Suggested Extension Ideas and Activities for Your Classroom

We hope that the teachers and students we work with continue to explore the topics we discuss here at STARBASE. However, we do understand that the demands placed on students and teachers alike do not always allow for extensive planning for extension. So in the following pages we hope that you find suggested activities and ideas that will be easy for you to use in your classroom to reinforce both basic academic skills as well as STARBASE specifics STEM-related topics.

The organization of this document is arranged to mirror our curriculum here at STARBASE. We first quickly recount our given National Educational Standard. Then we take and offer a variety of activities that tie back into the central objective. We are continuously striving to provide the best material, lessons, and knowledge to those that come to STARBASE.

If you find a better way of doing an extension or have an extension activity that we do not have in this document that you would like to share, please to do not hesitate to contact and let us know so we can share this with other teachers and students that visit us here at STARBASE. We would love to see this book grow to be full of your ideas and activities.

We would like to kick start this initiative off with a little contest. For the teacher(s) who submits the most extension ideas and/or evidence of using these ideas and others to us by the end of the year will receive materials to conduct further activities based on STARBASE curriculum. We would like to offer this prize to the top two teachers who complete/submit the most activities. Additionally, for any teacher who can provide evidence (pictures, sample, writings, etc.) of completing at least three activities will receive a class prize to use to conduct another activity. Good luck! We look forward to hearing from you all!

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General Extension/Celebration Ideas

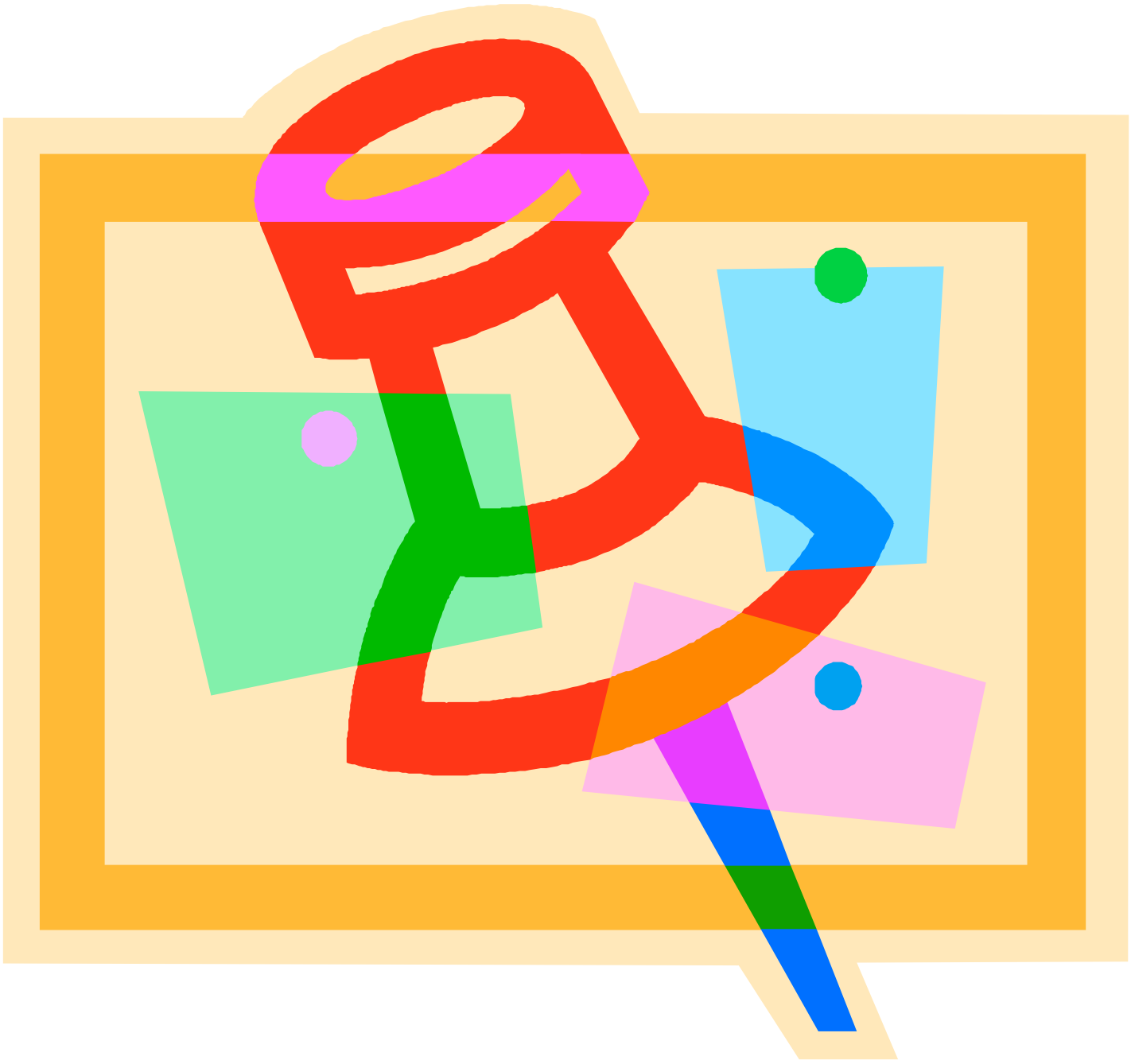
There are several ways to extend activities that are presented at STARBASE back in your school and classroom. This promotes a positive attitude toward learning and creates excitement fro what students are doing. It also promotes excitement for future STARBASE students if they can see some of the things that they will get to do in fifth grade.

The following ideas are some we have seen in place in schools that we visit as well as others we feel would help promote the idea that "Learning is Fun!" Some can be done in the duration of STARBASE and others can continue after STARBASE is over for your students. Feel free to use or modify ideas. Again if you have ideas that you are willing to share please let us know and we will share your ideas with other teachers we work with here at STARBASE.

Bulletin Boards

A good general idea for extension/celebration is to create a bulletin board of the students' work from STARBASE. We saw one teacher creating a bulletin board of her students' work from The CAD program we use, Pro-Engineer. There was also talk of creating another one using the students' work from Microsoft Excel.

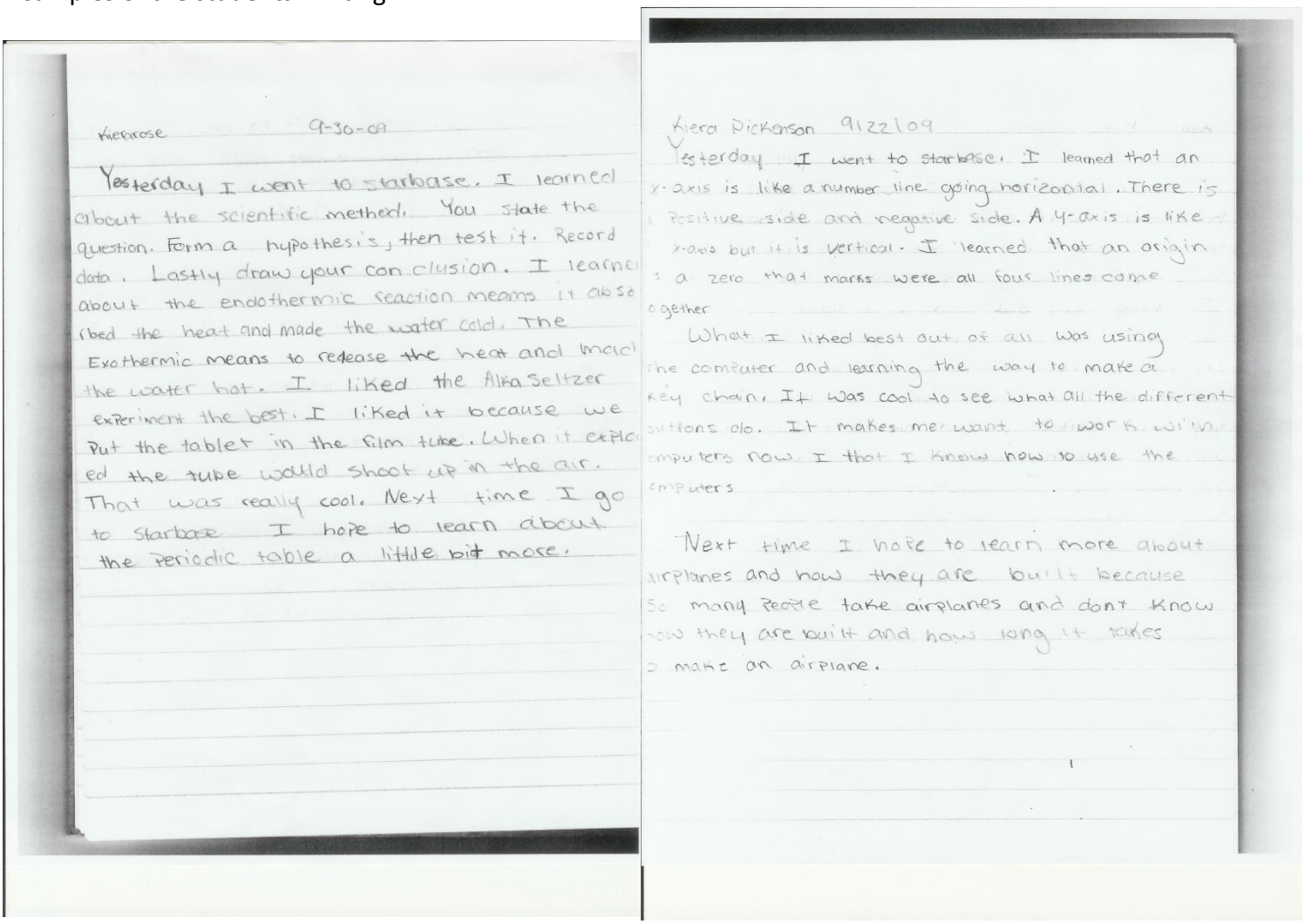
This is a great way to promote pride in students, both for their ability and the quality of their work! We love to see the work students do being placed in a place for all to see. This is an easy way to promote your students!



