottom of pizza boxes that measure 18" by 24" (46 cm by 62 cm), and a bigger one is better. If you go much smaller than that you might have trouble. A bigger paddle seems to create a bigger wave of air so you can walk slower, which makes it easier to keep things balanced.

Pattern: When the tumbling pattern prints out it should be approximately 9" long. Some printers change the scale. The exact size is not important, but a big tumbling is easier to fold, less affected by air currents and it turns slower, so it's easier to learn with.

The following video starts with an introduction, then instructions for making and flying tumblings.

(<http://www.sciencetoy maker.org/tumbling/index.htm>) If YouTube is blocked at your site, here is the Schooltube equivalent

(<http://www.schooltube.com/video/f3ba37634e9049bfb666/BIG%20MOUTH%20TUMBLEWING%20MAKE%20AND%20FLY>).

Let's Build It

You can either print out a page of patterns for students or have them measure out rectangles. They are about 230mm by 45mm or 9" by 1 3/4".

Note that it matters which way you lay out the rectangles on the page. Paper has a grain direction,



just like wood. The back and forth rectangle is too weak to provide support. So orient your rectangle up and down the phone book page or your glider might be too flimsy to fly, especially in humid weather. If using a pattern, rough-cut out two strips. Tape down the ends. Cut the sides on the solid lines. Cut the strips apart down the middle. Only then should you cut on the solid end lines, which will also separate off the pattern.

Whether you use glue or tape to hold the ends together, be very sparing to keep it light. For most efficient flight offset the strips by about 30mm or 1 ¼ inch, the distance is shown on the pattern.

Use a *little* tape and then flip it over to tape the other end. If gluing, put a little on one end, then the other.

That's it, but it won't glide well until you can launch and adjust. *Tip: Watch the video, starting at 5:10 for launching and adjusting help.*



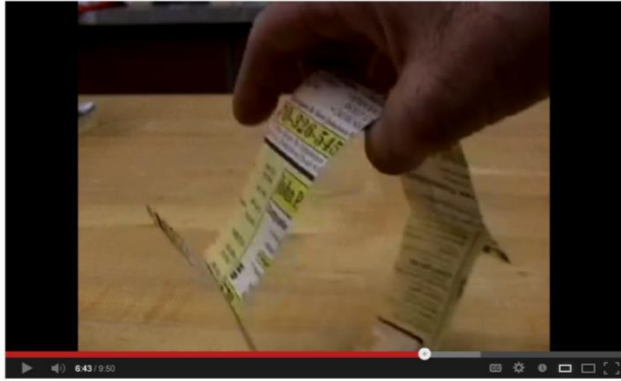
Don't quit and get frustrated here because we can't separate launching and adjusting. They are learned at the exact same time! You'll need to be in a room with very calm air. When the big mouth spins, the paper should curve out a little, as much as the paper is wide, or even a little more in the middle. If it doesn't the glider is uncontrollable, slips to the side, and makes it impossible to fly. The other extreme that happens is that it flares out too much, making it inefficient, drop too quickly, hit the board, and be unable to fly. It all takes balance.

Unfortunately you can't know if it's going to be too skinny, until you launch it!

Launching

Know that the glider spins opposite of the way that a wheel spins. The top of a wheel spins in the direction of travel. Tumblewings don't work that way. The top moves against the direction of travel as tumblewings are constantly flipping up and over. To fly it has to be gliding away from you.

Pinch one piece between thumb and finger, like in the image.



Or like this.



Either jerk it a tiny bit forward and/or swing the bottom forward a little.



Most people start out dramatically throwing it, but it's really just a slight flick that's necessary.

- 1.) start the tumbling gliding away from you, so push it away from you a little, and
- 2.) start it rotating in the right right direction, so push the edge you're holding onto down a little at the same time you are pushing it away

Troubleshooting:

- If too narrow: Pull it out symmetrically by gently tugging on each rectangle/side of the mouth.
- Use the same idea as when you curl paper with scissors, but gently pull/rub it through your fingers or against a pen to form a more gentle curve or bend.

- The glider always turns one way: You're probably unconsciously tilting it! Launch it level!
- To make the tumblewing fly higher you walk faster, DO NOT angle it up, like the 2nd picture.



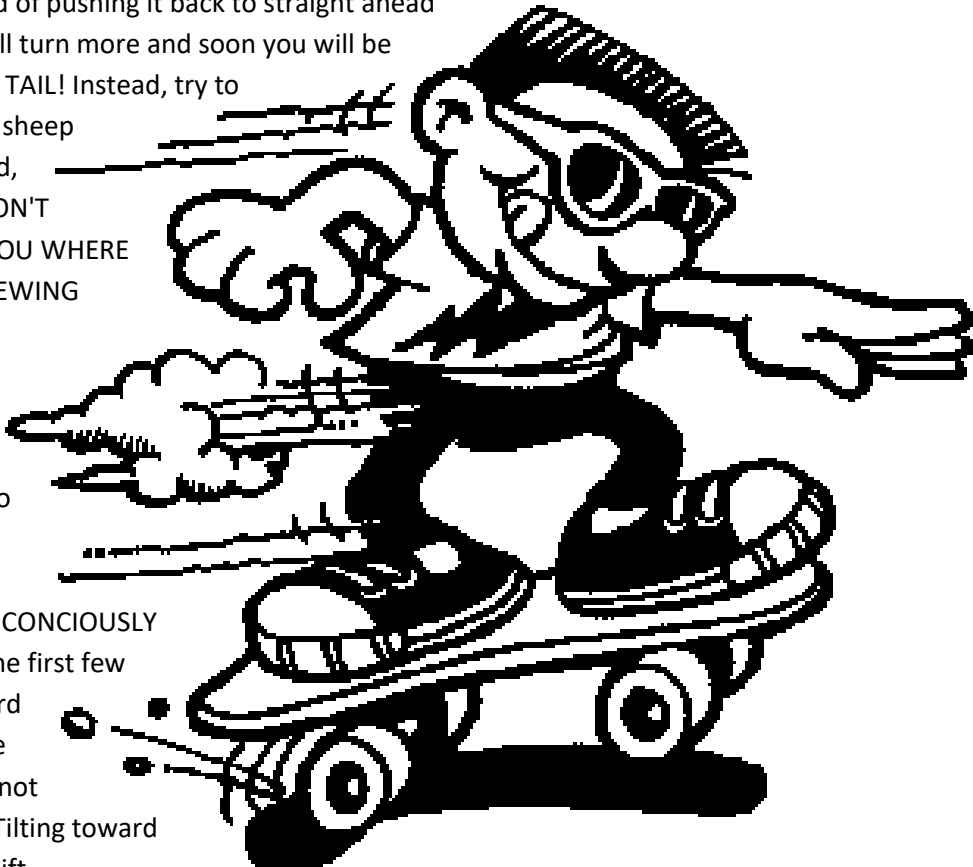
Surf Time!

(for tips start the video at 7:20)

Once you've figured it out (how wide it should be and how to launch it) it's time to surf. Surfing involves balancing the glider on a wave of air that you can't see.

Common Mistakes:

- When you release the tumblewing and it starts to turn a little bit left or right, you may find yourself turning with it instead of pushing it back to straight ahead again. It will turn more, you will turn more and soon you will be like A DOG CHASING ITS OWN TAIL! Instead, try to be like a sheepdog. When the sheep wander to one side of the road, the dog nudges them back. DON'T LET THE TUMBLEWING TELL YOU WHERE TO GO; YOU TELL THE TUMBLEWING WHERE TO GO!
- The second mistake is almost everybody changes the tilt of the cardboard paddle to try to make the tumblewing go higher (gain altitude). Tilt the paddle to slant a little off vertical, as shown, AND THEN CONCIOSLY KEEP IT AT THAT ANGLE. On the first few tries, most people tilt the board toward horizontal to make the tumblewing rise and they are not even conscious of doing this. Tilting toward horizontal actually decreases lift.



Tilting the cardboard is so ingrained (most people do not realize they are doing it) that it helps to have your students practice the following exercise. By going to the extreme of that parameter, their mind starts to establish walking faster as the way to gain altitude.

Try It! Establish in your mind that you will not change the angle of the cardboard. Launch the tumblewing and push it **too fast**... so it actually blows over the top of the top of the cardboard. It might be annoying to have the tumblewing blow into your face, but it strengthens the habit of raising altitude with speed, **not tilting**.

Finally...Practice, Practice, Practice!

Variation: Tumblesufer

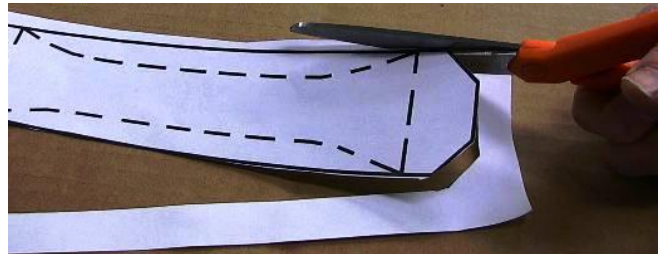
Instructions & Images from: <http://www.sciencetoymaker.org/tumblewing/makeTumblewing.htm> For educational and non-commercial use only. All Rights Reserved.

Just like with all inventions, someone took the original design, and tweaked it! Have your students test it and see which invention they'd rather work with.

When the tumblewing pattern prints out it should be approximately 9 1/2" long . Some printers change the scale. The exact size is not important, but a big tumblewing is easier to fold, less affected by air currents and it turns slower, so it's easier to learn with.

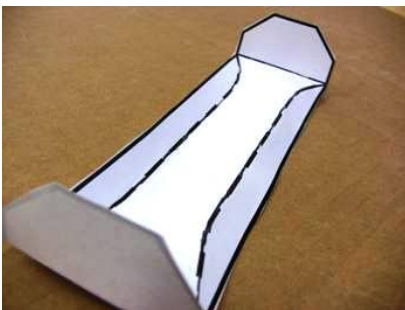
A FEW SIMPLE TOOLS : Templates, phone book paper, Scissors, tape, and a ball-point pen

A PLACE TO FLY : Finding a place to fly is a problem sometimes. If you stand still but can feel the slightest wisp of wind against your face, you are probably going to have a difficult time flying. Sometimes it is calm enough at dawn or dusk, but mostly I teach people how to fly indoors. Even indoors air currents from



ventilation systems or open windows can cause problems. It becomes noticeably harder to air surf in my school once warm weather commences and windows are opened--even in the halls, and even though I cannot actually feel the wind.

The second thing to consider is having some space. Of course it's great to have an expanse of indoor public space such as a school or library or the aisles of a grocery store, but even a typical hallway of a typical house can work.

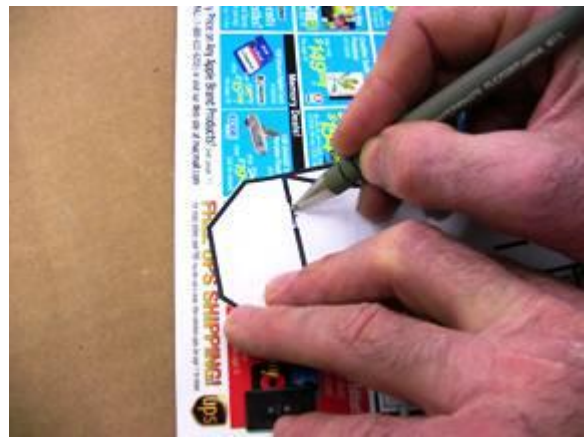


Step 1 Cut and Fold The Pattern

The drawings ought to be about 9 1/2" (245mm) long. Cut out the pattern on the outside solid line.

It is much easier to fold the printed pattern first, then use it to help fold the phone book paper. You will be folding on the 4 dashed lines. The two long dashed lines are particularly difficult to fold because they

curve at the ends. If you first put the pattern on something softer than the table, such as the phone book or a magazine, and “draw” with a ball-point-pen the folding is easier and more accurate. Push very hard with the pen and go over it several times.



Try to weaken the paper fibers along all the dashed lines. Push very hard and be especially thorough where the dashed lines curve.

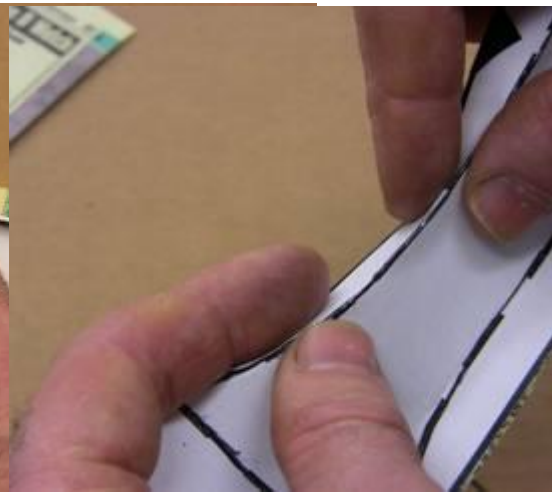
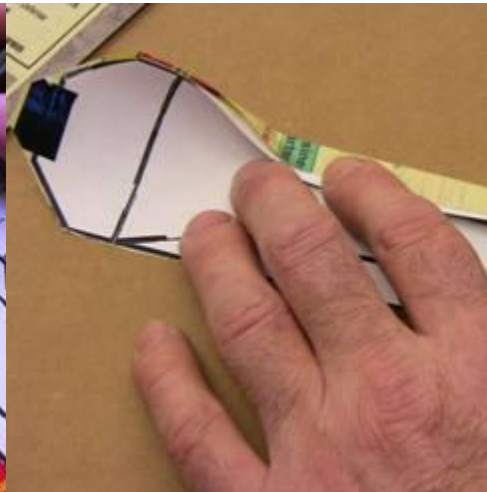
Push hard with the pen on the small dashed lines at the ends. The pen does not even have to have ink to work. You are not pressing too hard unless the paper rips.

One long fold should go up and one long fold should go down, both at about an angle of 30 degrees. Because of the symmetry of the tumbling, it does not matter which goes down and which goes up. If you pushed hard with the pen, it should be easy to fold. The short folds (end tips) both fold in the same direction (both up or both down--it doesn't matter which because of symmetry) 90 degrees.

Now, Use the pattern to Cut and form the Tumbling

Flatten the pattern. Tape it onto the phone book paper in 4 places, one on each side. Use the pattern to cut out the phone book paper, cutting out along the outside of the pattern **except on the ends**. It will hold the pattern to the other paper.

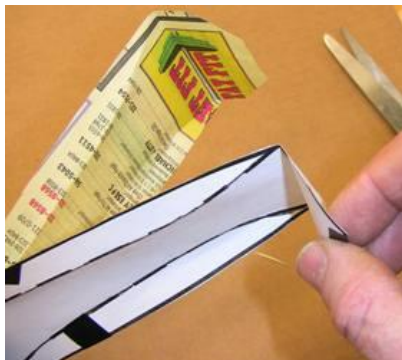
Use the pen again to squish the paper fibers along the fold line, then use the pattern to transfer the folds into the phone book paper.



Press very hard again on all the lines that used to be dashed. Your students are probably getting tired from all that pressing, but tell them it is worth the effort. It makes folding the phone book paper so much easier.

Fold hard! The fold lines in the phone book paper should be clear and strong even though the long folds will only be about 30 degrees when they fly.

More transferring the folds to the phone book. Pay particular attention to the curved part.



You are almost finished!

More folding, where the line curves and the short bend for the wing tip. Finally, cut through the tape at the end and separation! Clean up the folds on the ends of the phone book tumblewing.

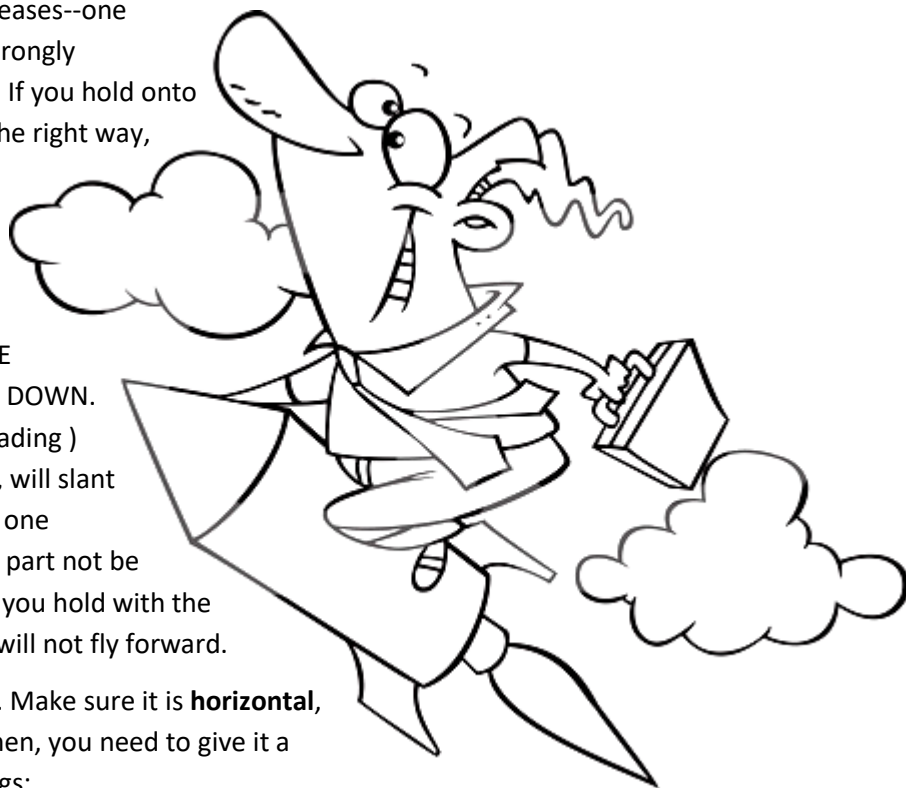
Learning To Launch the Tumblewing

To avoid needless frustration, learn to launch your tumblewing well before you try to keep it in the air with the paddle. It won't take long if you follow a few guidelines.

Everybody understands that the long folds help keep the length of the tumblewing rigid, and they perform another vital function. The creases--one bending up and one bending down--strongly influence how the tumblewing will fly. If you hold onto it the right way and start it revolving the right way, you will have perfect launches almost every time.

When students gently hold onto one of the long tilted edges it is very IMPORTANT THAT THE EDGE THEY ARE HOLDING ONTO IS SLANTING UP, NOT DOWN. The other edge--it will be the front (leading) edge facing away from you--of course, will slant down since they are holding onto the one slanting up. However, the long middle part not be tilted down; it should be horizontal. If you hold with the edge you are holding folded down--it will not fly forward.

You do not just let the tumblewing go. Make sure it is **horizontal**, not tipped to one side or the other. Then, you need to give it a quick, short push that will do two things:



- 1.) start the tumblewing gliding away from you, so push it away from you a little, and
- 2.) start it rotating in the right right direction, so push the edge you're holding onto down a little at the same time you are pushing it away

Remember to hold onto the edge which **bends up**. Hold it horizontally, not drooping down. You will have to impart the forward motion and the turning motion of the tumblewing. (Not only push forward also pushed the back down to start the turning motion).

This push is very short--only an inch or two, or a few centimeters--and very quick. You push both forward and down. You have to let go at just the right time, which comes with practice. Now the trick is to snap your fingers back out of the way so it doesn't hit them as it flips over.

Troubleshooting

As you are practicing your launches, notice whether the tumblewing is gliding straight ahead, or does it always turn? If it's always turning strongly in the same direction--and you can rule out wind being the cause—you can adjust it so it goes fairly straight, which will be easier to fly (you can make it turn at will with the cardboard paddle, but that's coming up in the next step).

The wing tips are usually folded at exactly 90 degrees. When they are bent over, they tend to drift to one side.

A tumblewing that turns too much will be hard to fly. To make it fly straight, bend the wing tips in the direction it is turning. If bending the wing tips as shown does not stop it from always turning in one direction, there are two other things that could be causing the problem:

- a.) air currents are turning it, or
- b.) you are unconsciously tipping the tumblewing to the left or right.

Once most of your launches send the tumblewing straight away from you with a gentle glide, you are ready to grab your cardboard paddle and actually make it fly, not just glide.

BIG MOUTH TUMBLEWING

30mm (1 1/4") offset 

Strips are about
230mm by 45mm
(9" by 1 3/4")

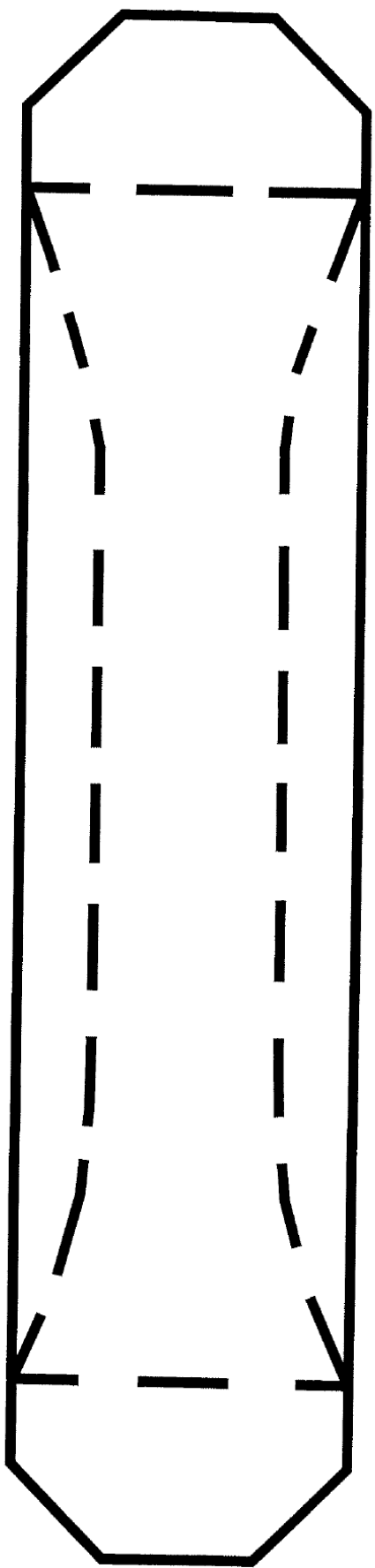
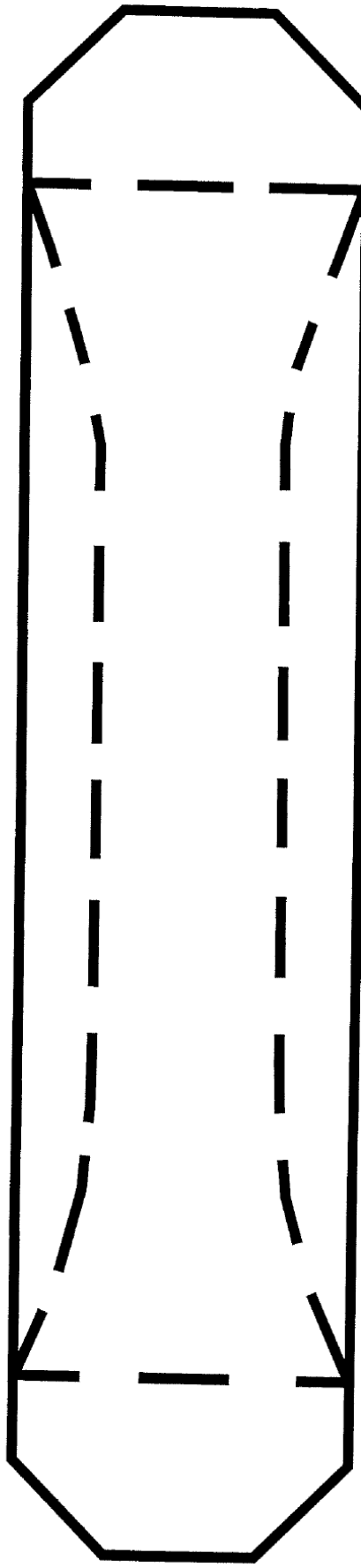
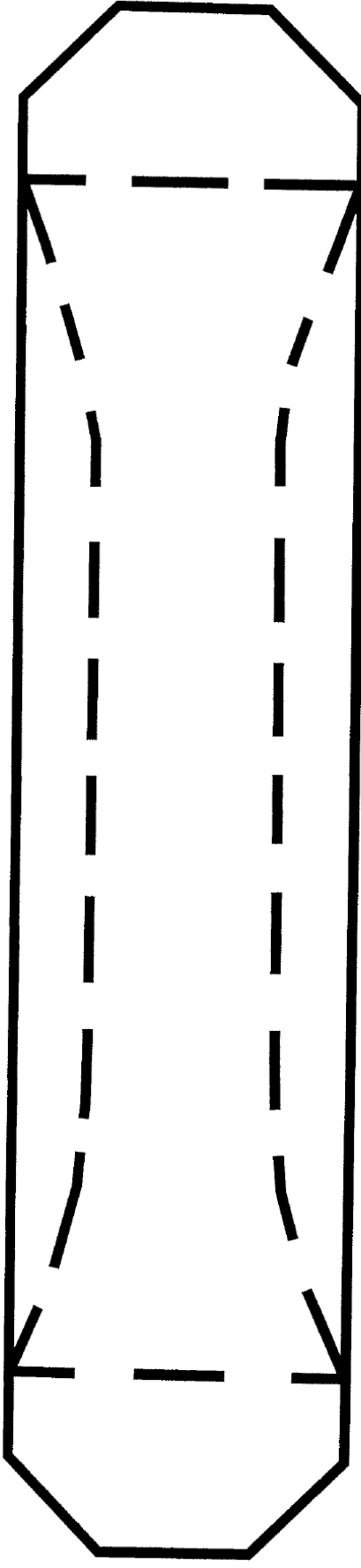
Big Mouth Tumblewing
© 2011 Slater Harrison/ sciencetoymaker.org.
Not for commercial use.

BIG MOUTH TUMBLEWING

30mm (1 1/4") offset 

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230mm by 45mm
(9" by 1 3/4")

Big Mouth Tumblewing
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Not for commercial use.



What is An Invention?

Let kids know that an invention is a useful creation that didn't exist before.

Round out their understanding of invention by sharing the characteristics below.

- An invention usually fills a need or solves a problem.
- Inventions often make the world a better place.
- Inventions can be things (e.g., a cell phone or backpack) as well as ideas (e.g., a new method for tying a knot, or a story).
- An invention often makes something better (e.g., faster, stronger, cheaper, easier, safer or more efficient, attractive, useful, accurate, fun, or productive). *Like our alternate tumblewing!* But as long as it's a new way to do something, it's still invention even if it isn't necessarily better than what existed before.

Everybody can envision the “Eureka!” moment of invention, where the idea suddenly strikes and—BOOM—there's a new product ready to change the world. Through the following activities we'll get to know the real story behind an inventor's work. Invention is a process, from creative ideas all the way to successful marketing

Why Invent?

Inventing is a process. It starts with a need and ends up with something new—the actual invention.

- To solve problems: Inventors are skilled at spotting ways to improve a situation or process. Inventors develop solutions to problems by applying the design process.
- To improve our world: Imagine how different our lives would be without inventions, such as computers, refrigerators, electricity, plastic, and medicine. Inventions improve things at home, at school,



in the community, and in the world.

- To enjoy the creative process: Invention involves both thinking and doing. Kids can become involved in the process of thinking about a problem and then doing something about it. Because they create their own solutions, kids get excited about the process of inventing.

Inventors & Engineers: Two Peas in a New Kind of Pod?

Engineering is a process for developing solutions to problems. Inventing is a process for creating things that didn't exist before. Inventors sometimes use engineering to create new solutions, but, many do not. Both inventors and engineers look for ways to improve things in areas like health, food, safety, transportation, aerospace, electronics, communication, and the environment. And when the improvement is something new, it's an invention.



The men and women who are inventors and innovators have changed American society for the better -- but not all innovations have a uniformly positive impact. Brainstorm with your class about the pros and cons of inventions and innovations. For example, what is the good and bad associated with the Internet? Television? Fast food? What do students believe innovators are motivated by? Is it the betterment of society? Money? Or, both?

Debate It!

Divide your class into six groups and have each select an invention, inventor, or innovation to "put on trial." [Check out the list of inventors and innovators at http://www.pbs.org/wgbh/theymadeamerica/whomade/innovators_hi.html, or <http://invention.smithsonian.org/centerpieces/ilives/> for ideas]

Ex.

- Charles F. Brannock (inventor of the Brannock foot-measuring device)
- Joseph B. Friedman (inventor of the FlexStraw)
- Charlotte Cramer Sachs (inventor of the boxed cake mix)
- Orla Watson (inventor of the Telescoping Shopping Cart)

Each group should further subdivide into equal numbers of students who will argue as two groups, the Pros and the Cons. After researching the impact of their innovation, each group of students should conduct a debate in front of the entire class. First, the Pros will give a presentation about the specific ways in which their innovation has benefitted society. How has it improved our lives as Americans? Then the Cons will explain how society has been hurt by the innovation. Both sides should try and

imagine/describe life without the particular innovation and the ways in which society might be better or worse. At the end of each debate, the class as a whole should vote as to whether the innovation in question was "worth it." In making that assessment, what standards should be used?

THE PROCESS OF INVENTION INVOLVES:

- Identifying a problem and/or realizing that something can be improved.
- Talking to people who might use the invention.
- Brainstorming creative solutions to a problem, which often involves making
- Imaginative connections between seemingly unrelated things.
- Devising and testing solutions (i.e., experimenting).
- Applying science and engineering concepts.
- Using tools, materials, and techniques to make workable solutions.
- Trying again when things don't work out. Like some inventors say, "Fail fast—succeed sooner!"
- Seeing a project through by being motivated, persistent, and dedicated.

The steps of inventing can be summarized & illustrated by the following "it" phrases:

1. Identify a problem or need (Think it)
2. Conduct research (Explore it)
3. Make sketches (Sketch it)
4. Build prototypes (Create it)
5. Test the invention (Try it)
6. Refine it (Tweak it)
7. Market the invention (Sell it)

But, that's too Hard!

There's a stereotype that engineering is boring and hard and it's totally not true. To fight this stereotype, tell kids about some of the exciting challenges inventors and engineers take on to help improve people's lives, and point out how central invention and engineering are in our daily lives.