Writing Prompts

Writing prompts are great way to have students reflect on the material covered each day at STARBASE. Sample writing prompts will be given for each sample lesson grouping. Feel free to alter any of them to meet your classroom goals and students' needs. We recommend having them use learned vocabulary and specific details, and avoiding the use of many pronouns. These writing prompts can be used to foster sentence structure, paragraph building, etc.

One teacher simply has students write about what they did at STARBASE the day before. Here are a couple of samples of the students' writing:



Kierarose 9-30-09

Yesterday I went to starbase. I learned about the scientific method. You state the question. Form a hypothesis, then test it. Record data. Lastly draw your conclusion. I learned about the endothermic reaction means it absorbed the heat and made the water cold. The Exothermic means to release the heat and made the water hot. I liked the Alka Seltzer experiment the best. I liked it because we put the tablet in the film tube. When it exploded the tube would shoot up in the air. That was really cool. Next time I go to starbase I hope to learn about the periodic table a little bit more.

Kiera Dickenson 9122109

Yesterday I went to starbase. I learned that an x-axis is like a number line going horizontal. There is a positive side and negative side. A y-axis is like x-axis but it is vertical. I learned that an origin is a zero that marks were all four lines come together.

What I liked best out of all was using the computer and learning the way to make a key chain. It was cool to see what all the different buttons do. It makes me want to work with computers now I that I know how to use the computers.

Next time I hope to learn more about airplanes and how they are built because so many people take airplanes and dont know how they are built and how long it takes to make an airplane.

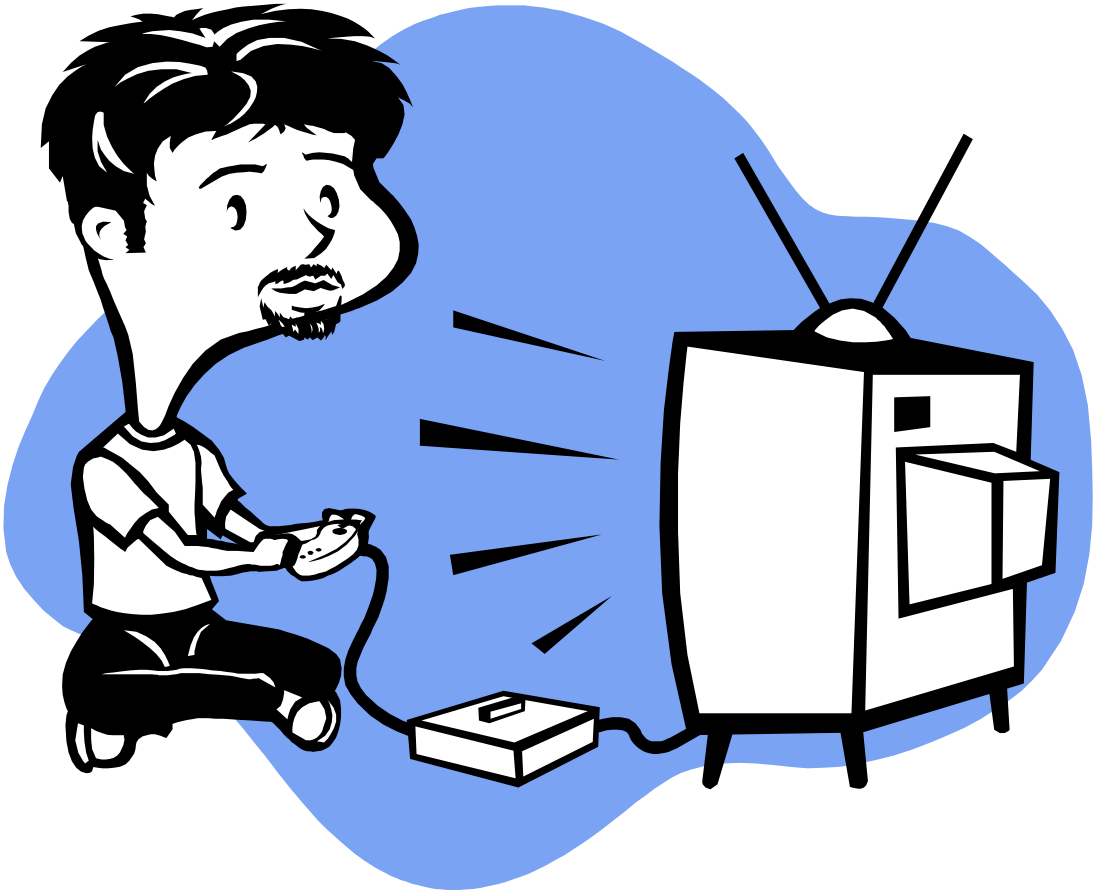
Science Fairs

Science Fairs are a great way to have students showcase their scientific interests, abilities, and work. Encourage students to submit work for a district science fair if one is place. There are national scientific competitions that student can participate in as well. Various competitions like *Destination Imagination, Odyssey of the Mind, eCYBERMISSION* exist and are wonderful opportunities for students with an interest in science and engineering to experience STEM if fun and collaborative environments.

Internet Games

The Internet has a seemingly endless supply of wonderful STEM-related games. We have several links on our website (www.starbase-ct.com), under the Kid's Page. Doing web searches for "educational science games," "STEM games," Etc. will turn a multitude of options.

These games make great ways to review concepts individually and in groups. They also provide students with a great "fun" way to interact with concepts and places learning into a medium that is often rather mindless.



GPS/Google Earth/Google Maps

Our objectives (based on National Standards from the International Society of Technology in Education, National Science Education Standards, and National Council of Teachers of Mathematics Expectations) on mapping and navigating are as follows:

- The learner will use technological tools to gather, evaluate, and use information.
- The learner will recognize the benefits of advancements in technology tools, which provide information relating to location and distance.
- The learner will use coordinate points of latitude and longitude to specify locations and navigate from one point to another.

We have designed our GPS/Google Maps lesson to meet these goals. Realizing that GPS units are not readily available in most classrooms, we propose the following extension activities for your classroom:

- Trip Planning
- Geographic Scavenger Hunt
- Writing Prompts

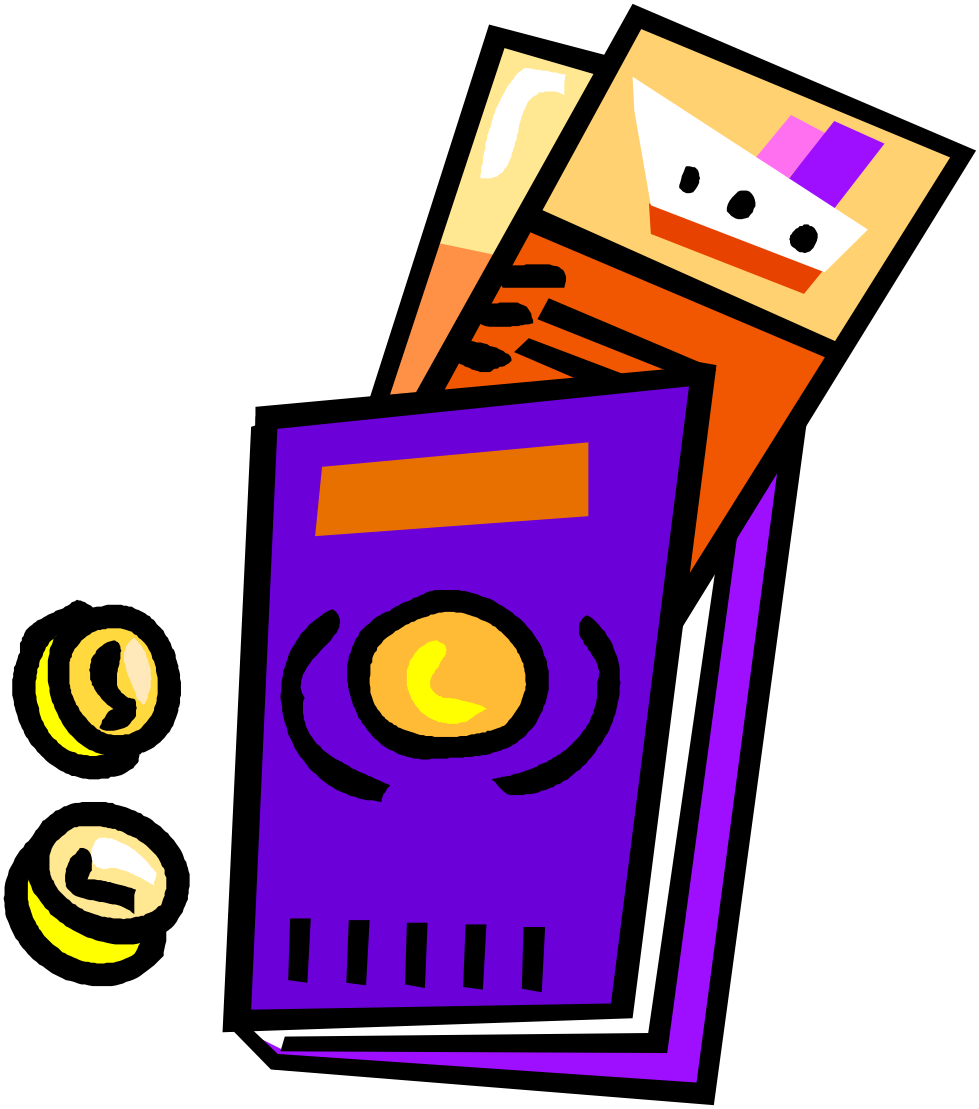
Trip Planning

This activity is a great cross-curricular exercise. Give the students a set budget and timeline to plan a dream vacation and then have them plan their vacation by picking a destination, plan an itinerary, and keep a budget.

For example, students are given a budget of $5000. They are told that they need to plan a five-day vacation to the European destination of their choice. They have to plan their daily itinerary for all five days of their trip as well as keep track of a budget for the course of their vacation.

They had to plan the cost of travel (car rental, train, plane, etc.). As well it was mandated that at least on historical site was visited each day.

This is a time intensive activity and will require a lot of encouragement and computer time.



Geographic Scavenger Hunt

Getting state road maps is fairly easy to do. AAA typically is willing to give away road maps for educational purposes (to members and non-members alike). Using the folding road map to develop a scavenger hunt for students to complete is a great way to have students use maps and work collaboratively to reach a goal. This will take a time to prepare and for students to complete. We recommend coming up with approximately thirty items on the scavenger hunt. Below are some sample items.

SAMPLE ITEMS:

- What interstate highways run through Hartford?
- What city has the largest population?
- What highway connects Putnam to Killingly?
- What state forest is found at C7?
- Etc.

Writing Prompts

Here are some sample writing prompts that relate to the GPS/Google Maps activity from STARBASE.

- What drew you to the place you chose to visit on your Dream STEM Vacation?
- Imagine you actually go on your vacation. Describe the trip. What do you see on the road? Where do you eat? Where do you stay?
- Imagine you are pirate captain. How could what you learned about latitude and longitude help you?

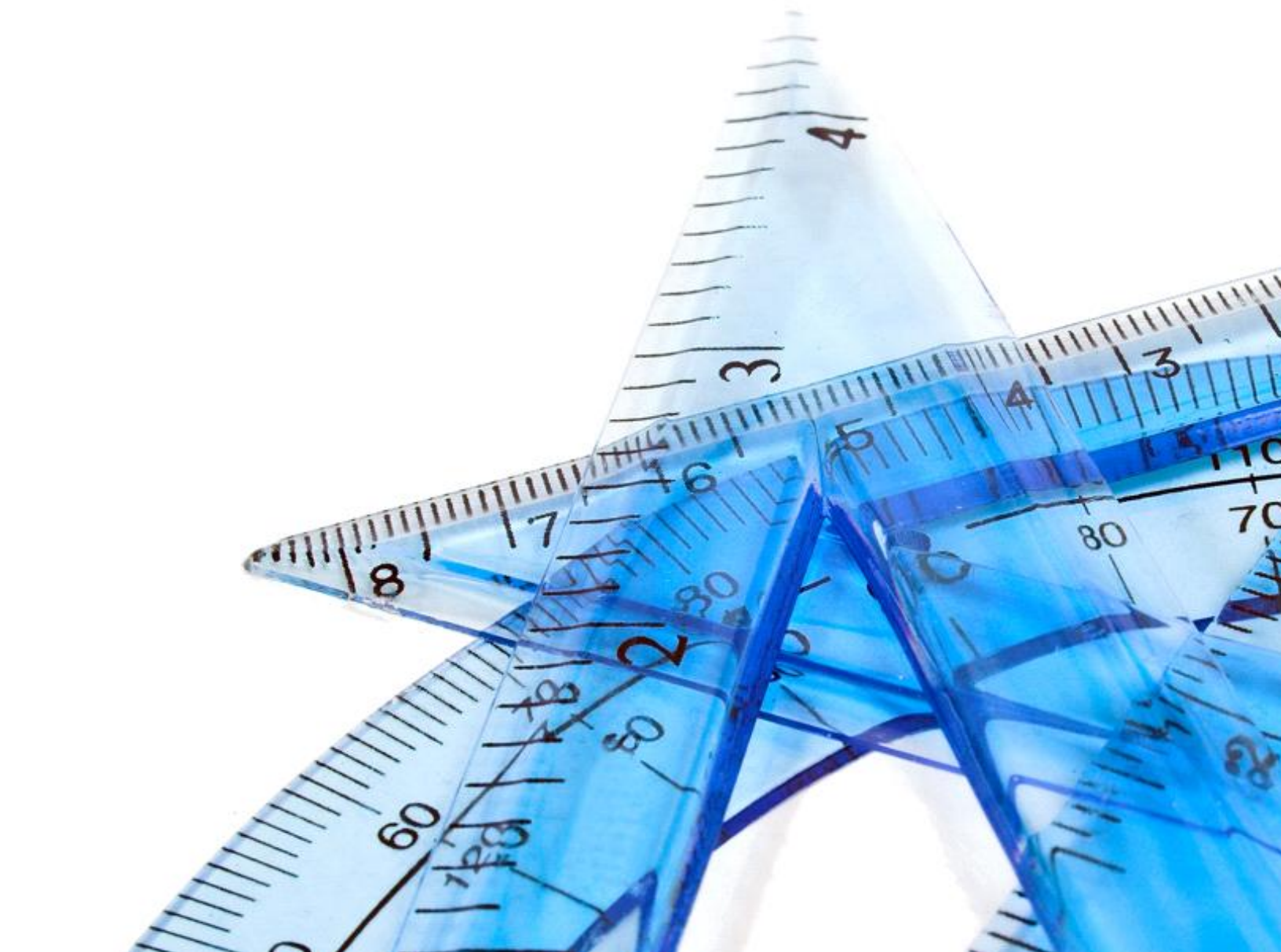
Measurement

Our objective (based on National Council of Teachers of Mathematics Expectations) on measurement is as follows:

- The learner will select and apply appropriate standard units and tools to measure length, area, volume, mass, and degrees of angles

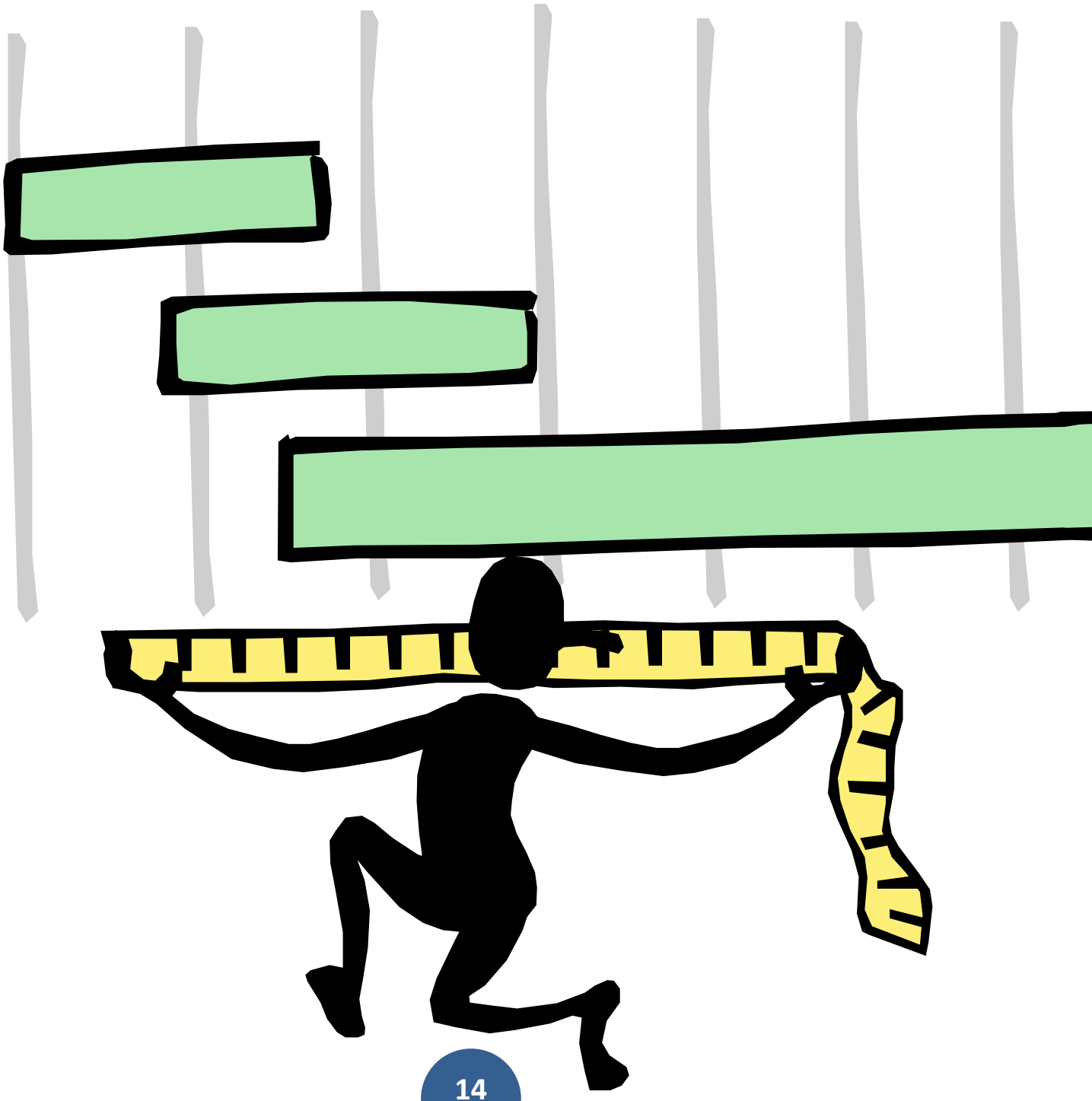
We have designed our Measurement Madness lesson to meet this goal. We propose the following extension activities for your classroom:

- Measurement Scavenger Hunt
- Measurement Collage
- Writing Prompts



Measurement Scavenger Hunt

Similar to the Measurement Madness activity done at STARBASE, you can conduct a measurement scavenger hunt in your classroom. Have students complete a list of measurements of any number of items readily available to them in the classroom. You can even have them calculate the volume of rectangular solids by reminding them of the similar measurements they did here at STARBASE.



Measurement Collage

Have students create a collage of items that are measured in a specific unit (e.g., centimeters, meters, liters, Etc.). Similarly you can have students give examples of items that are measured in all of the base Metric units. So on their "collage" there would an example of something measured in meters, something measure in grams, something in liters, Etc.

Writing Prompts

Here are some sample writing prompts that relate to the Measurement Madness activity from STARBASE.

- You take part in a scientific experiment and are shrunk down to the size of an ant. Describe the world around you using measurement vocabulary and the new way in which you see it from your new size.
- Write a letter to the President telling him why the U.S. should or should not change to the Metric system.
- Describe your dream house using Metric units.

Alka-Seltzer Rockets, Atmosphere, & Excel Graphing

Our objectives (based on National Council of Teachers of Mathematics Expectations) on data analysis are as follows:

- The learner will collect data using observation and experiments.
- The learner will represent the data using tables and graphs.

We have designed our Alka-Seltzer Rockets, and Atmosphere graphing lessons to meet these goals. We propose the following extension activities for your classroom:

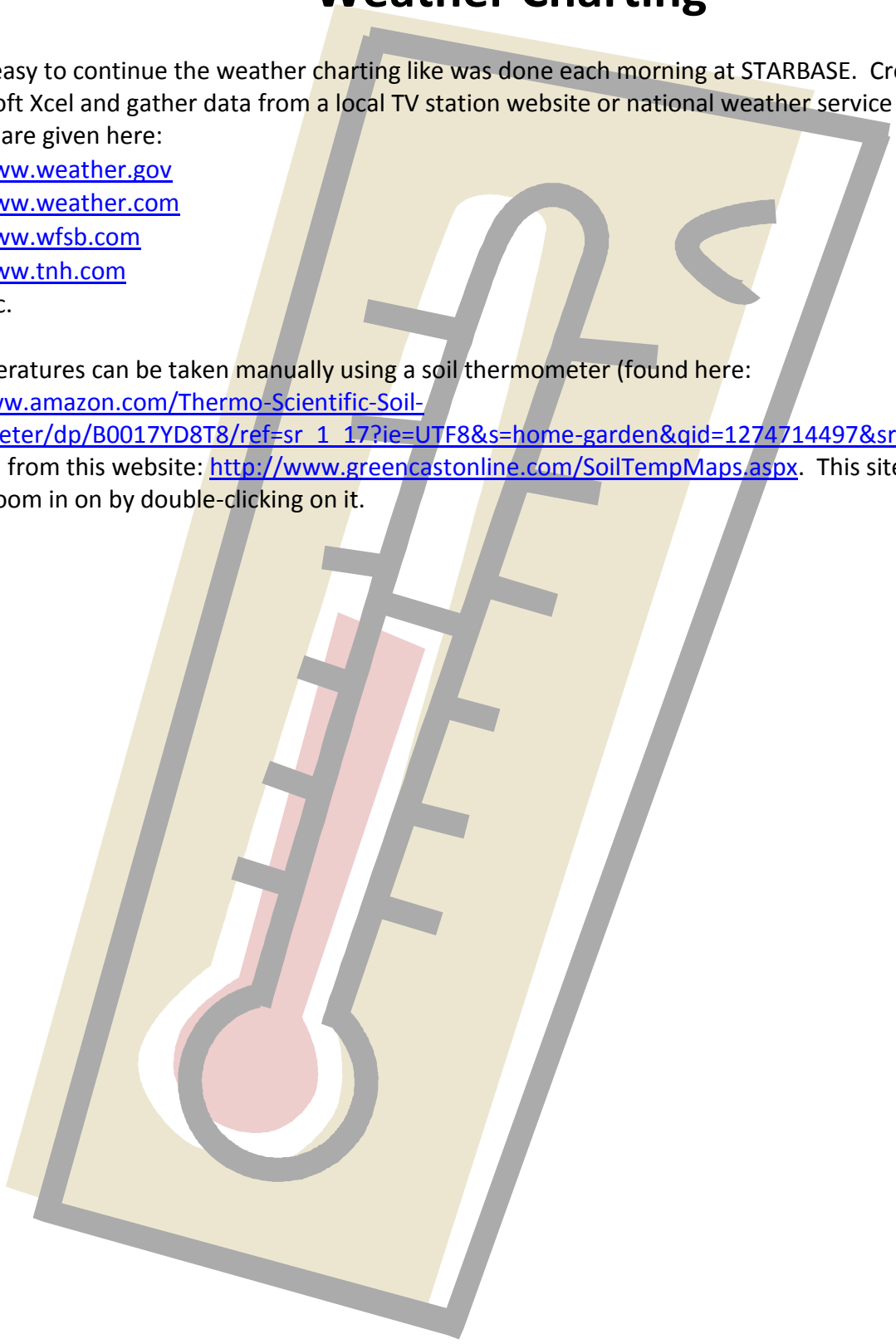
- Weather Graphing
- M&M Graphing
- Vowel Graphing
- Writing Prompts

Weather Charting

It is very easy to continue the weather charting like was done each morning at STARBASE. Create a blank chart in Microsoft Xcel and gather data from a local TV station website or national weather service website. Examples are given here:

- www.weather.gov
- www.weather.com
- www.wfsb.com
- www.tnh.com
- Etc.