- Create more fuel-efficient cars
- Design a lighter bike frame
- Invent a more powerful superglue
- Create satellites that detect droughts around the world
- Develop state-of-the-art cell phones
- Invent artificial retinas for people who are blind
- Develop a feather-light laptop
- Design clothing that repels mosquitoes
- Create a wheelchair that can go up stairs

TEACHER TIPS FOR FACILITATING OPEN-ENDED CHALLENGES

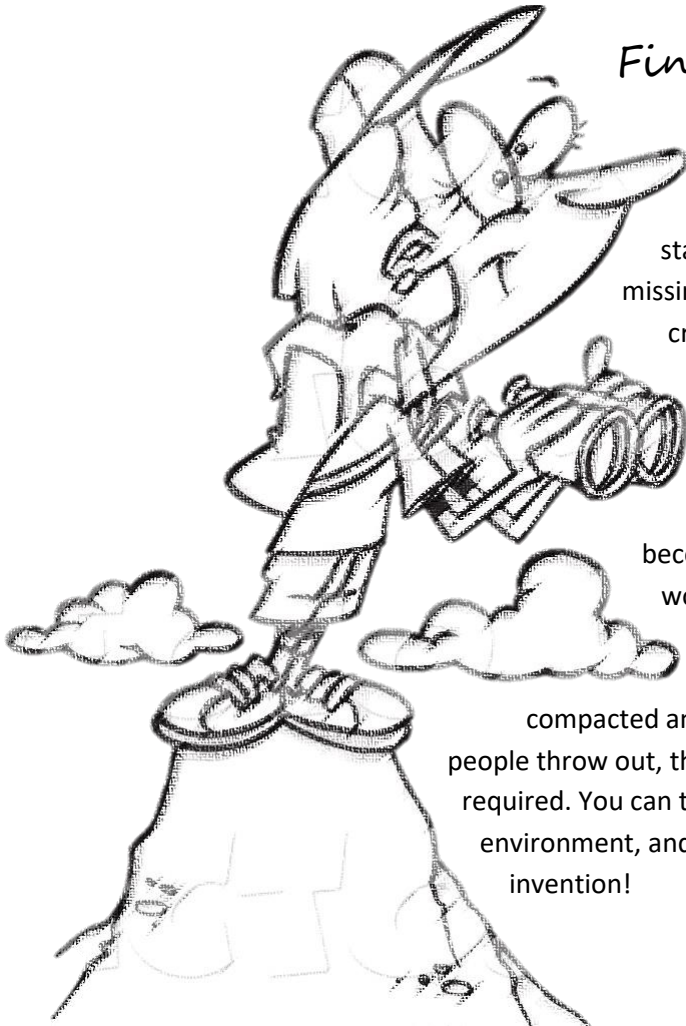
- There are multiple ways to successfully tackle a challenge. One solution can be just as good as another. Help kids see that the challenges are not competitions. Instead, they're opportunities to unleash an individual's ingenuity and creativity.
- When kids feel stuck, have them describe why they think they got the results they did. Ask questions rather than telling them what to do. For example, ask: "Why do you think this is happening?" or "What would happen if...?" or "What is another thing you could try?"
- When something's not going as desired, encourage kids to try again. Have them compare their design to other kids' designs. Remind them that problems are opportunities for learning and for using creative thinking.
- Have kids come up with several ways to solve a problem before they move ahead with an idea.

Take the Challenge!

Inventors and engineers work to make the world a better place. The steps of the design process encourage them to think creatively about a problem to produce a successful result.

Science is all about having an open imagination, not being afraid of making mistakes and asking the right questions. Almost all old and new scientific inventions and discoveries owe their origins and existence to these three essential human attitudes! Although most inventions have been results of deliberate conceptualization and research, time has also stood testimony to a number of accidental inventions that changed the world! Right from the invention of the wheel by prehistoric humans to more advanced inventions that changed the world (like gunpowder, antibiotics, aircraft, telephone, etc.), science has experienced only progress and advancement in the hands of humankind.

Now it's time to have your kids apply their inventing skills to their own lives. Use the ideas below to help kids identify a need and then do something about it by devising an original solution.



Find Problems to Solve

Encourage kids to keep their eyes open for problems. Remind them that they don't need to look far. Innovation comes from anyone. It starts like a giant puzzle with random components missing at first. But with some used material, genuine creativity and determination to learn and fix things, inventions can quickly become tools that help the greater good of society.

One problem is what to do with the tons of waste humans create every year! This waste is becoming an increasing concern for people all over the world. In the United States, the average person throws out nearly five pounds of trash every day. Often, this trash ends up in a landfill, where it is compacted and buried. The more non-biodegradable waste people throw out, the faster these landfills will fill and new ones will be required. You can take steps to help slow this damage to our environment, and one is to upcycle your waste into a brand new invention!

Have students watch the YouTube video about recycled or upcycled bicycle machines in Guatemala. The people in San Andrés Itzapa would randomly get bike parts from USA, Italy and France, and instead of leaving the bikes there to rust, Carlos and Cesar, creators of Maya Pedal, started creating bicimáquinas (bicycle machines) that helped the people of Guatemala perform tasks that would normally take them hours to do by hand. Have students watch the video at

<https://www.youtube.com/watch?v=2aqir3xepuQ&feature=youtu.be> or

<http://www.colors magazine.com/blog/article/maya-pedal>. It's in Spanish, but for speakers of other languages the visuals offer all you need to understand this inventive organization and how it impacts peoples' lives. Bicimáquinas are pedal-powered machines that assist with a variety of jobs in the home,

on the farm, on the road and in small businesses, ex. pedal-powered blenders, nut shellers, grain mills, roof tile makers, wood saws, washing machines, threshing machines, and more, eliminating the need for fuel and electricity. Pumps are also possible, and are capable of



Maya Pedal Asociación

extracting 30 liters of water per minute from 30-meter deep wells (electric pumps reach just to 12 meters). Each bicimáquina is handmade in their workshop using a combination of old bikes, concrete, wood, and metal, creating original designs that have proven to be both functional and economical.

The idea of these ingenious contraptions emerged from the desire to help the farming families of the San Andrés community.

The issue that gave rise to Maya Pedal was the expense and shortage of electricity and fuel in the village.

Carlos and Cesar,



Maya Pedal Guatemala

creators of Maya Pedal, have achieved an extraordinary result: a worthy project that does not pollute and is extremely fascinating in its involvement of volunteers from around the world who are building a fantastic pedal revolution.

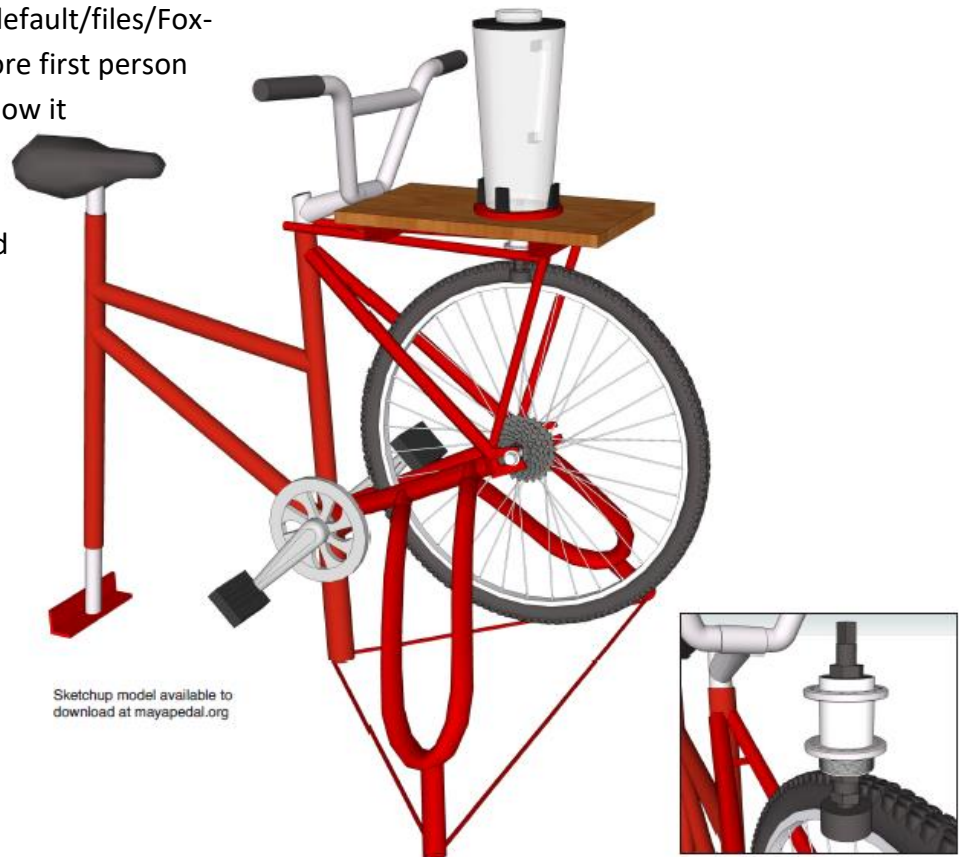
Blue Prints for a Green Footprint

There are currently 24 different kinds of machines whose constructions are available as downloadable blueprints. Choose one or more of your favorites, print out the fact sheets from the following website (<http://mayapedal.org/machines.en>) and have students look at the designs and diagrams of how the machines work and have them figure out how the machines work.

As a group, have older students read and discuss the following 2-page article “Pedal Power” by Conrad Fox at

<http://projectword.org/sites/default/files/Fox-Blueprint-SepOct05.pdf> for more first person perspectives, information on how it all got started and what the farmers initial reactions were. Even the best ideas need some testing & tweaking!

Pedal Powered Blender



Conrad Fox

Pedal Power

Recycled bike-machines give new life to Guatemalan farmers

A FEW YEARS AGO, Everilda Tubac would have winced at seeing the twenty-five sacks of corn sitting in the courtyard of her family farm in Guatemala’s arid central highlands. It used to be backbreaking work to grind feed for her pigs, ducks, and chickens. She’d beat the cobs with a stick to loosen the grains, handpick each grain, and grind them in a hand-cranked mill. The process would take more than a week.

These days, she can do the job in a day and a half, thanks to a contraption sitting in the shade of her simple, whitewashed concrete house. The machine, which resembles a primitive exercise bicycle and is known as a *bicimolino*, or “bike mill,” allows Tubac to de grain and mill corn with no more effort than a leisurely bike ride.

“The hand mill was so tiring,” she says, massaging her arm at the memory. “And we can’t afford electric or gas-powered mills. This costs us nothing.”

Tubac bought her bike-mill from Maya Pedal, a cooperative enterprise in the small town of San Andres Itzapa, about fifteen kilometers down a potholed highway from the Tubac farm. Since Maya Pedal’s inception in 1997, several U.S. and Canadian nonprofit groups, including Boston-based Bikes Not Bombs and Chicago-based Working Bikes, have donated about two thousand bicycles and components—often

outdated, sometimes rusty, always considered trash or too expensive to repair in their countries of origin.

The result, according to several sources, is one of the largest bike-recycling programs of its kind in the world, and the only one wholly run by an indigenous community. The basic bike-machine concept—modifying a bicycle so that stationary pedaling can accomplish a task—has existed for more than twenty years. But Maya Pedal has quietly created the most diverse collection of bicycle-machine designs anywhere.

Maya Pedal specializes in more than a dozen homegrown designs, from a bike irrigation pump that draws water up to five times faster than pumping by hand, to a vibrator that settles concrete for the production of cheap, strong roofing tiles.

Apart from their sheer novelty, all the innovations avoid the use of diesel or electric energy. “This is nonpolluting technology,” says Mario Juarez, director of Maya Pedal, which also promotes chemical-free homemade animal feed and the use of bicycle trailers for market deliveries.

But most farmers who buy the machines aren’t motivated by ecological concern. “These people are so poor they don’t have the luxury of thinking about the environment,” Juarez says. “If they get

a bike-machine, it’s because of simple economics.”

Seventy percent of the world’s poor live in rural areas, just over a billion people live on less than a dollar a day, and at least 700 million people don’t get enough food. Typical industrial-scale solutions—dams that displace whole communities, hybrid livestock that die when farmers can’t afford expensive vaccinations, or diesel machinery that breaks down irreparably—often fail to help.

In the highlands of Guatemala, a scattering of lavish development projects has not alleviated the poverty of the area, which was among the worst ravaged by the country’s thirty-six-year civil war. The mainly indigenous Mam and Kakchiquel peoples still scrape by on small-scale subsistence agriculture. Diets consist of tortillas and thin bean gruel, and wages average \$500 a year. Even where modern amenities like electricity exist, most daily tasks—such as shelling corn—are still done by hand.

For several years in the 1990s, Tubac scraped together enough money to buy commercial feed for her animals, until rising prices forced her back to the hand mill. Farmers in a neighboring village invested in a shiny new diesel-powered mill, but the machine soon broke down, and nobody local could fix it.

In 1996, frustrated by the prohibitive costs of irrigation, a farmer near Tubac built a water pump with a gear mechanism driven by hand. Another mated an old bicycle with a grain mill. Since the machines were prone to breaking down, the farmers sought help from a local ecodevelopment

initiative, which contacted a Canadian organization called Pedal Energy Development Alternatives. Its representatives arrived from British Columbia with bike parts, expertise, and new designs. Out of that exchange, Maya Pedal was born.

At first, the area's farmers snubbed the bike mills—which had been offered for free, but still suffered from significant engineering problems. “Farmers would try them out,” Juarez laughs, “and tell us ‘this doesn't work, you've got to change it,’ or ‘strengthen that, it's going to break.’ Together we made them work.”

In the revised version, the operator pedals an old bike crank, which drives a spinning cast-iron plate that rips kernels off corn cobs dropped through a hopper. Then, using a simple box wrench, the operator disconnects the mill and connects another plate to run a grinder.

But even with the kinks worked out, Maya Pedal met resistance from local farmers who were allured by examples of development spending. “They'd ask, ‘Don't you have one that's remote control, or diesel powered?’” Juarez recalls. “I'd say, ‘Yeah, but what are you going to do when it breaks down? With a bike machine, all you need to fix it is this wrench.’”

As Tubac's son Luis pedals away on their bicimolino, she tells how her neighbors scoffed when she first acquired it. Now she charges them five quetzales (about sixty-five cents) a sack to grind their corn—a bargain for the farmers, and a return on investment for Tubac.

According to its proponents, Maya Pedal exposes a flaw of conventional planning: most people in developing countries



A man grinds corn using Maya Pedal's signature machine, a bicimolino.

entirely Guatemalan-run and self-financing.

With volunteer outreach help from half a dozen local non-governmental organizations, the cooperative has distributed eighty bicimolinos and several dozen other machines around the country since 2002. NGOs and farming cooperatives from several Latin American countries have inundated Maya Pedal with requests for assistance in building

do not need sophisticated, capital-intensive technology. “They need an improvement on traditional technology, something intermediate,” says Andrew Scott of UK-based Intermediate Technology Development Group, a pioneer in simple, low-cost development solutions. “Appropriate technology builds on existing skills and knowledge. It's something that people will use and further develop themselves.”

That's exactly what has happened with Maya Pedal's basic designs: as a result of tinkering by users, a five-gallon water bottle serves as an improved hopper, a converted mountain bike shells macadamia nuts with its knobby tires, and a bike-blender makes organic shampoos.

Maya Pedal now sells sixteen models of bike-machines at full price (about \$50 to \$250) to individuals, and at cost (\$40 to \$200) to groups and cooperatives. Along with sales of refurbished conventional bicycles, the bike-machines net just enough revenue to cover the salaries of Juarez and three assistants. While foreign organizations and donations kept the project alive initially, today Maya Pedal is

ing bike-machines. Bikes Not Bombs has also teamed with engineering students at MIT to draw up blueprints of Maya Pedal's unpatented designs and, with Maya Pedal's blessing, to post them on the web. Organizations worldwide could then download the designs, allowing villagers to make machines with simple welding skills and parts mostly from discarded bikes.

Such resourcefulness has worked for farmers like Everilda Tubac, whose bike mill has made her small poultry farm profitable again. And that advances one of Maya Pedal's chief goals: to help farmers retain traditional ties to the land despite the pressures of economic globalization.