Soil temperatures can be taken manually using a soil thermometer (found here: http://www.amazon.com/Thermo-Scientific-Soil-Thermometer/dp/B0017YD8T8/ref=sr_1_17?ie=UTF8&s=home-garden&qid=1274714497&sr=8-17) or can be estimated from this website: http://www.greencastonline.com/SoilTempMaps.aspx. This site uses a map that you can zoom in on by double-clicking on it.



M&M Graphing

This is a classic activity for graphing. Give students a bag of M&M's and have them count and separate them by color. Then have students graph the distribution of M&M's in their bag. You can have students hand draw graphs or if available have them do the results on Microsoft Xcel similar to the way they did the components of the atmosphere.

Vowel Graphing

Here's a new way of looking at students' favorite books. Have students randomly pick a page from their favorite book. You could base this on their favorite part of the book, be completely random, or assign them a page. Once that is done have the count the number of time the five vowels appear on that page and the graph those results by hand or on Microsoft Xcel.

Writing Prompts

Here are some sample writing prompts that relate to the Data Analysis activities from STARBASE.

- If you were to graph how you spend your time during an average day, what would it look like? Be sure to not only make the chart but to explain it.
- If you were to graph the heights of the people in your family, what would it look like? Be sure to not only make the chart but to explain it.
- If you were to graph the ages of the people in your family, what would it look like? Be sure to not only make the chart but to explain it.

Coordinate Planes/Geometry

Our objective (based on National Council of Teachers of Mathematics Expectations) on geometry is as follows:

- The learner will recognize geometric properties and relationships and apply them to other disciplines and to problems that arise in everyday life.

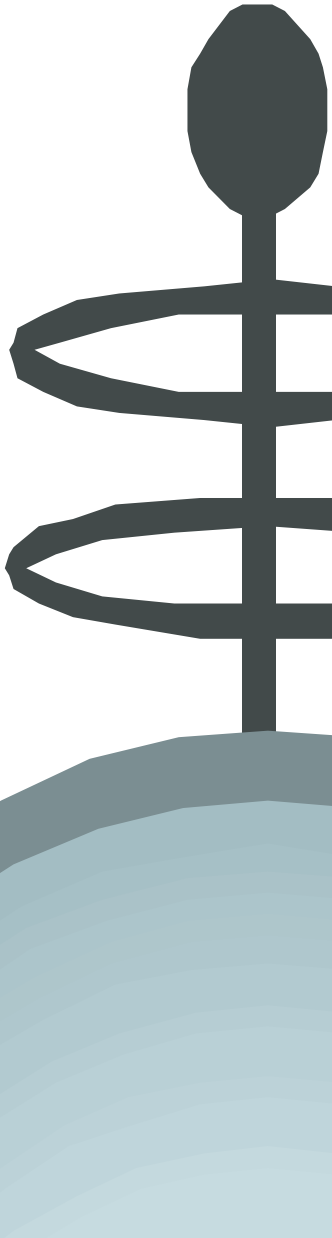
We have designed our Coordinate Planes/Geometry lesson to meet this goal. We propose the following extension activities for your classroom:

- Teacher-bot
- Connect the dots
- Animal Graphers
- Tangrams
- http://www.purposegames.com/game/2d-shapes-quiz
- Writing Prompts

Teacher-bot

Teacher-bot is a direct extension of the coordinate plane activities at STARBASE. Start by drawing a coordinate grid on the board. Then explain to the class that you are the "teacher-bot" and their job is to direct the teacher-bot to the given coordinate point. The key is for the students to be exact in giving directions (this is a focus on communication skills) as well as their ability to graph coordinate points. This exercise reinforces to always start at the origin and to do the X coordinate then the Y coordinate. A sample set of directions to get to the coordinate point (4, -7) would read as follows:

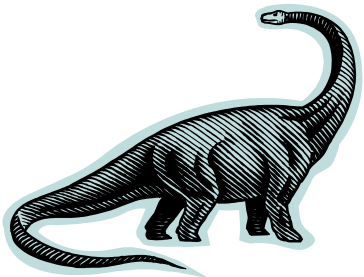
1. Go to (0,0)
2. Go right 4.
3. Go down 7.
4. This is your point.

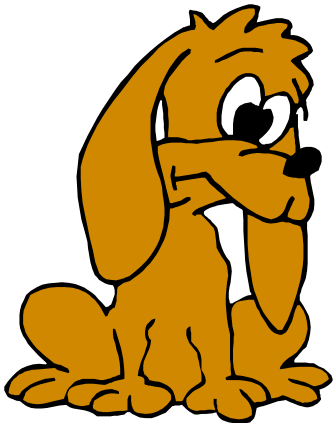


Connect the Dots

Coordinate planes are great for having student s plot points then connect the dots to make a picture. Here are some sample sets you can have students plot then connect the dots and decorate. What they make is listed afterward. Make sure students connect the dots in order that points are given otherwise they will not get the correct picture. Start a new line when you see Lift Pencil. Work left to right.

Set of points	Image created
(-2, -1) (-9, -1) (-6, 4) (-2, 5) (2, 4) (5, -1) (-2, -1) (0, -7) (-3, -9) (-4, -8)	Umbrella
(24,18) (24,17) (22,16) (20,11) (19,6) (19,2) (17,2) (17,6) (16,5) (15,2) (13,2) (14,5) (14,6) (12,6) (12,2) (10,2) (10,4) (9,2) (7,2) (9,6) (7,6) (4,4) (2,3) (0,2) (1,3) (3,5) (5,9) (9,11) (17,11) (21,17) (23,18)	Dinosaur (Diplodocus)
(4, 5) (4, 1) (3, 0) (1, 0) (0, 2) (0, 8) (1, 9) (3, 9) (6, 8) (7, 8) (10, 8) (11, 7) (11, 6) (10, 5) (8, 5) (7, 6) (7, 7) (8, 8) (11, 7) (15, 7) (16, 6) (16, 5) (15, 4) (14, 4) (13, 5) (13, 6) (14, 7) Lift Pencil (15, 4) (14, 3) (13, 0) (11, -1) (10, -1) (8, 1) (7, 3) (6, 2) (8, -1) (7, 0) (5, -2) (5, -3) (6, -4) (8, -4) (9, -5) (9, -6) (7, -7) (5, -7) (4, -6) (4, -3) Lift Pencil (4, -6) (3, -7) (1, -8) (-1, -8) (-2, -7) (-2, -6) (-1, -5) (-1, -2) Lift Pencil (-1, -4) (-4, -4) (-4, -6) (-5, -7) (-7, -7) (-9, -5) (-8, -2) (-12, 4) (-5, 4) (0,3)	Dog

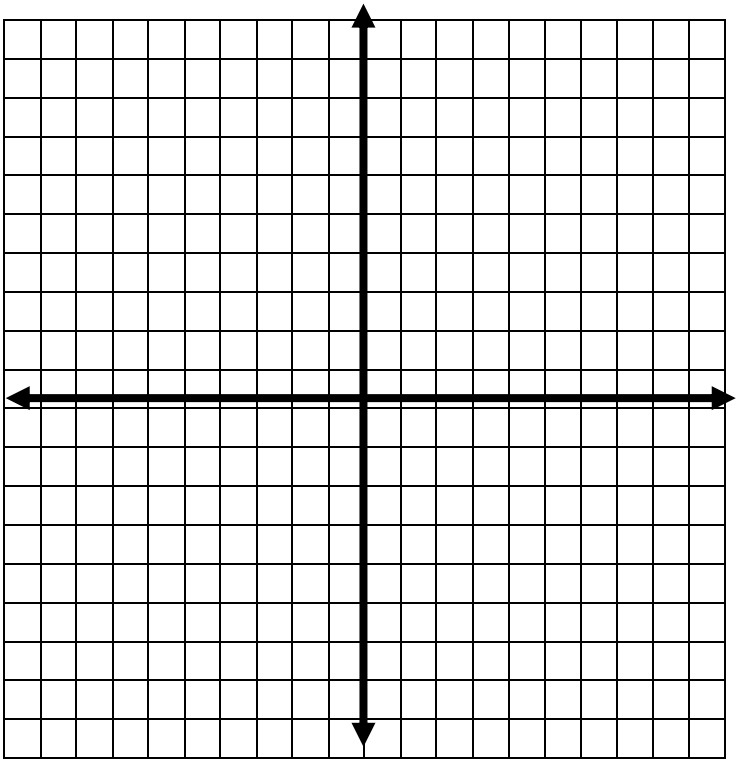




Animal Graphers

Using all four quadrants on the coordinate grid at the right, lightly draw the outline of an animal that is easy to recognize. It is probably best to draw the animal in profile. Be sure to include its most distinguishing features.

Adjusting your drawing as necessary, identify the coordinates of at least ten points that could be connected to recreate your drawing on another grid. Write the coordinates of the points on a separate sheet of paper.



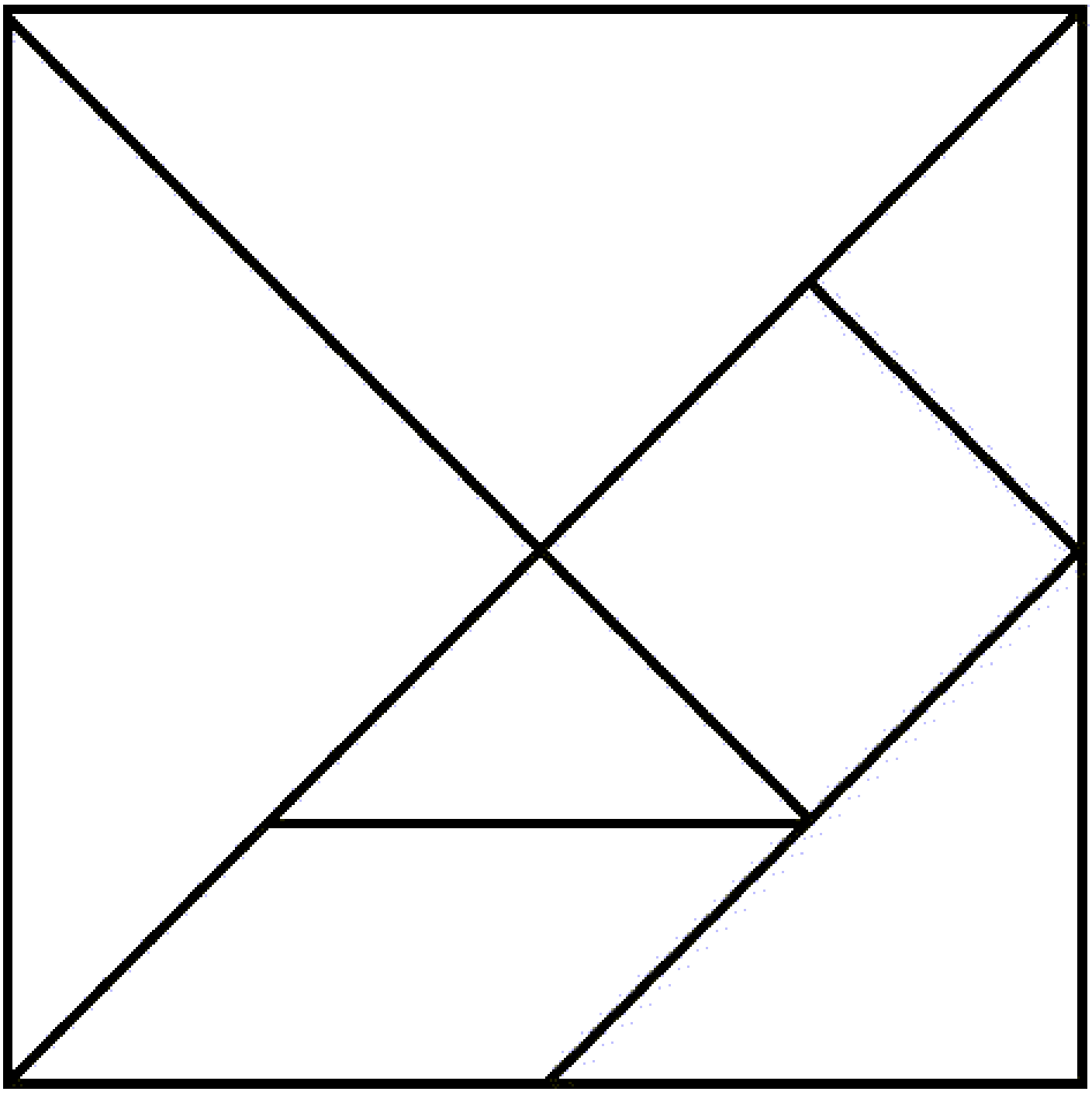
1. Give a classmate the coordinates for your drawing. He or she should plot the points on a coordinate grid, connect them, and try to guess what animal you drew. Were they successful in guessing the animal? Why or why not?

2. What coordinates most closely identify the point in your drawing where your animal's eye would be?

3. On a separate coordinate grid, use twice as many points to make a larger, more detailed drawing of your animal. Was making this drawing easier or more difficult than the first? Why? Describe what you did differently.

Tangrams

Tangrams are great way to get students to work with geometric shapes. Have students use tangrams to fill in designated shapes and then tell what geometric shapes they used to fill the shape. Below is a sample tangram.



Writing Prompts

Here are some sample writing prompts that relate to the Coordinate Plane/Geometry activities from STARBASE.

- Pick out a couple of everyday items (piece of fruit, pencil, bridge, etc.) and describe the geometric shapes that make it look the way it is.
- Look at the picture on the board (teacher supply any random picture), and describe the geometric shapes you see in the picture. Be sure to say what shape goes with what item from the picture.
- Design a bicycle and describe the geometric shapes you would use in your design.

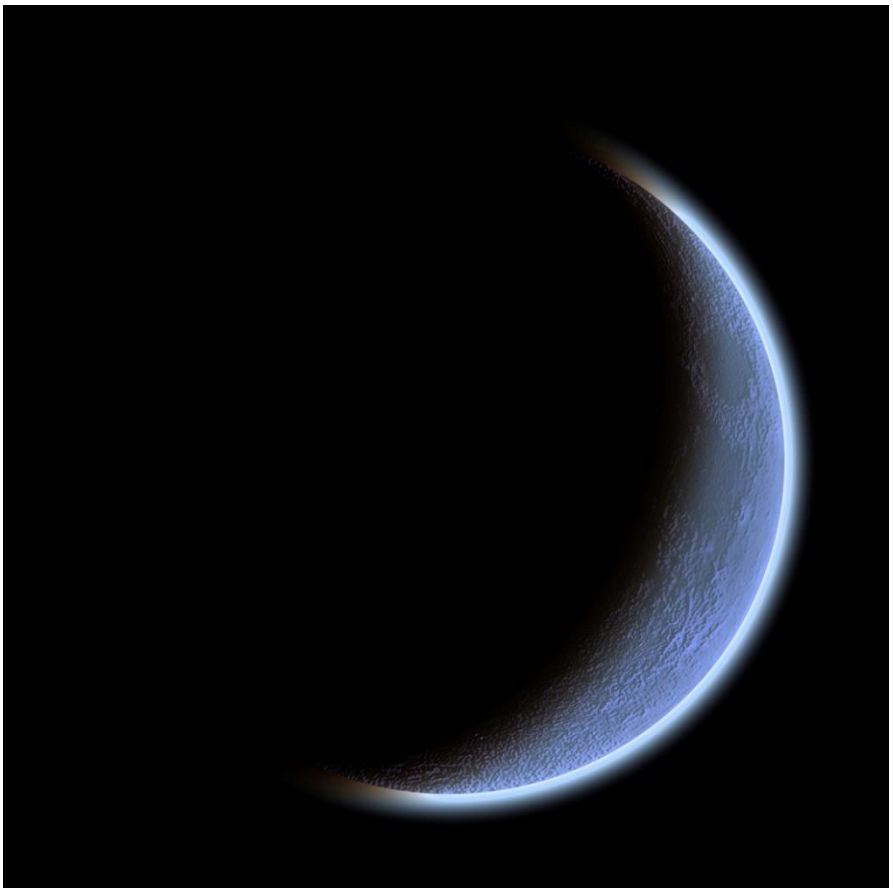
Moon Phases - Number Relationships

We have coupled our objective (based on National Council of Teachers of Mathematics Expectations) on number relationships and the CT standard fro fifth grade on the Phases of the Moon for our activities at STARBASE CT. Our objective on number relationships is as follows:

- The learner will solve problems using fractions, decimals, and percents.

We have designed our Moon Phases lesson to meet these coupled goals. We propose the following extension activities for your classroom:

- Moon Phase Shuffle
- Pizza Pieces
- Class Fractions/Decimals/Percentages
- Writing Prompts



Moon Phase Shuffle

Make placards of the phases of the moon and shuffle them then give each placard to a different student and then time them as them work to arrange themselves in the correct order. Then repeat with a different group of students.