“The industrialized life is less healthy and brings no spiritual satisfaction to us,” says Juarez. “I think the bicycle-machines is the best for us. [Indigenous farmers] are used to breathing clean air, hiking through our fields, eating fresh food. Rather than destroy our way of life, we should find a way to make it sustainable.”

Asociación Maya Pedal, 502/7849-4671, www.MayaPedal.com

Liter of Light: Bright Lights in a Dark City



A Liter Of Light *Official Version*

Some of you may have heard the familiar saying “One man’s trash is another man’s treasure.” On the other side of the world in the Philippines, “Solar Demi” has helped bring natural sunlight into homes of the families in Sitio Maligaya through upcycled solar light bulbs or sky lights from soda bottles. His technique includes an empty soda bottle which he fills with mineral water and bleach to produce a makeshift light bulb that lights up the entire room during the day time.

The bleach prevents algae and particle **build-up**, keeping the water clear and the light bright. Have students watch the 2 minute video at https://www.youtube.com/watch?v=o-Fpsw_yYPg&feature=youtu.be or <http://dreamprojectun.ning.com/video/a-liter-of-light-official-version>

The Science behind it: A plastic bottle is filled with water and bleach. That’s it. It forms a light tube that refracts (bends) and brings light from the outside to the inside of a dark room. The water refracts (bends) that light from the sun in all directions inside the room and disperses the sun’s rays that would otherwise go in one direction inside the home.

Using solar bottle bulbs is an innovative way to light up homes in parts of the world where there is no electricity.



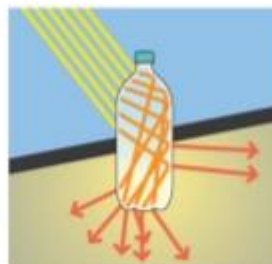
The water light bulb is simple and cheap. A 2-litre bottle is filled with clean water, plus about 10 millilitres of bleach in order to inhibit algae growth over time.



The advantage to using solar water bulbs over simply cutting holes in the roof is that sunlight shining down a hole works like a spotlight, lighting only a small area within the room.



Putting a water-filled bottle in the hole collects more light because light rays travelling through denser-than-air material such as water change direction.



Light reflected this way will bounce back and forth as it travels through the water bottle, and will spread out to light the room more evenly.

THE GLOBE AND MAIL | SOURCE: PHYSICSCENTRAL.COM

By refracting light from the sun, it produces light 360 degrees around the room with equivalent light power of 60 watts bulb.

The bleach prevents algae and particle build-up, keeping the water clear. Once the “light bulbs” are assembled, they are put through holes in the roof. The process can be done in an hour.

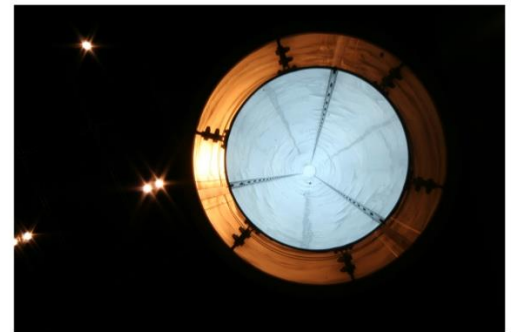
So far, workers have installed 10,000 of them in homes in Manila. The obvious drawback is that the light bulbs are only functional during the daytime, but even then, installing them translates to tremendous costs savings for families who can ill-afford what they consider a luxury. They will last for FIVE YEARS without maintenance and before the water has to be changed.

Light tube technology is used in other forms around the world, in every day homes, and in public places like this giant version used to light up a subway station in Berlin!



Let the Light So Shine!

Try it with your students and have them install a “light-bulb” or bottle solar light into a large box. Simply use water (it’s not a long term installation so the bleach won’t be necessary) & cardboard instead of sheet metal for the support. Take a look in the box prior to the installation. It’s pretty dark in there! Then install your light bulb. Any difference?



Berlin light tube openings

If possible, use a lamp and have students do a comparison of the efficiency of the “solar light bulb” vs a single electrical light bulb.

Trash to Treasure: Looking at the Possibilities

Both these inventions do not use electricity or fuel and provide a service to many people in the local area. These inventors thought outside of the box and reused materials that have come from hours of previous consumption and have made this world a little greener.

Inventors think about things in new ways and see interesting possibilities. Give students the opportunity to think of a problem, and a solution using the design process, and give kids a real-world context for the challenge’s problem as well as a sense of relevance, purpose, and meaning for their own inventing. They can find opportunities to make improvements in their:

- Community (animal shelters, grocery stores, shopping malls, recycling center, parks, etc.).
- School (lunch room, auditorium, playground, classroom, lockers, etc.).
- Home (backyard, garage, bathroom, mailbox, kitchen, etc.).
- Favorite activities (sports, music, reading, etc.).

Sample Challenge Ideas:

Examples:

- Think about a problem in your school and come up with an invention to solve it.
- Think about a problem in your home and come up with an invention to solve it.
- You need water in your garden and don't have an easy source. (Plus, you don't want a huge water bill. What can you invent to solve your problem?)
- Find an invention that you use and tell us how you would improve upon it.
- Think about a real-world problem that exists today and invent something that could help solve it.



No matter the challenge, if a design doesn't work as planned, encourage kids to try again. Setbacks often lead to design improvements and success. As Thomas Edison, famous inventor said, "Just because something doesn't do what you planned it to do doesn't mean it's useless. Many of life's failures are people who did not realize how close they were to success when they gave up."

The Design Process

Inventors' and engineers' initial ideas rarely solve a problem. Instead, they try different ideas, learn from mistakes, and try again. The series of steps they use to arrive at a solution is called the design process. As kids work through a challenge, use the following to talk about what they're doing and to tie it to specific steps of the design process. **Remember! When scientists and inventors conduct experiments, they record details about what they do, what they observe, and what they learn.** *Pass out the reminder sheets to students after cutting them in half to help students while they work on their projects after discussing the following.*

BRAINSTORM

- List the problems that kids identified or the sample challenges provided.
- Discuss different ways to tackle these problems. Record each idea. Seeing ideas together helps kids make imaginative connections that can often lead to even better solutions.

DEVELOP A PRELIMINARY DESIGN

- Make sure kids define what it means to succeed by having them set a goal and
- Outline performance criteria.
- Have kids phrase their solutions as: "I will invent an x that does y."
- Draw a picture of your idea. Label parts with materials you might need.
- Encourage kids to talk to people who might use their invention.
- Have kids anticipate problems they'll need to solve as they build their projects.

BUILD

- Ask kids to list the materials they'll need. Thomas Edison noted, "To invent, you need a good imagination and a pile of junk." To get our "junk" we're going to upcycle, or reuse items that students have easily available for a new purpose in our inventions. *Ex. Take apart a mechanical device that no longer works. Broken clocks and discarded toys are great choices. How many simple machines, such as wheels, gears, or pulleys can you find inside? Can you create something new out of these old parts?*
- Build your prototype. Have students write down each step so that they will remember exactly how they built their model.
- Have kids figure out substitutes for things that are unavailable or too expensive.



TEST, EVALUATE, AND REDESIGN

- Get kids to identify the kinds of tests that will help them perfect their invention.
- Have students perform some experiments to find out how well their prototype works. Write down the results of each test.
- How can you improve your prototype? Tweak it!
- Have kids tell you how they will know when their invention has succeeded.
- Suggest that family, friends, and the ultimate users evaluate a kid's invention.

SELL IT!/SHARE SOLUTIONS

- Give your invention a name
- Encourage kids to enter their invention in a contest or gallery. *Ex. The Smithsonian Institute Spark!Lab! says. Take a picture of your invention and ask a parent or guardian to e-mail it to sparklab@si.edu. Be sure to include your first name, age, hometown, and a brief description of your invention, and we'll display the photo of your invention in spark!lab!*
- If you are under 13, you must have parental permission to submit your photo.
- Have kids use the Internet to find out if a similar invention exists. **How is it the same? How is it different?**

IDENTIFY PROBLEM



BRAINSTORM



DESIGN



BUILD



REDESIGN

**TEST &
EVALUATE**



SHARE SOLUTION

The design process is a great way to tackle almost any task. In fact, you use it each time you create something that didn't exist before (e.g., planning an outing, cooking a meal, or choosing an outfit).

IDENTIFY PROBLEM



BRAINSTORM



DESIGN



BUILD



REDESIGN

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EVALUATE**



SHARE SOLUTION

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Patents

In 1900, a Japanese diplomat who was sent to the United States to study the American patent system had this to say, "We (Japan) have looked about us to see what nations are the greatest, so that we can be like them. We asked what made the United States such a great nation? We investigated and found that it was patents."

New inventions lead to new technologies, create new jobs, and improve our quality of life. A patent helps an inventor to make money from his or her invention by allowing only the inventor or those who get his or her permission to make and sell the invention. Patents encourage investing in research since research results in new inventions. **And new inventions result in?**

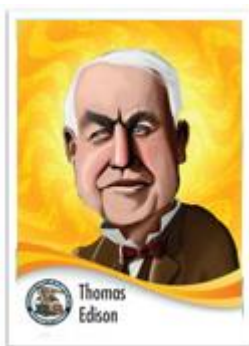
I Can Own an Idea?

Patents, trademarks, copyrights, and trade secrets are "intellectual property". Along with human creativity and inventiveness, intellectual property is all around us. Every product or service that we use in our daily lives is the result of a long chain of big or small innovations, such as changes in designs, or improvements that make a product look or function the way it does today. These are products that come from a creative mind whether it's a finding inventing or breeding a new kind of plant, a new machine, or a new design. Take a simple product. For example, a pen. Ladislao Biro's famous patent on ballpoint pens was in many ways a breakthrough. But, like him, many others have improved the product and its designs and legally protected their improvements through the acquisition of IP rights. The trademark on your pen is also intellectual property, and it helps the producer to market the product and develop a loyal clientele.

Intellectual property is imagination made real. It is another asset just like your home, your car, or your bank account. Just like other kinds of property, intellectual property needs to be protected from theft and misuse.

To get a patent you have to send your patent information or invention into a patent agency, like the US Patent and Trademark Office. Then they can cross reference if your invention has already been made, if not you can then pay the fees you have to pay in order to get the patent. What does that do? The grant itself says you then have "the right to exclude others from making, using, offering for sale, or selling" the invention in the United States or "importing" the invention into the United States. Patents provide exclusive rights to make, use, import, sell and offer for sale the invention for up to 20 years, then they

have to be renewed, if possible. To get a U.S. patent, an application must be filed in the U.S. Patent and Trademark Office. The protection guaranteed by the patent is included in the Constitution of the United States (Article 1, Section 8) and has been in place over 200 years.



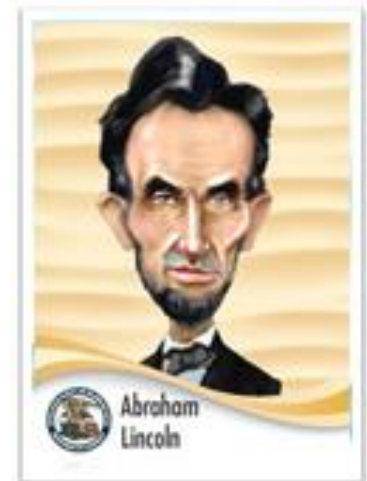
In the US the concept of protection for property rights is as old as the ideas of the founding fathers who wrote the Constitution. Before the Constitution was in place

there were no general laws providing for the granting of patents. On September 11, 1787 the delegates signed the Constitution. Included in Article 1, Section 8 was the provision, *Congress shall have the power...to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.* George Washington signed into law the first patent act on April 10, 1790 and the first copyright law on May 31st, 1790. That first year, the patent board (made up of 3 men, the Secretary of State, the Secretary of War, and the Attorney General) issued only three patents. Since that time many revisions to patent laws, processes, and even title of the governing office have changed, but nearly 8 million patents have been issued and over 3 million trademarks registered. Today the Patent office employs about 9,000 people!

Under the patent system, American industry has flourished. New products have been invented, new uses for old ones discovered, and employment given to millions of people.

Did you know that Thomas Edison holds over one thousand patents having invented things such as a voting machine (Patent #0,090,646) which was the invention he received his first patent on to the phonograph that recorded and played back sounds. The invention of the phonograph (0,200,521) helped dubbed Edison's nickname, the "Wizard of Menlo Park". Edison's best known for his epic invention which was an improved electric filament light bulb (0,223,898) that provided a practical electric incandescent light bulb that was convenient and reproducible for use in homes throughout America.

Abraham Lincoln was more than just President of the United States, he was an inventor. Abraham Lincoln's invention consisted of a set of bellows attached to the hull of a ship just below the water line. On reaching a shallow place, the bellows are filled with air and the vessel, thus buoyed, was expected to float clear of the sand bar. Lincoln's invention was never marketed, probably because the extra weight of the device would have increased the probability of the ship running onto sandbars more frequently. Lincoln whittled the model for his patent application with his own hands. The Lincoln Patent model is on display at the Smithsonian Institution National Museum of American History.



In 1858, Lincoln called the introduction of patent laws one of the three most important developments "in the world's history," along with the discovery of America and the perfection of printing. During the Civil War, he took a personal interest in new weapons, advocating the adoption of ironclad ships, the observation balloon, the breech-loading rifle, and the machine gun. Lincoln declared that "The patent system added the fuel of interest to the fire of genius."

Discuss: Why might it be important for an inventor to apply for a patent? How does a patent protect the inventor? Should a patent last forever rather than just 20 years? Why might it be good for it to only last 20 years? What types of items do you think can receive a patent? Should there be different types of patents?

Who can apply for a patent?

Anyone! A patent is obtained through the process of applying to the US Patent and Trademark office.

What can be patented?

Patents protect inventions that are a novel, nonobvious, and useful. So, you ask, what in the world does that mean?

- **New and Novel:** For a United States patent the invention must never have been made public in any way, anywhere in the world, a year before the date on which an application for a patent is filed. In other countries, you have no one year grace period and require absolute novelty.
- **Original and Nonobvious:** An invention involves an inventive step if, when compared with what is already known, it would not be obvious to someone with a good knowledge and experience of the subject, for example, if you just make cosmetic changes that is obvious.
- **Useful:** This means that the invention must take the practical form of an apparatus or device, it has to do something.

What cannot be patented?

Obtaining a patent is one of the most effective ways to protect a new idea. The problem is that not only do new inventions have to meet strict, well-detailed criteria, but the process involved in getting a patent can also be very expensive, very time-consuming and, at times, for the inventor, very irritating. Here are ten items that can be either difficult or impossible to patent:

- **Natural laws or processes.** Just because you discover or can scientifically explain a process or event authored by Mother Nature does not mean that you can get a patent for it.
- **Theories, ideas, and concepts of an abstract nature.** An idea that is merely conceptual in nature--i.e., cannot be put together or substantially diagrammed on a piece of paper--simply cannot be protected.
- **Systems for doing business.** You may, for example, come up with a more efficient way to manage the place where you work. Even if you can list the steps in a logical sequence, this type of systems architecture cannot be patented.
- **Constant motion machines.** Since the beginning of time, people have been trying to invent a device that can keep going once started without the aid of a power source. Needless to say, if achieved, this would be a major breakthrough in physics but, in the mean time, the US Patent Office will not grant you a patent on it.
- **Things people have moral & ethical problems with, for example:**
 - **Cloning processes or apparatuses.** Unfortunately for the inventor, because of the many caveats and ethical concerns, cloning has not yet been fully blessed by developed countries, including the US. Until legal and ethical hurdles are overcome, it would be very difficult, if at all possible, to obtain a patent for cloning purposes.

- **Stem-cell-use processes and apparatuses.** Because embryonic stem cells require the use and destruction of human embryos, there are simply too many legal and ethical concerns involved. Somatic stem cells and stem cells from animal embryos, however, present less of a problem, although their scientific usefulness may not be as expansive and promising.
- **Any new invention for which you refuse to provide detailed diagrams.** Your invention may be so unique and so financially promising that you may hesitate to give anyone, including the Patent Office, the ins and outs on the idea. Unfortunately, however, even if your invention is indeed obviously unique and you do an excellent job of providing a rough-sketch description, it will not be accepted unless you provide full and complete details.
- **Any new invention you may have stolen from someone else.** If another inventor, for example--even one without a patent on the idea--alleges that you stole his idea, the patent office would at the very least authorize an investigation. The same may happen if there is documentation or common knowledge that someone else was selling or marketing your idea before you, though not connected to that party, filed for a patent.
- **Any device obviously designed to perform an illegal activity.** If someone, for example, designed a better drug smoking pipe, while that may make them popular with some people, it may not thrill anyone at the patent office--at least not to the point of getting them a patent, and the authorities, such as the police, might get involved.
- **New weapons of mass destruction.** If you, for example, came up with a new type of bomb, explosive device, a new destructive use for a commonly-used chemical, or an as-yet unidentified, discovered, or recently-enhanced lethal biological weapon, you may not find it easy to get a patent for such an invention. In fact, just to avoid legal trouble, you may be better off seeking legal assistance to see the best way to approach this situation. Maybe the military might be interested in your invention and, assuming that they do not suspect you of being a potential terrorist, or that maybe you obtained or stole the idea from an unfriendly source, they might make you an offer and you might then be able to apply for a patent, assuming the government does not just confiscate your idea (especially if you cannot prove that you are the original inventor or have been advised not to take credit for the invention).

What's my Type?

There are different kinds of patents:

- **Utility patents** protect useful processes, machines, articles of manufacture, and compositions of matter. Examples: fiber optics, computer hardware, medications, medicine, electronics, and sporting equipment. These are the most common form of patents.
- **Design patents** guard the unauthorized use of new, original, and ornamental designs for articles of manufacture. The look of an athletic shoe, a car, a bicycle helmet, and the Star Wars characters are all protected by design patents.

- **Plant patents** are the way we protect invented or discovered, asexually reproduced plant varieties. Hybrid tea roses, Silver Queen corn, Better Boy tomatoes are all types of plant patents.

Making an Invention Famous: Brand Names and Trademarks

Introduce the concept of trademarks through the following questions:

- Ask students to raise their hands if they are wearing Nike athletic shoes.
- Ask students to raise their hands if they are wearing Levi's jeans.
- Ask students to raise their hands if they have a Jansport backpack.
- Ask students to raise their hands if they have a Bic pen.

Ask students what all of these items have in common. Explain that each item you asked for was identified by a brand name. What other brand names can students list? Write down their answers. Why might we be more inclined to buy a "brand" name item? What is the generic term for each of the items you asked for? (pen, jeans, sneakers, backpack).

The law protects intellectual property in four distinct areas: patents, trademarks, copyright, and trade secrets.

Trademarks. Brand names are the trademarks for the item. It's how that item is identified and helps with selling it or marketability. In addition to brand names trademarks, are words, scents, symbols, sounds, or colors that distinguish goods and services. Trademarks, unlike patents, can be renewed forever as long as they are being used in business. **Can students think of any trademarks that aren't names?** McDonald's arches, John Deere green? The roar of the MGM lion, the pink of the insulation made by Owens-Corning (who uses the Pink Panther in advertising by permission from its owner!), and the shape of a Coca-Cola bottle are familiar trademarks. FYI: Famed motorcycle company Harley Davidson spent tens of thousands of dollars and over six years on a case to try and get a sound patent on the sound their motorcycle engine makes. They eventually withdrew their case. Despite the successful registration of trademarks in sounds (*in 1950, NBC successfully registered the musical notes G, E, C played on chimes as a trademark for its radio broadcasting services, the MGM lion's roar, the song "Sweet Georgia Brown" for the Harlem Globetrotters basketball team, the spoken letters "AT&T" with a distinctive musical flourish in the background*), the PTO reports that only 23 of the more than 729,000 trademarks in force in the United States are sounds. And, since 1946, there have only been 71 applications to register sounds as trademarks or service marks.

Trademark Symbols - TM, SM, ®

What is the difference between the notations TM or SM and the ® or registration symbol? TM and SM usually indicate that someone is claiming trademark rights, however, they have not registered the trademark with the United States Patent and Trademark Office or USPTO.

The ® registration symbol can only be used after the trademark is actually registered with the United States Patent and Trademark Office USPTO.

Copyrights protect works of authorship, such as writings, music, and works of art that have been tangibly expressed. The Library of Congress registers copyrights which last for the life of the author plus 70 years. *Gone With the Wind* (the book and film), music recordings, and video games are all works that are copyrighted.

Trade Secrets are information that companies keep secret to give them an advantage over their competitors. The formula for Coca-Cola is the most famous trade secret. Another famous one is the recipe for Kentucky Fried Chicken. What are those 23 herbs and spices? It's a trade secret!

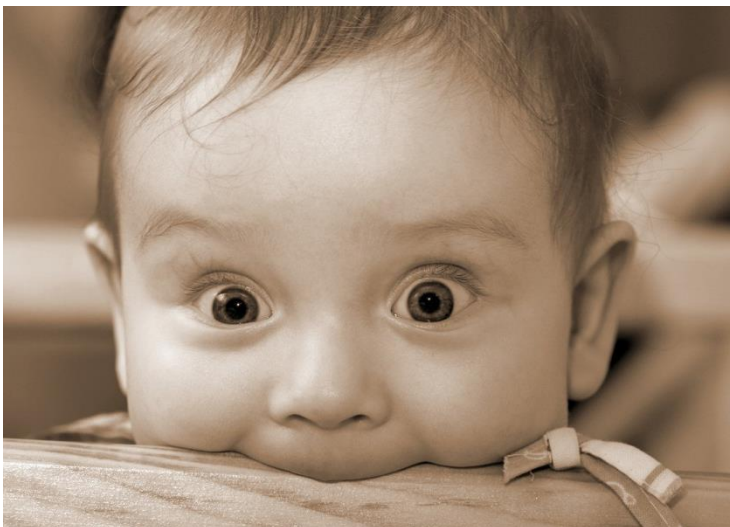
Classroom Scavenger Hunt:

Direct students to look all over the classroom for trademark items. Remind students that the presence of the symbols are clues that indicate a trademark.

Encourage students to “look outside of the box” at clothing worn by students, items outside windows, school products, etc. Give students 5 minutes to hunt for marks. Meet back and discuss the trademarked items they found. What symbols did they notice? **Ask students to identify trademarked items they use every day.** The average

American encounters thousands of trademarks every single day, from the closet to the kitchen, in newspapers, magazines, games, on TV and radio, in supermarkets and snack machines, restaurants and shopping malls. We are surrounded by trademarks!

Symbols
© ® TM



Catching Attention!

If an invention is new and unfamiliar, it is important for inventors to create a good brand name to call their invention. An interesting brand name or trademark can attract customers. Sometimes it takes a while for a trademark to catch on and the fact that the invention is desirable is what eventually makes the trademark for the invention popular. In other cases, when the

new invention may be okay, but not great, a really catchy trademark can make the invention even more successful. But sometimes it becomes generic.

What Does Generic Mean?



A trademark is a **brand** name, but it can become from the customer's point of view, a generic name. Most inventions have two names. Think about it, for example, you might think about Coca-Cola. You may know it as Coke—the brand name, but it's also called what? Soda or pop. It's important that new inventions have two names. The brand name and the generic name, like a nickname. The generic name lets people identify it and the brand name is associated with quality and the desire to purchase or spend money on it.

The word escalator was once the trademark for a moving stairway. There was the Escalator brand of moving stairway and other moving stairways were never called Escalators. What began as a novelty ride at Coney Island became ubiquitous and after the patent was lost, "escalator" has officially been a generic term since 1950. Now escalator is the word we use for all moving stairways and nobody uses the name moving stairway. If a trademark becomes too familiar or generic nobody can claim trademarks rights to that name.

Inventors can lose their exclusive right to use a trademark. **What other generic terms can students think of? Kleenex, Xerox, Yo-yo.** Most people know when they say "band aid," "jello," "coke," or "post-it" as a generic term that it's really a trademarked brand name still protected by law. There are names with

less awareness like Crock Pot, which is used generally to indicate a slow cooker appliance, but is currently a trademark of Rival. Others like this include Bubble Wrap (trademarked by Sealed Air), Rollerblades, Onesies (trademarked by Gerber), Styrofoam (trademarked by Dow), and Hula Hoop, Frisbee, and Hacky Sack (all from Whammo).

Companies spend millions of dollars to advertise their products, so no company wants their trademarked names to be used generically and to lose their special significance. The Kimberly-Clark Corporation, which owns the trademark Kleenex for facial tissue and the Xerox corporation are two examples of companies that have spent time and millions in court to enforce their trademark rights. It continues on today when companies like Google and Lego are trying to prevent what's happened to so many enormously popular brand names before them: becoming genericized. Some are more surprising "genericized" names.

Aspirin

Invented: late 1800s

Manufacturer: Bayer

The name for the most basic reliever of aches and pains either derived from the botanical name for meadowsweet, *Spiraea ulmaria* or acetyl and spirsäure, German for salicylic acid. Bayer's patent expired in 1917, after which many competitors muscled in. It was genericized as part of post-WWI war reparations in the U.S., Australia, France, Ireland, and elsewhere, but remains a trademark in over 80 countries.



Butterscotch

Invented: 1817

Manufacturer: Samuel Parkinson

It's hard to imagine an era without this sinful confection made of brown sugar and butter, but it was first whipped up in Doncaster, England, where it remained a tourist attraction until 1977. In 2003 the recipe was (conveniently?) discovered in a tin in a Doncaster cellar, and is an attraction once more.

Cellophane

Invented: 1908 by Jacques Brandeberger

Manufacturer: DuPont

Brandeberger was reportedly inspired to invent a film to make cloth waterproof after seeing someone spit wine onto a tablecloth. The name probably came from cellulose + Greek phainein "to appear", according to the Online Etymology Dictionary. It remains a registered trademark in the UK and some other countries.

Kerosene

Invented: 1854 by Abraham Gesner

Manufacturer: North American Gas Light Company and the Downer Company

The word comes from the Greek term for wax, keros, and is probably a contraction of keroselaion, or "wax oil." Now it's used for any produce with the same mix of petroleum chemicals and used as fuel, heating oil, or in insecticides.

Phillips-Head Screws & Screwdrivers

Invented: 1933 by J.P. Thompson

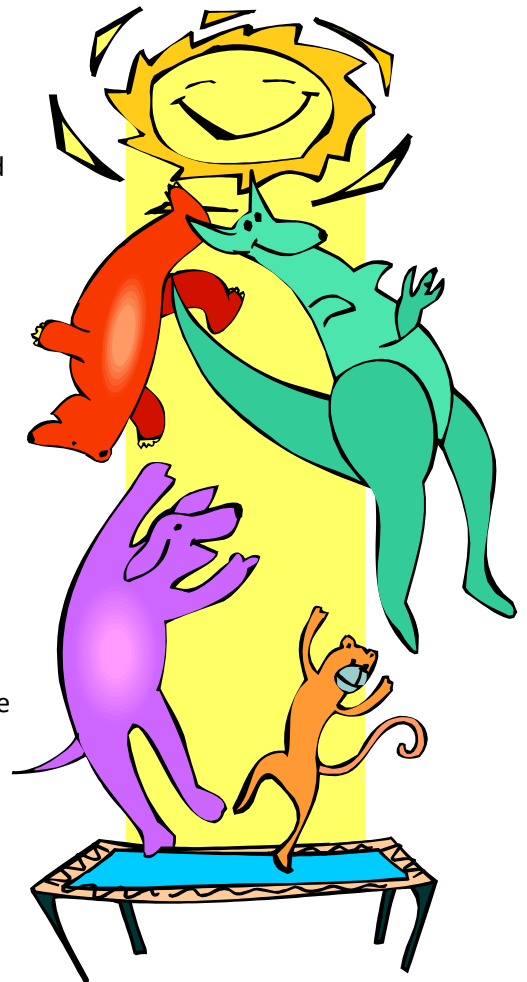
Manufacturer: Phillips

Phillips' cross-head screws and the complementary screwdrivers came about because of the mass-production needs of the post-industrial revolution era. The term went generic when the last patent on the Phillips systems expired in 1966.

Trampoline

Invented: late 1930s

Manufacturer: Griswold-Nissen Trampoline & Tumbling Company



The once-trademarked name is derived from the Spanish term for diving board, *trampolin*.

Videotape

Invented: 1951, Charles Ginsburg and his research team

Manufacturer: Ampex

Today videotape's inventor Charles Ginsburg is known as the father of the VCR, but presumably only to those who know that videotape was once a trademark of Ampex.

Zipper

Invented: In 1913, Gideon Sundback improved a few previous versions

Manufacturer: Universal Fastener Company

The registered trademark zipper in 1925 originally referred to the B.F. Goodrich overshoes that it appeared on, and while Goodrich used "zipper boots" for a while after, the term zipper genericized.

If a trademark becomes generic do you think it is a good thing for the person or company who created the trademark? Why or why not? Trademarks can help make an invention sell. They identify the source or origin of a product or service. Trademarks can also come to signify quality, ex. a customer might be more inclined to buy Tylenol, due to that name, rather than the generic store brand version.



A Patently Good Idea!

Have students give their invention a name that is unique.

Now use pencil or a black marker to create a drawing of the item. There are two acceptable types of drawings that can be sent with a utility patent application.

1. Black ink. These are normally the required type. India ink or a type that will produce solid black lines must be used.

2. Color drawings are accepted only when necessary and after filing an explanation telling why the color is important to the patent process.

The drawing(s) should be on unlined paper and can be similar to those used by Fred Frick or others who have applied for a patent. (If students have not seen the patent drawings at

<http://www.fi.edu/time/Frick/Schutte/patdrawings.html#drawinfo> you may want to have them view them before beginning.)

Students should label their drawing so that all of the parts of the item are indicated.

Add different views (figures) of the parts of your article if needed.

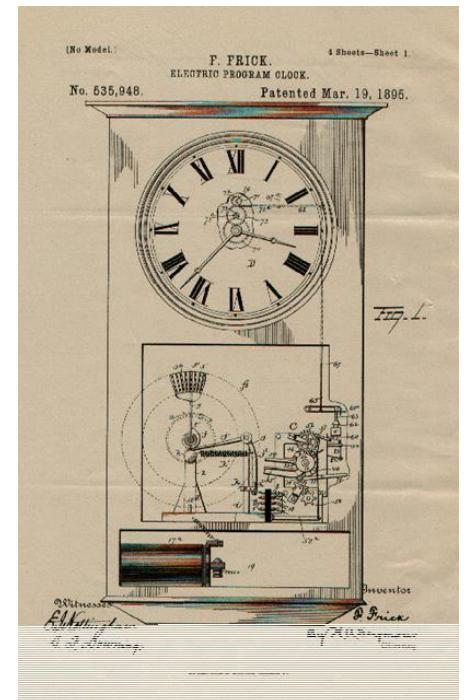
Write a description of your article on a separate sheet of paper which will help explain your illustration.

If possible, have students use the computer to do this.