Pizza Slices

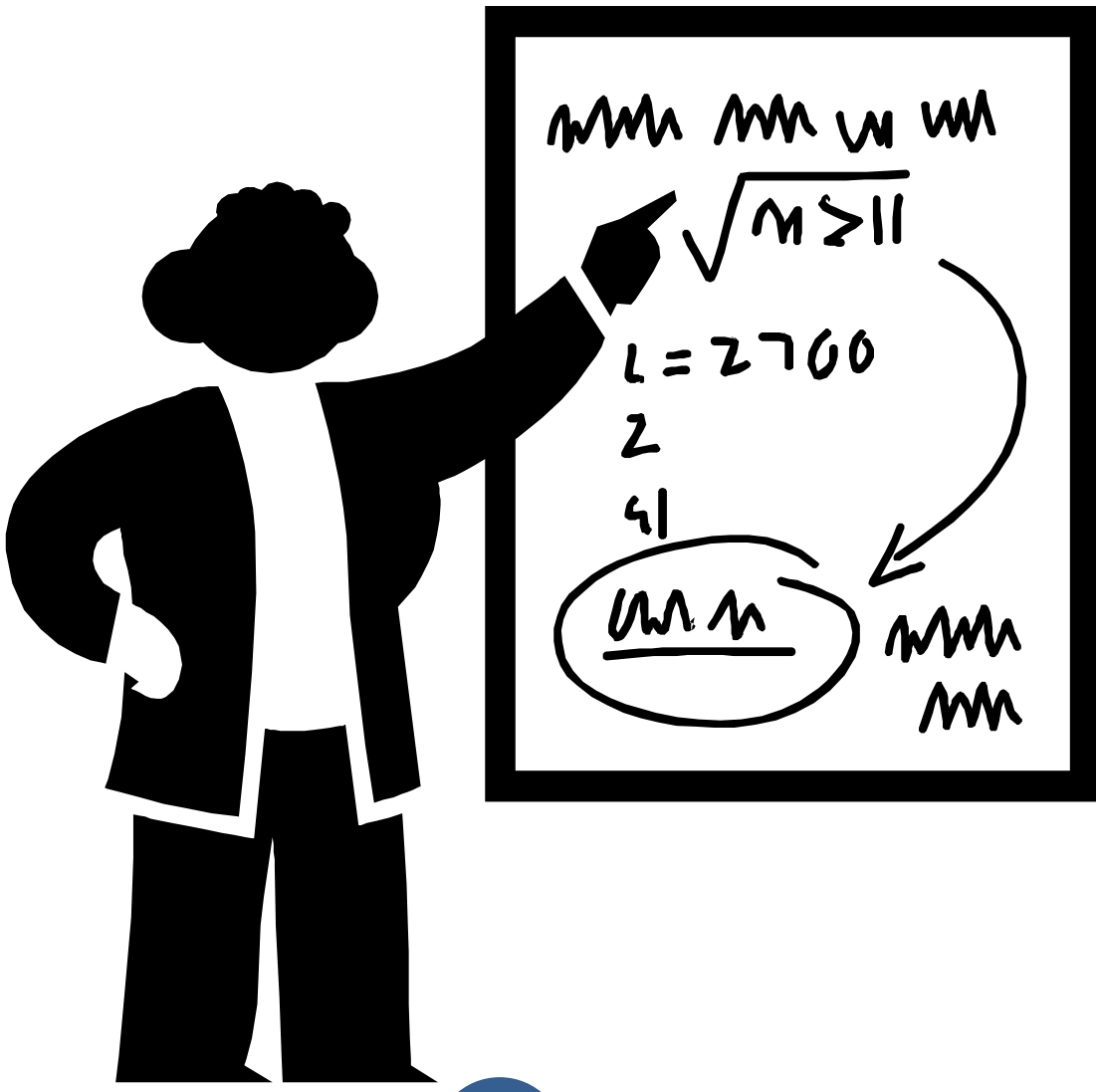
Show the class a picture of a pizza cut into slices. Determine the fraction of the pizza that is one slice. Then explain a fraction is simply a division problem (numerator divided by denominator) and from that you can find the decimal and percentage of the pizza that one slice comprises. You can vary this activity by showing different images being separated in a various number of pieces.

Class Fractions/Decimals/Percentages

This activity can be used to show number relationships, talk about diversity and commonalities. IT IS WORTH NOTING THAT TOPICS CHOSEN IN THIS ACTIVITY NEED TO BE THOUGHT ABOUT CAREFULLY TO AVOID ISSUES THAT MAY BE SENSITIVE FOR STUDENTS (i.e., race, home life, etc.) You know your students well enough to pick wisely.

Poll the class on various topics that you can use to determine fraction/decimal/percentage size. Some choices include:

- Eye color
- Hair length
- Favorite color
- Gender
- Etc.



Writing Prompts

Here are some sample writing prompts that relate to the Moon Phases/Number Relationships activities from STARBASE.

- Which number form do you like using the best. Why?
- Most of the world no longer uses fractions. Should the US continue using fractions or adopt using only decimals and percentages?
- Explain why we have the various phases of the moon. Use proper names of phases and other related vocabulary learned at STARBASE.

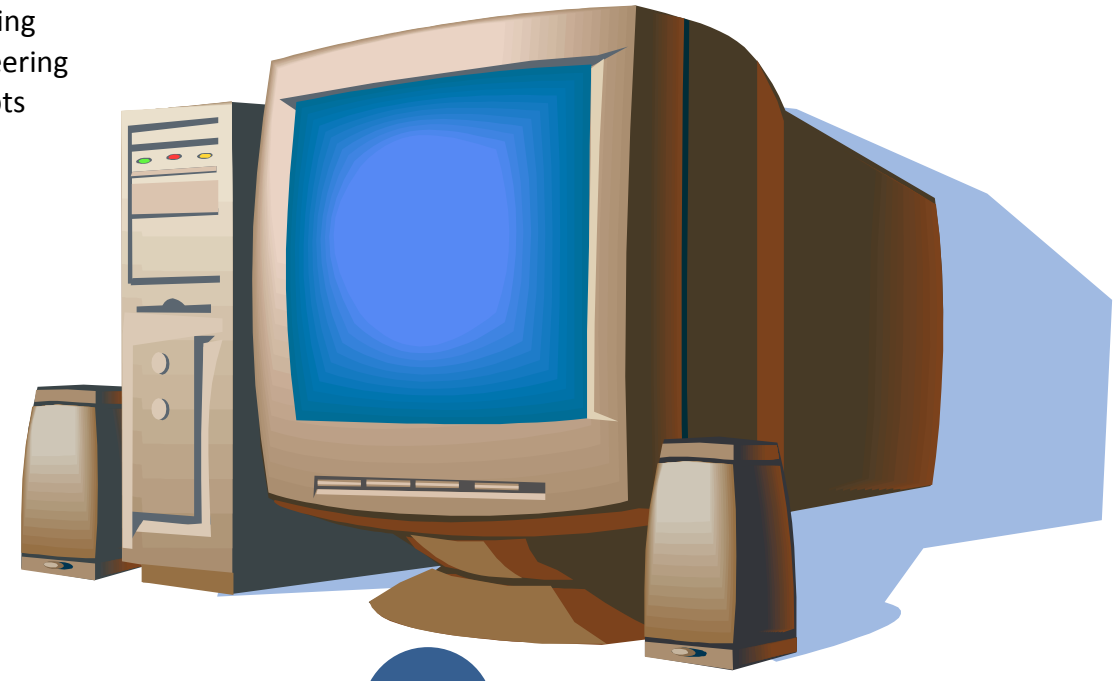
Pro-Engineer (Start Part & ISS, Capsule)

Our objectives relating to the use of the Pro-Engineering program is based on standards from the International Society of Technology in Education (ISTE) and the NCTM. Our objectives are as follows:

- The learner will construct a 3-D scale model based on geometric relationships using engineering design software and computer technology as required by OASD/RA (Office of Assistant Secretary of Defense/Reserve Affairs).
- The learner will use engineering design software to demonstrate basic CAD operation and skills in the areas of:
    - Sketching (2-D geometry creation and modification)
    - Geometric and dimensional constraints (applying appropriate constraints)
    - Modeling (3-D modeling skills and modifications)
    - Assemblies (understanding and creating simple assemblies)
- The learner will relate geometric relationships and mathematical applications to parameters of CAD
- The learner will apply basic computer skills such as mouse dexterity, keyboarding, data entry, and folder navigation.

While Pro-Engineering may not be readily available there are things that you can do and use in the classroom to extend your students expose to CAD and engineering. Here a few examples:

- LEGO Engineering
- Reverse Engineering
- Writing Prompts



LEGO Engineering

LEGO has a program that is a FREE download that works like a CAD program. It is designed so you can virtually build something of LEGOs and the order that specific kit. So your students can use and not order the kit. It takes a little bit to used to orientation of the program and all the various skills needed to successfully navigate the program but it Is an inexpensive alternative to Pro-Engineer and student can navigate it on their own without needing to be taught the program.

It can be found here: http://ldd.lego.com/

We recommend using it some yourself before allowing students on so you might be able to field any questions they may have as the first use the program.