Remind students to sign the statement saying this is your original work. This signature is required for anyone applying for a patent.

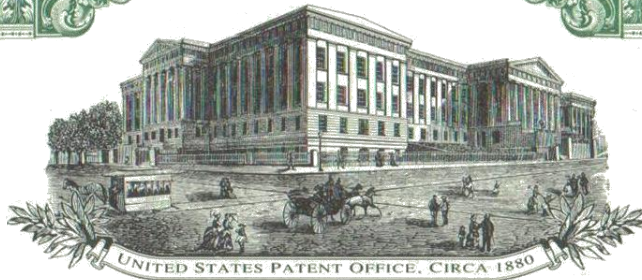
Do they think their idea and new name could become so well known that it could become a generic name? Why or why not?

For their Portfolio: A printable patent certificate is available for you to print out for each student which can be filled out and issued to them upon completion of this activity.





- US



**CERTIFICATE FOR
UNITED STATES PATENT**

GRANTED TO _____

THE DIRECTOR OF PATENTS AND TRADEMARKS has received an application for a patent for a new and useful invention. The requirements of law have been complied with, and it has been determined that a patent on the invention, known as,

shall be granted under the laws of the United States of America.

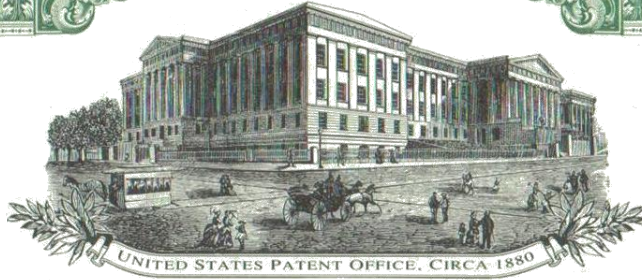
Therefore, this UNITED STATES PATENT grants to the person or persons having title to this patent the right to exclude others from making, using, selling or importing the invention throughout the United States of America for the term of fourteen years from the filing date of this patent, subject to the payment of maintenance fees as provided by law.



Attesting Officer



- US



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Attesting Officer

Ad Ons!

Have you ever heard someone say, “You can’t believe everything you see?” Or “You can’t believe everything you hear.”? Either way, this is really good advice—especially when it comes to advertising.

People are constantly exposed to advertising messages designed to make them believe they can’t live without a certain product. Even though the average person probably knows it is just advertising and is probably stretching or distorting the truth, he or she still is affected by the charm and appealing presentation of advertising.

In a competitive marketplace, sellers compete with other sellers for consumers. There is an old saying: If you don't advertise your business services and products for sale, you will soon be advertising your business for sale.

Engage students in a brief discussion about their experiences with and the effects of advertising. You may want to ask students:

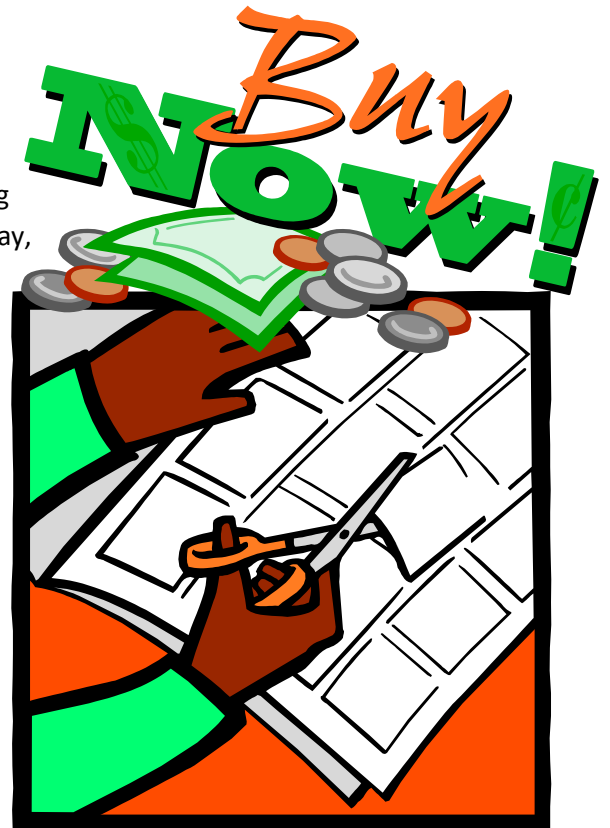
- Where do you encounter advertising? (They will likely mention television, billboards, radio, Websites, school hallways, and so on.)
- Which specific advertisements "stick in your head?"
- What makes these advertisements memorable? (They might mention music, catchy slogans, celebrity appearance, the kinds of words used, the appeal of the product itself, and so forth.)
- Do you think advertisements have an effect on your personal interests?

You will likely find that students have little trouble naming ads with which they are familiar, but most will claim that they have little effect on their habits, interests, or behaviors.

Explain to students that advertisers very carefully construct their ads to make them memorable and appealing to consumers, and that the ways in which they try to convince them to buy products are similar to the ways they have been taught to write persuasively, using certain techniques and aiming toward a particular audience.

Sellers use advertising to let consumers know about the goods and services they want to sell.

Advertising provides sellers with a way to tell consumers about prices, product features, quality and customer service. To increase their sales, sellers try to make themselves and what they are selling look and sound as good as possible. Advertisements can tell consumers about prices and other information that may help them in the decisions they make about what to buy. But students also should know that ads are slanted by sellers to show a product in the best light and to sell it to their perfect audience.





I'm talking to YOU!

Introduce the term demographics to students: the characteristics that make up a human population such as gender, age, and race. Have students discover which demographic group(s) they fit into by completing the Demographics: Who are you? handout. When

creating their own advertisements later, students will need to consider the demographics for their product/invention. Explain to students that this is how advertisers think of consumers: not as individuals, but as members of groups that tend to believe, behave, or purchase in certain patterns. Even when an advertisement is appealing to the idea of individuality (such as Burger King's "Have It Your Way" promotion), advertisers are appealing to the demographic group of "people who like to be thought of as individuals," not to any single consumer.

Option:

1. Continue the discussion of demographics by distributing the Targeted Commercials handout, which will further explore the concept of demographics. Ask students to begin applying their understanding of demographics and targeted advertising by showing the first part of a television program of your choice. Since the purpose of this activity is to show how advertisers cater to a show's intended audience, you may want to make sure you are presenting a show with commercials that very obviously target a specific demographic.
2. Before watching, share with students a brief description of the show they are about to see, including race/gender/class of the main characters, genre of the program, and the time/date/channel on which the program aired. Have students use these factors (and any other prior knowledge they may have of the show) to determine the probable demographics. Students should indicate their choices on the handout.
3. While students watch the commercial break(s), have them take brief notes to remind them of the products being advertised.
4. Have students complete the "After the program" response question at the bottom of the Targeted Commercials handout. Then discuss the degrees to which the advertisements match the demographics of the likely intended audience of the television program. Often, the commercials during a show correspond to the demographics for the TV show itself.

Discuss with students clear evidence you and they have seen that programming and advertising are marketed to specific groups. You may need to guide them towards recognizing the evidence. For

example, what kind of commercials do networks show during Saturday morning cartoons or on a kids network channel? During the 6:00 news? During soap operas? Talk about clear evidence students have seen that programming and advertising are marketed to specific groups. **Does who you are have anything to do with what you choose to watch on TV?** Have students give specific examples and list the examples on the board, ex: Hallmark Channel, Disney Channel, Cartoon Network, CMT (country music TV), Lifetime: Television for Women, Spike! TV, ESPN Sports, Logo, and Black Entertainment Television all exist not only to give viewers programming they might like, but also to allow advertisers to target their audiences more specifically. **What effect do you think advertising has on you? Do you think about commercials after you have seen them? Does advertising make you more interested in products, or do you already know what products you want?** Now, with online programming through companies like HULU and Amazon, the audience is sometimes asked, "Which commercial experience would you prefer?" **Allowing what?** Companies can immediately track the interests of their target audiences and get feedback on the success of their commercials.

In today's world, what about when you shop online or even simply spend time online? Do students ever notice ads on social media or websites related to what stores they may have looked at online or note of any blatant targeting based on who they are, what they're interested in, or their actions on the Web.? Ex. It can be very specific, if you look at a particular belt on a store website, all of a sudden that belt can be everywhere! Ads for that store and that belt will show up on your homepage and every site you go to. It's called behavioral marketing. Behavioral marketing is also spreading to social networks, including the popular Facebook. Companies keep a list of categories and subcategories based on your Web surfing habits and try to predict your age, gender, race, marital status, and income based on the Web sites you visit, making their advertisements very targeted indeed. **What is the core goal of targeting advertising? How will this affect us in the future as technologies enable more and more monitoring of our actions on the Web and advertising gets increasingly sophisticated?**

As time permits, engage students in a discussion on fairness in advertising. Is advertising ever unfair?

Did You Know?

While "soaps" themselves have complicated stories involving romance, betrayal, and characters getting all lathered up over dark family secrets, the story behind the term "soap opera" is simple and squeaky clean and related to advertising.

In the 1920s, radio was booming, and broadcasters wanted to get advertisers in on the act to increase their station's profits. So radio stations convinced businesses that sold household goods to sponsor radio shows. To appeal to the main consumers of these items -- female homemakers -- the radio stations created the daytime serial drama format. The first radio soap opera ran in Chicago and was sponsored by a margarine company.

Soon, all the networks had serials aimed at women, and companies selling cleaners and food products rushed to sponsor the shows. For example, Proctor & Gamble's Oxydol soap powder sponsored a popular serial drama in 1933. By 1939 the press started calling the shows "soap operas" because so many were sponsored by soap manufacturers. ie: "Ivory Soap presents AS THE WORLD TURNS" Advertisement during these shows has changed over the years as the stories were transferred to television but the name "soap opera" stuck with the style of program.



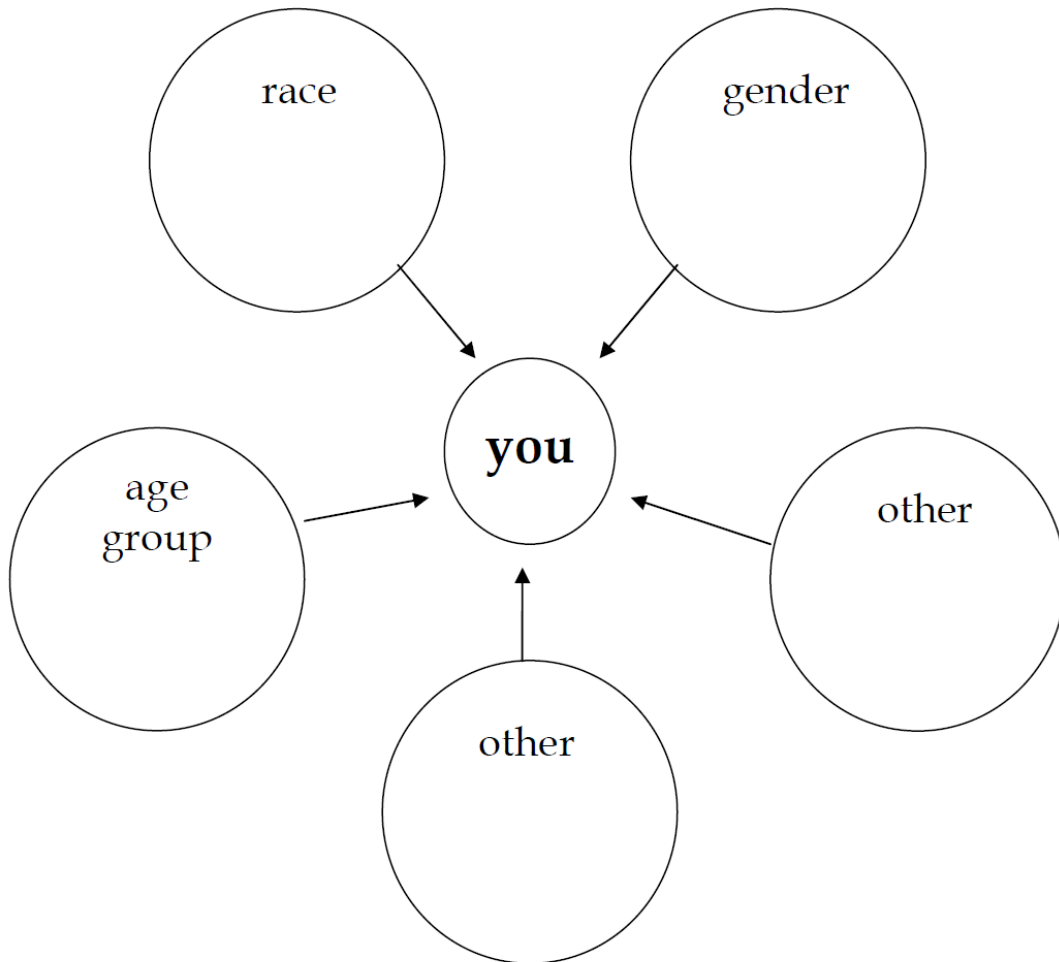
When can advertising actually be harmful to a group of people? Some ideas for discussion follow:

- Which advertisements could be viewed as harmful or unfair to a group of people?
- Can targeting a specific demographic sometimes encourage stereotyping?
- When do you see stereotyping used in advertisements?

Note: You may wish to give older students access to the online articles “Target me with your ads, please” [http://news.cnet.com/Target-me-with-your-ads,-please/2100-1024_3-6221241.html] and “Mixed Messages” [<http://www.utexas.edu/features/2006/health/index.html>], which discuss how Websites use technology to target consumers and the use of billboards in impoverished and minority neighborhoods, respectively, as part of this discussion.

Demographics: Who are you?

The concepts of identity and **demographics** will be relevant to several of our assignments during this unit. How do you define yourself? Provide the appropriate description in each circle below. Examples of "other" categories include social group, economic status, religion, level of education, region of the country, and so forth.



With these demographics in mind, list of specific types of media that people expect to appeal to someone like the person you described above:

TV programs

- 1.
- 2.
- 3.

Music

- 1.
- 2.
- 3.

Movies

- 1.
- 2.
- 3.

Targeted Commercials

Advertising isn't a random process—commercials are often carefully chosen to match the “target audience” of a particular show. The characteristics of this “target audience” are referred to as demographics. Complete this handout as you watch clips from a television program chosen by your teacher.



During the program

Age range of the target audience:

- 0 - 4
- 5 - 9
- 10 - 12
- 13 - 17
- 18 - 24
- 25 - 35
- 36 - 49
- 50+

Race of the target audience

- African-American
- Asian
- Caucasian
- Hispanic
- Other

Gender of the target audience

- Male
- Female

Other characteristics?

After the program

In at least one paragraph, explain whether or not the commercials matched the target audience for the show. Give specific examples of products, considering for whom the products were intended.

But...that's not Fair!

To protect consumers and make sure that competition among sellers is fair in the marketplace, the federal government requires that factual claims in ads be backed up with proof and prohibits advertisers from making false statements. When a factual claim is stated in an ad, the seller must be able to prove the claim. If someone reports it, and the government finds that a claim is false, the seller can be forced to stop running the ad and to pay a fine. For example, Skechers U.S.A. agreed in May of 2012 to pay \$45 million to resolve U.S. and state allegations it deceived customers into believing its Shape-ups athletic shoes would help them lose weight, tone muscles, and strengthen their buttocks and legs, just by walking in their shoes, which scientists say is not true at all. In fact, The FTC says studies conducted by Skechers did not actually produce the results its ads claimed, and were conducted by the scientist husband of one of Skechers marketing executives. **But what has already happened?** People, possibly many people, have bought the product and the company has made money! Customers can sometimes get a refund, if they find out about the lawsuit and apply, with proof of purchase, like if they have their receipt. Discuss: **Should customers really get to complain and get their money back for believing the hype and the celebrity endorsements (ex. Kim Kardashian & Brooke Burke)? Most people know that changing your shoes alone will not get you in shape, don't they? Whose fault is it? Do students believe that Skechers should have to pay?** It wasn't only them, In September, Reebok agreed to pay \$25 million in consumer refunds for making false claims about its similar EasyTone line of sneakers. Are the fines really that big a deal? Especially when toning shoes were once the fastest-growing segment of the athletic shoe market, with sales rocketing to \$1.1 billion in 2010, from \$50 million in 2008? Skechers held the largest share of the market, at 49 percent. **[How much money did they make?]** Last year sales were sliced in half, dropping to only \$550 million being made in one year. Do students think the fines were big enough? Ultimately for Skechers, the \$45 million settlement figure is a trivial amount considering the hundreds of millions of dollars in revenue the company has made from toning shoes over the years and, anyway, under the terms of the settlement, Skechers is still allowed to sell its toning shoes and make fitness claims about them, albeit less dubious ones. **Is it worth it (at least monetarily) for companies to make false claims, even knowing they may have to pay fines in the future? Why or why not? What might be some other consequences? Ex. loss of reputation and consumer trust?** *[More details about the research and refunds are available in the NY*



Times article at <http://well.blogs.nytimes.com/2012/05/16/skechers-toning-shoe-customers-to-get-refund/>

Puff it Up! That's Okay, We'll Sell Even More That Way!

Even with the FTC, it is usually okay for sellers to talk only about the positives and ignore the negatives of what they are selling. That's allowed. Another common trick is to use exaggerated claims called "puffery." It is up to the consumers to separate factual claims from opinions and exaggerations. So, advertisers don't have to tell the whole truth even when they say nothing but the truth, and they can target their ads to you.

If this all sounds a bit confusing, it can be! It is up to you, the buyer, to separate the facts that advertisers must be able to prove from opinions and exaggerations. Let's start by separating facts from opinions. Being able to tell the difference between factual claims and puffery or opinions can help consumers to make smart choices and avoid market disappointments or "buyer's remorse." **Challenge students to create a set of tips that could help consumers to make this distinction, ex. in relation to pairs of shoes that claim to help you get in shape, or play sports better, etc.**

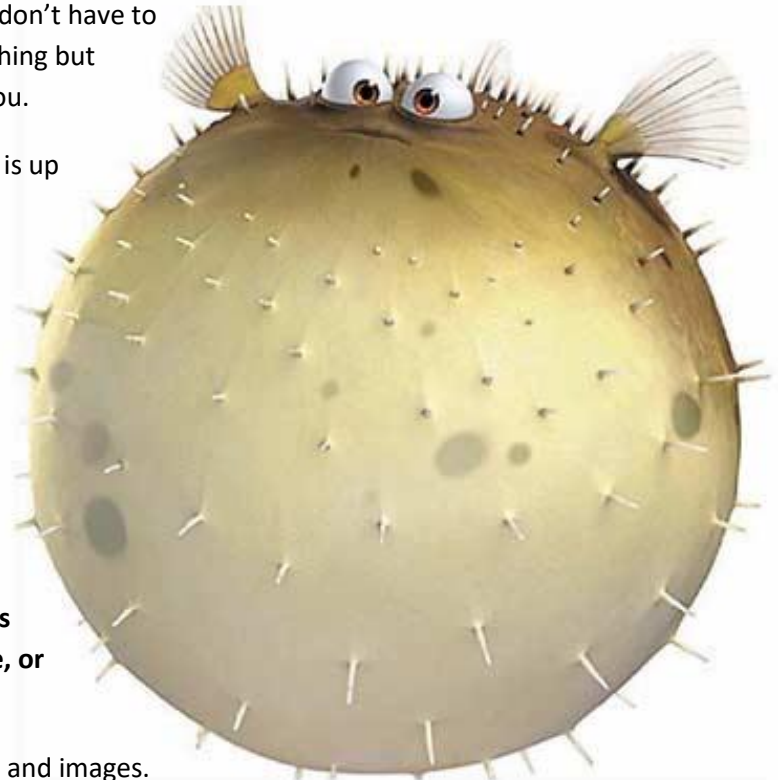
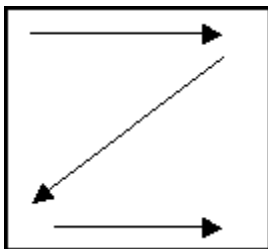


Image Credit: Bloat image provided by Disney Enterprises Inc./Pixar Animation Studios. All Rights Reserved. Copyright 2012.

Advertising, like books, contains both words and images.

The "Z" Form: select any of the ads to demonstrate how eyes track over an ad. According to one theory, if you learned to read left-to-right (English, Spanish, French, etc.), your eyes will scan over the page from left-to-right in a "Z" form unless a design element directs your attention elsewhere. **What if you didn't learn to read left-to-right?**



Marketing firms use this theory to place ad elements where they will catch your eyes. There will be an element to lead your eyes in, something catchy in the middle, and the logo or message will frequently appear in the lower-middle area to the right.

Light Works: Human eyes tend to look towards a lighter color. Where are the lighter colors? Or is light color used to draw the eye to the product?

Turn the ad upside down. Where do your eyes go within the advertisement? Can you still notice the "Z" form?

The same techniques are used to place elements in newspaper or magazine stories and other non-ad print applications. Right-side placement is considered superior and right-page advertising frequently costs more than left-page advertising. In an article, the more compelling photos tend to appear on the right pages. Pass out ads and/or articles and ask students to find how the "Z" form is utilized. Note: the "Z" form appears over two-page spreads for many articles.

Pass out a variety of print materials to students. Include advertisements in which the words have been covered, as well as photographs from magazine articles. Share with students the print ads you already collected as well as the Web Resources for Finding Example Advertisements (listing is located at the end of the lesson) and have them look for ads.

1. Remind students what they have learned so far in this lesson: techniques advertisers use to persuade consumers to buy their products and the concept of "targeting" certain audience demographics to make the process of persuasion more efficient and focused.
2. Explain to students that they will have the opportunity to apply this knowledge by looking at some real ads for real products. Share that the goal of this activity will be to examine how advertisers skillfully use multiple strategies to persuade their audiences.

Discuss the images using the following questions as guidelines:

- Is this image an ad (i.e., selling something) or a photograph?
- What appeals or does not appeal to you in these images?
- What kinds of words are used?
- What are the differences between ads and articles? What is information and what is selling? Is it hard to tell the difference?

Have groups or individual students choose print advertisements and explain why they think they are effective. They will have the opportunity later to use those advertising techniques in the ad they create.

Fact or Fiction?

Some of the words and images in advertising may be true, while others are fiction. Sellers make a variety of claims in advertisements; some claims are factual and some are statements of opinion. Factual claims are statements that can be proven true or false. Facts can be all or some of the following: can be proven, real for all people and places, can be duplicated, can be observed, historical, or 100 percent true. Ask students to identify places where facts can be found (encyclopedia, dictionary, almanac, atlas, text books, *Guinness Book of World Records*, etc.). The following statements are provided as examples of factual claims.

- The shoe has laces.
- The shoe is available in red or blue.
- The price of the pair is \$90.00.

Opinions are statements based on a belief or value. Opinions refer to a particular person's (or group's) feeling, thought, judgment, belief, estimate, and/or anything that is not 100 percent true and can't be proven. Ex. Is Papa John's "Better ingredients. Better pizza." slogan fact or opinion? Ask students to identify places where opinions can be found. (Autobiographies, self-help books, novels, journals, advertisements, etc.) For example:

- The shoe is made of better materials than shoes made by other companies.
- The shoe is easier to run in.
- The shoe is more fun to wear than other shoes.

Make sure students understand that just because someone else says something, it's not necessarily a fact. It's most likely just his/her opinion. To simply agree with someone else's opinion is to consider it a fact and thus make it real. For example, believing others who say "You can't play soccer very well" can either convince you to agree with them and continue being poor at soccer OR motivate you to believe "I'm better now than before and I'll improve with even more practice!"

After the difference between fact and opinion is explained gather several ads and read several sentences from them. Ask students, as we read the claims made in the following advertisements. Can you believe them? We'll see! Have students vote whether each asserts a factual claim or an opinion.

Options:

- Put a sign that says, "Fact" on one wall and an "Opinion" sign on the other. As you read statements, the kids move to the correct sign and be prepared to defend their choice. [ex. If it is a fact statement, students must give an example of a source where the fact can be found. If the statement is an opinion, students must be prepared to explain why it is an opinion statement.]
- Give students cards and have them write, Fact! or Opinion! and hold them up to vote.
- Make a game board on the whiteboard. This allows teachers to keep score with moves, rather than simple tally marks, and allows a very visual stimulus as pieces race across the board. Read a statement to a member of classroom teams, the student must decide if the card is Fact or Opinion. Correct answers give teams a move. Incorrect answers give opponents the chance to answer correctly and move ahead.
- Have students work in pairs and read the advertising claims, and find facts or opinions in them and be prepared to defend their choice.

Discuss the following questions with students.

- Which do you think are more useful to consumers—facts or opinions? Why? [A factual claim makes a statement that is true for everyone while opinions may only apply to the person who makes the statement.]
- All the facts and opinions focused on the good qualities of the good or service. What do you think is the reason for this? [Sellers want to make what they are selling look good so that consumers will buy. Negative images and statements rarely encourage consumers to buy-- except perhaps indirectly by saying something negative about a competitor.]
- Ask students to write down three pieces of advice that they would give others so that they are not misled by advertising claims and images. [*Some possible answers of advice you could give to others so they aren't misled is: look for factual claims that can be proven true, beware of opinions, read the fine print, read food labels, just because something is shown on a package doesn't mean it is inside, and ads sometimes promise more than they can deliver.*] Consider consolidating the students' tips into a class tip sheet that the students could use in their own efforts to separate fact from opinion and exaggeration in advertising.

Have students think about the following:

- What sound effects or music does the commercial use? Do the sounds make it more exciting?
- How do the actors using the product look? Do you think the product could make you happy or popular?
- Are there celebrities in the commercial? Do you think the celebrity really uses the product? (Celebrities get paid a LOT of money to endorse products, why? If a popular actor, athlete, or singer endorses a product, or has their face on the packaging, what usually happens? They charge you more and sell more of them)
- When watching a toy commercial, is the toy pictured in a group with other toys that are all sold separately? What does that mean? (more to buy, the company makes more money)

Questions to Ask After You Buy

- Does the product look bigger or better on TV than in real life?
- Does it work the same at home as it did on the commercial?

FYI: Companies Create Celebrities

Your favorite celebrity that's endorsing that product? May have been "created" for just that reason. Menudo was a popular boy band, created by marketers to make lots of money. And they did!

Menudo didn't start as a group playing music in someone's garage. A marketer carefully chose each member to appeal to young Latin Americans. Whenever a member turned 17, he was asked to leave the band and replaced by a younger teen.

Marketers also created *NSYNC, which made millions of dollars. Do you remember 98 degrees or The Backstreet Boys? Hannah Montana? Many bands or artists created by companies have been popular over the years.

Packages Are Advertising, Too!: The Economics of Product Design

Discuss with students how packaging is a form of advertising. Packages are designed to catch our attention as we walk down store aisles. They are a seller's last chance to convince us to buy a particular product rather than the one next to it. Research has found that most of us don't make a distinction — on an unconscious level — between the package and the product. The product is the package and the product combined. Sell the package, you sell the product.

We all want to believe we make completely rational decisions in the supermarket. I want to think I do, too. But even the smartest shopper is constantly manipulated in subtle psychological ways.

Louis Cheskin (1907-1981) Clinical psychologist and famous color researcher. Strategic use of color in branding and packaging — marketing in general — was a concept Cheskin catapulted forward. Studying, implementing, experimenting, observing and then (lucky for us) reporting his findings and opinions in a prolific collection of books is how Cheskin established himself as a Color Expert.

Companies like Ford, Imperial Margarine, Betty Crocker, Tide, and Marlboro depended on Cheskin for spot-on guidance and advice about how to enhance perception of brand through the use of packaging strategies and color.

One of the projects Cheskin worked on was margarine. In the late 1940s, margarine was not very popular. Consumers had no interest in either eating it or buying it. But Cheskin was curious. Why didn't people like margarine? Was their problem with margarine intrinsic to the food itself? Or was it a problem with the associations had with margarine? He decided to find out. In that era, margarine was white. Cheskin colored it yellow so that it would look like butter.



Then he staged a series of luncheons with homemakers. Because he wanted to catch people unawares (without any prejudices), he didn't call the luncheons margarine-testing luncheons. He merely invited a group of women to an event.

[Cheskin] brought in speakers and served food, and there were little pats of butter for some and there were little pats of margarine for others. The margarine was yellow and they didn't let people know there was a difference. Afterwards, everyone was asked to rate the speakers and the food, and it ended up that people thought the 'butter' was just fine. Market research had said there was no future for margarine and they should give up, Cheskin disagreed.

After his test, the question of how to increase sales of margarine was much clearer. Cheskin told his client to call their product Imperial Margarine, so they could put an impressive-looking crown on the package. As he had learned at the luncheon, the color was critical: he told them the margarine had to be yellow. Then he told them to wrap it in foil, because in those days foil was associated with high quality. And sure enough, if they gave someone two identical pieces of bread — one buttered with white

margarine and the other buttered with foil-wrapped yellow Imperial Margarine — the second piece of bread won hands-down in taste tests every time.

“You never ask anyone, ‘Do you want foil or not?’ because the answer is always going to be ‘I don’t know’ or ‘Why would I?’ says Masten. “You just ask them which tastes better, and by that indirect method you get a picture of what their true motivations are.”

Option: Conduct a blind taste test of margarine vs. butter on plain bread. How do students rate it?

Other tests conducted by Cheskin’s company in modern times:

- They tested Seven-Up. They had several versions, and what they found is that if you add fifteen percent more yellow to the green on the package — if you take the green and add more yellow — what people report is that the taste experience has a lot more lime or lemon flavor. And people were upset. ‘You’re changing my Seven-Up!’ It was exactly the same product, but a different set of sensations had been transferred from the package, which in this case wasn’t necessarily a good thing.



- If you pick up a can of Hormel canned meat look at the tiny sprig of parsley between the r and the m, when researchers added it, taste testers said the canned food tasted fresher, but they didn’t change the recipe.



- When Del Monte took the peaches out of the tin and put them in a glass container, researchers found that people said, ‘Ahh, this is something like my grandmother used to make.’ People say peaches taste better when they come in a glass jar. It’s just like ice cream in a cylindrical container as opposed to a rectangular package. People expect it’s going to taste better and are



willing to pay five, ten cents more — just on the strength of the package, for the exact same product.

What kind of packaging catches your attention? Bold colors? Cool pictures? An actor, singer, or athlete who you really like?

Option: Test your consumer savvy and have students test their savvy at Don't Buy It! by PBS

<http://pbskids.org/dontbuyit/buyingsmart/>

Take a Stand!

Advertising has grown to be an industry worth many billions of dollars across the world. Online advertising alone is believed to be worth \$24 billion a year. Almost all public space has some advertisements in sight (**look around your classroom, how many of the students are wearing advertisements? Take a poll, anything with a visible label, logo, insignia, etc is an ad. How many ads can you identify just in your class?**)



and all forms of media, from newspapers to the cinema, are also filled with adverts. Whilst this helps companies sell their products, and helps consumers to learn what is on offer, many believe that this huge amount of advertising can be harmful. It may make people want too much, or things that they cannot have, or it might make them feel inadequate when they don't have something. Research shows that children can be particularly open to these kinds of risk. Let's poll a little public opinion

Materials:

- Four posters, each labeled in large letters with one of the following: Strongly Agree, Agree, Disagree, Strongly Disagree
- a teacher-generated list of statements about the various factors of advertising
- writing paper and pencils at each corner.

Place a poster in each corner of the room. Then read a statement, and tell students to go to the corner that best describes how they feel about that statement.

Encourage students to voice their opinions from their respective corners. Then have each group gathered in response to a statement work together to write a clear statement logically explaining their position and be prepared to defend it.

Sample Statements:

- Companies shouldn't have to tell the truth about what they're advertising, their job is to sell products, not tell the truth.
- All attention is good attention when it comes to marketing and branding.
- Customers should have to figure out what's true and false in an ad, if they're gullible, it's their fault.

- No one is forced to look at advertising.
- Advertising helps us make better decisions about how to spend our money, by giving us more information about the choices available.
- Advertising does not help us choose, it merely confuses customers who are not sure who is offering what.
- People can just ignore ads if they don't want to buy the product.
- Advertisements are a form of brainwashing that take away people's freedoms to make choices.
- Advertisements play a crucial role in ensuring that what money people have, they spend on the most appropriate product for themselves.
- There is no way for advertisement to be used as a way to brainwash people.
- Advertisers don't have the good of society in mind when they do their work - they only care about making profit.
- Companies should be allowed to track everything we do, that way they'll know what to advertise to us, and we'll know about products we may like.
- Advertisement is one of the most important industries in existence.
- Advertisements make people too interested in material things.
- Stereotyping is a good way to advertise.
- Celebrities should have to actually use the products they endorse.
- Movies should always be able to make extra money by showing characters using specific brands.
- Advertising in fact gives an unfair advantage to big businesses. Small companies might have much better products, but they cannot afford to advertise them as well and so people don't find out about them.
- People shouldn't have to have their lives attacked by a huge quantity of information they might not want.

Buy In? Creating a Campaign

Students will use this session to begin to synthesize all they have learned about advertising and begin creating an ad campaign for their invention. Have students develop a theme, logo and consider a slogan or tagline. Students should determine the target audience for their product, remembering previous lessons on demographics. Will they include a "famous" endorser? Crafting an advertisement that entices potential consumers might seem like a challenge, but it's simpler than students think when they incorporate all they've learned.

Depending on available time and resources, ask students to create a print, filmed, live, and/or Internet advertisement for their product. They should take into account their observations from previous activities. To guide students through the process of writing, designing, and testing an ad, follow these steps.

Come up with a catchy, snappy tagline. Keep it short and sweet; the average product needs no more than six or seven words. Less is always more. The less a reader has to read, the less a listener has to take in, bodes well for your ad. If you say it out loud and it sounds like a mouthful, edit it down. Whatever it is, it should grab the consumer's attention and convince him or her that your product/shoe is different from everyone else's. Consider using writing techniques like:

- Rhyme – "Do you Yahoo?"
- Humor – "Dirty mouth? Clean it with Orbit chewing gum!"
- Onomatopoeia—Snap! Crackle! Pop! Or Mmm, mm, mm! It's good!

- A play on words – “Every kiss begins with ‘Kay’”
- Creative imagery – Yellow Pages: “Let your fingers do the walking”
- Metaphor – “Red Bull gives you wings”
- Alliteration – “Intel Inside”
- A personal pledge – Motel 6: “We leave the light on for you”
- Dry understatement – One beverage company has a big sign in downtown Copenhagen that reads something like, “Probably the best drink in town”.

Avoid the same old. The key to a good advertisement is being memorable. The second your ad borrows a familiar advertising phrase (for example, “new and improved,” “guaranteed,” or “free gift”—is there any other kind?), it becomes interchangeable with thousands of others. What’s more, listeners are so used to ad clichés that they don’t even hear them anymore and that makes your ad unmemorable.

Startling the reader into paying attention is especially useful if you have a lot to say (or just a little). For example, this long, environmentally-oriented announcement wouldn’t turn many heads if it weren’t for the unusual, confrontational tagline; if the reader wants to get the joke, she or he has to read more.

Know how to walk the line between controversial and entertaining. Pushing the limits of good taste to help your ad grab attention is common practice, but don’t go too far—you want your product to be recognized on its own merits, not because it was tied to a tasteless advertisement.

Use a persuasive technique. There are tried and true methods that advertisers rely on to make their ads stick. These include:



Common sense: Challenging the consumer to think of a good reason why not to purchase a product or service.

**YESTERDAY
YOU SAID
TOMORROW**



Humor: Making the consumer laugh, thereby making yourself more likeable and memorable. This pairs especially well with refreshing honesty. Not the most successful business in your class? Advertise that your lines are shorter. Sometimes companies admit their flaws and faults in a bid for public empathy. The strategy usually has two parts. Part one: Fess up. Part two: Vow to do better. Ex. Hardee’s trashed the poor quality of its hamburgers in an ad campaign a few years ago. The Chicago Bears football franchise took out newspaper ads to apologize to the team’s fans for its subpar performance. Not the best selling pizza in town?

For sheer corporate candor, it’s tough to beat Domino’s delivery in 2010. In its TV commercial and Web video, the pizza chain admitted something startling -- namely, that its pizza was pretty terrible. [See their ad @ <https://www.youtube.com/watch?v=AH5R56jILag>] " 'Worst

excuse for pizza I ever had,' " a company executive says grimly, quoting a customer's comment. " 'Totally devoid of flavor.' " "Domino's pizza crust to me is like cardboard," says a woman in a clip taken from a focus-group panel. Another employee, who appears near tears, reads another review: "The sauce tastes like ketchup.' " This is a way to win customers? Domino's very public admission of its own awfulness might represent the most elaborate mea culpa ad in history. But it's hardly the first.

Acknowledging that you've messed up may win some goodwill among consumers, but marketing experts say it also carries some risks. **What risks do students think it might carry?** Possible answers: People are going to hear only part of the message—your product stinks--and not hear the part about how they're going to get better. Apology ads can reinforce negative perceptions and raise awareness of them among people who've never tried, or even heard of, the product. One possible good thing, when someone does fess up, people tend to respect you for having the courage to admit it. However, there is another potential problem: credibility. Hasn't Domino's been saying for years how great its pizza is? And isn't it now insulting all the customers who thought its product was just fine the way it was?

Repetition: One of the pillar strategies of marketing and branding is repetition. Repetition creates brand awareness. Brand memory is strengthened through repetition. Most marketers use subtle repetition. A TV commercial here, a print ad there, a billboard somewhere else. Other ways are less subtle. Jingles are the most obvious way to do this, but unless they're very good, they're also the most annoying.

If you go this route, brainstorm a more creative, less obvious repetition technique than some. Ex. Does anyone *not* remember the tagline, "HeadOn. Apply directly to the forehead" repeated endlessly? And it's associated commercial

[https://www.youtube.com/watch?v=f_SwD7RveNE or here <http://www.adsavvy.org/the-tacky-repetitive-commercial-does-it-work/>]?



When figuring out their ad campaign Miralus Healthcare used focus groups to try a number of potential commercials, with one focused solely on repetition; the focus groups recalled the ads much more than with any other method, although many people considered the ads quite annoying. And, there was near universal consent when it released to the public: the ad was not only cheesy, it was annoying! But annoying is one thing. Money is the bottom line. And, the fact was, customers remembered it! Short term, the commercials have paid off by creating lots of attention, recognition and sales. The big question is whether the brand will survive over the long haul given that it has strong negative associations with it's annoying commercials and 2) the effectiveness of its product has been questioned.

So clearly, in the short term, repetition is effective in marketing. But one size does not fit all. **What do students think? Is irritating advertising effective? Will they ever be able to get that commercial out of their heads? Would they buy the product?**

Exigency: Convincing the consumer that time is of the essence. Limited-time only offers, fire sales, and the like are the commonest ways to do this, but again, avoid meaningless phrases that will slip under your customers' radar.

Know thy customer!

Remember, even the cleverest ad won't work if it doesn't appeal to the target audience. Are you looking for a certain age group? Do you want people with a set income level? Or maybe you're looking for a population with a special interest? Whatever it is, try to get a clear picture of who your dream consumer is and why he or she would be interested in what you're advertising.

Keep your target consumer in mind when you're developing the tone and look of your ad. Remember: it needs to appeal to your audience as much as possible and avoid offending or talking down to them. Kids tend to be over-stimulated, meaning you will need to grab their attention on multiple levels (color, sound, imagery). Young adults appreciate humor and tend to respond to trendiness and peer influence. Adults will be more discerning and respond to quality, sophisticated humor, and value. And don't forget that we now live in a world where social media is king and communication is instantaneous. **How might social media impact advertising?**

Find a way to connect the desires of consumers to what you're advertising. Think of it this way: the ad should be a bridge between what your dream consumer wants or needs and your product.

Students should:

- Brainstorm about what your consumer would want, as well as some of the suggestions below. Don't edit your ideas immediately, just write them down—you'll have plenty of time to pick over them later.
- Ask yourself if your product or event is aspirational. Are you selling something that people would buy in order to feel better about their social or economic status? For instance, you might be selling tickets to a benefit gala that is designed to feel elegant and luxurious, even if the ticket price is well below what most wealthy people would be able to pay. If you are selling an aspirational product, try to make your advertisement exude an air of indulgence.
- Determine whether or not your product is for practical means. If you were selling something like a vacuum cleaner, designed to perform common tasks or make life easier for the consumer, what could you do? Spin it in a different direction. Instead of emphasizing luxury, you could focus on how the product or event will provide relaxation and peace of mind to your consumer.
- Focus on the most appealing aspect of your product. Why should it entice people? What sets it apart from other similar products? What do you like best about it? These can all be good starting points for an advertisement.
- Is there an unmet desire or need, any frustration in the mind of your consumer, that will create a market for your particular product? Assess the need gap that exists for the product or service

Try to make sure your advertisement will age well. You don't want people looking back at your ad in 10 years and being shocked at its content. *For good examples of how common social tropes (beliefs) can*

look terrible in older ads, have students search for soap, cigarette, or diet pill ads from the 1950s and '60s. ex. http://library.duke.edu/digitalcollections/sizes/adaccess_BH1218/

Make sure all the relevant information is included. If your consumer needs to know your location, phone number, or website (or all three) in order to have access to your product, provide this information somewhere in the ad. If you were advertising an event, you would need to include the location, date, time and ticket price.

Decide where and when to advertise. If you were advertising for an event, you'd need to start promoting it at least 6 to 8 weeks beforehand if it's going to accommodate more than 100 people; if it's less than that, you'd need to start advertising 3 to 4 weeks ahead. If you're advertising a product, think about the time of year when people are more apt to buy what you're selling. For instance, if you were promoting a vacuum cleaner, it might sell better in the spring, when people are undertaking spring cleaning.

**Her Throat Insured
For \$50,000.**

**DOLORES DEL RIO* tells why it's good
business for her to smoke Luckies . . .**

"That \$50,000 insurance is a studio precaution against my holding up a picture," says Miss Del Rio. "So I take no chances on an irritated throat. No matter how much I use my voice in acting, I always find Luckies gentle."

They will be gentle on your throat, too. Here's why . . . Luckies' exclusive "Toasting" process expels certain harsh irritants found in all tobacco. This makes Luckies' fine tobaccos even finer . . . a *light* smoke.

Sworn records show that among independent tobacco experts—men who know tobacco and its qualities—Luckies have twice as many exclusive smokers as all other cigarettes combined.

**WITH MEN WHO KNOW TOBACCO BEST
IT'S LUCKIES—2 TO 1**

LUCKY STRIKE
CIGARETTES

*DOLORES DEL RIO
STARRING IN THE 20th CENTURY-FOX
PICTURE, "SHANGHAI DEADLINE"

Planning Your Advertisement

Purpose of the product: _____

Product name: _____

Demographic you are trying to reach (check all that apply) :

Age

- 0-12
- 13-17
- 18-24
- 25-35
- 36-50
- 50 +

Race

- African-American
- Asian
- Caucasian
- Hispanic
- Other: _____

Gender

- Male
- Female
- Both

Explain in detail the persuasive technique(s) you will use in your ad. Ex. Humor, Common Sense, Repetition, Exigency

What does your logo look like? Draw it here or on the back of this sheet.

What's your short, creative, memorable tagline? *Keep it short and sweet; the average product needs no more than six or seven words. Less is always more. If you say it out loud and it sounds like a mouthful, edit it down.*

What kind of packaging will you use?

Designing an Advertisement

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.

Sources and Resources

We hope the activities in this lesson reach young people at a time in their lives when they are still intrigued by the world around them. Our goal is to spark their investigative spirit, promote creativity, help them think through problems, and express their ideas through building things. This process stimulates young people's interest in math, science, and engineering. It also connects the process of invention to their everyday lives and to a broad range of careers and social issues. In the construction of this lesson plan we have been guided by, and recommend the following resources among many others:

- <http://www.wikihow.com/Create-an-Advertisement>
- <http://www.readwritethink.org/classroom-resources/lesson-plans/persuasive-techniques-advertising-1166.html?tab=4>
- <http://www.adsavvy.org/the-tacky-repetitive-commercial-does-it-work/>
- <http://well.blogs.nytimes.com/2012/05/16/skechers-toning-shoe-customers-to-get-refund/>
- <http://www.getrichslowly.org/blog/2007/08/13/malcolm-gladwell-on-the-power-of-marketing/>

INVENTION CONTESTS

- The Christopher Columbus Awards christophercolumbusawards.com/enter.php
Challenges middle school students from around the country to identify a problem in their community and create an innovative solution.
- eCYBERMISSION <https://ecybermission.apgea.army.mil> Has kids in grades 6–9 invent science-, math-, and technology-based solutions to problems in their community and enter them in a free, Web-based competition.
- ExploraVision exploravision.org Encourages K-12 students to create and explore current technology and envision its future.
- INVENT AMERICA! inventamerica.org Provides K–8 students opportunities to learn critical and creative thinking skills through the process of inventing. Also hosts a national student invention contest.
- National Museum of Education nmoe.org/competitions.htm Offers a series of fun invention contests and a gallery of America's young inventors.
- Tech Challenge techchallenge.thetech.org Inspires kids' inner innovator by getting teams of 5–12 graders to develop creative solutions to real-world challenges in familiar settings.
- TOYchallenge sallyridesience.com/toychallenge Runs a national contest in which 5–8 graders create a new toy or game.

Web Resources for Finding Example Advertisements

To find web-based advertising for a product, simply type the product's brand name into the search engine of your choice.

[Advertisement Ave.](http://www.advertisementave.com/)

<http://www.advertisementave.com/>

Features advertisements organized by company, product, and Super Bowl appearance.

[Google Video](http://video.google.com/)

<http://video.google.com/>

Searchable video database.

[Ads of the World](http://www.advertisementave.com/)

<http://www.advertisementave.com/>

Advertisements organized by seven different media.

[Ad Flip](#)

<http://adflip.com/>

Searchable database of classic print ads, including some modern advertising.

[Ad*Access](#)

<http://library.duke.edu/digitalcollections/adaccess/>

Duke University's database of newspaper and magazine ads from 1911-1955.

[Coloribus Advertising Archive : Creative Ads](#)

<http://www.coloribus.com>

A searchable archive of video advertising.