Reverse Engineering

This is a team-based activity. Split the teams into two parts. One part will be the engineers and one will be the construction member. The Engineers are shown an item (without the construction members seeing) and they are given a set amount of time to look at the item and figure out how to build it. They cannot touch it or move it in anyway. They may only do visual inspection on the item. They must then write detailed instructions for the construction members to use to recreate the item. The construction member cannot talk to the engineer. They can only follow the directions they are given. You can do this part timed as well. Then examine how successfully teams are able to recreate the items. The switch roles and repeat the exercise.

Writing Prompts

Here are some sample writing prompts that relate to the Pro-Engineer activities from STARBASE.

- Why do you think companies like Nike use programs like Pro-Engineer?
- How is math involved in a program like Pro-Engineer?
- What was your favorite part of using Pro-Engineer? Why?

Newton's Laws of Motion (Straw Rockets)

Our objectives (based on National Science Education Standards and National Council of Teachers of Mathematics Expectations) on Newton's Laws of Motion are as follows:

- The learner will recognize examples of Newton's Laws in the physical world.
- The learner will demonstrate that an object in motion or at rest will stay in motion or at rest unless acted upon by an outside force (FIRST LAW)
- The learner will predict and determine the acceleration of an object when given the variables of mass and force. (SECOND LAW)
- The learner will conclude every action is followed by a reaction equal in magnitude and opposite in direction. (THIRD LAW)

We have designed our Newton's Laws and Straw Rockets lessons to meet these goals. We propose the following extension activities for your classroom:

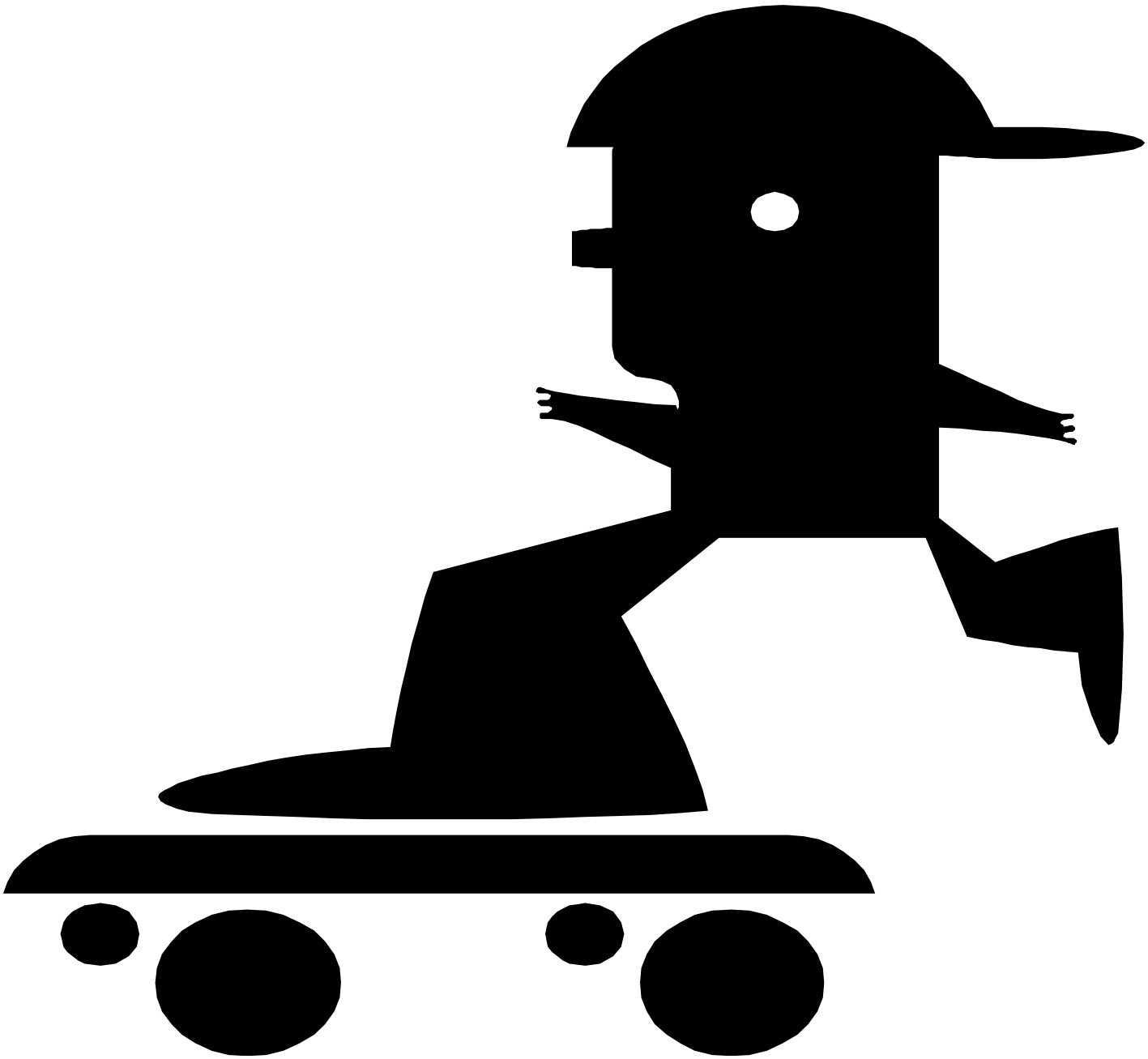
- Force Diagramming
- Newton Skateboarding
- Hot Wheels Lab
- Writing Prompts

Force Diagramming

Using force diagrams to show the direction and amplitude of forces can help students further understand Newton's Laws of Motion. Drawing a force diagram is simple. Simply use varying size arrows to show the direction and amplitude of forces in an action. See the example below. This can be done for any action.

Newton Skateboarding

To do this activity you need a skateboard or roller skate. You can illustrate or have students illustrate Newton's laws of motion and you can also use force diagramming to show where the motion is happening, its amplitude, direction, etc.



Hot Wheels Lab

Rice University offers this alternative. That looks at motion and how a ramp impacts the motion of Hot Wheels. The lab can be found at: http://teachertech.rice.edu/Participants/louviere/Newton/hotwheels.html.

Writing Prompts

Here are some sample writing prompts that relate to the Newton's Laws of Motion activities from STARBASE.

- Give an example of Newton's First Law of Motion. Explain how it shows Newton's First Law of Motion.
- Give an example of Newton's Second Law of Motion. Explain how it shows Newton's Second Law of Motion.
- Give an example of Newton's Third Law of Motion. Explain how it shows Newton's Third Law of Motion.

Properties of Air

Our objectives (based on National Science Education Standards and National Council of Teachers of Mathematics Expectations) on the properties of air are as follows:

- The learner will determine there are a number of characteristic properties of air including mass, weight, density, volume, and pressure.
- The learner will discover air pressure is not constant, varies with altitude is inversely proportionate to velocity, and varies with changes in kinetic energy.
- The learner will identify gases and their proportions that make up the Earths atmosphere.
- The learner will categorize air as a fluid, similar to the ocean, based on observable properties.

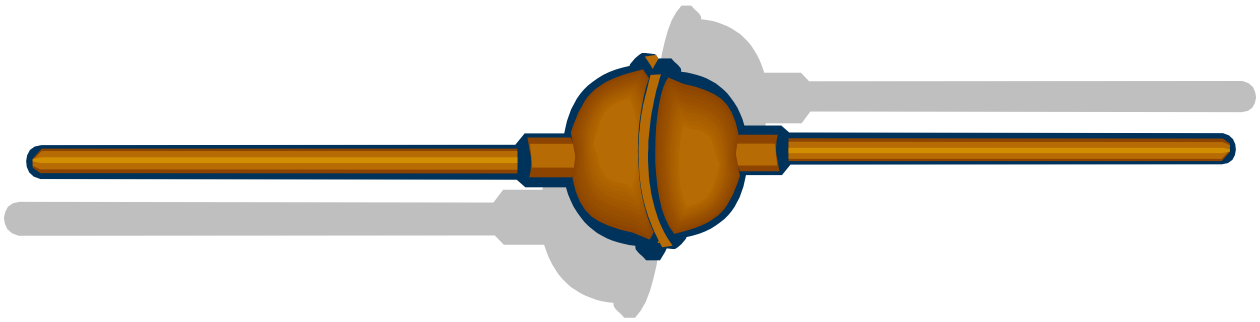
We have designed our properties of air lesson to meet these goals. We propose the following extension activities for your classroom:

- Plumber Magic
- Magic Coin
- Karate Air
- Writing Prompts

Plumber Magic

Taken from http://www.thehomeschoolmom.com/teacherslounge/articles/air_pressure_experiments.php

Take two clean old-fashioned, red rubber-and-wood-stick plungers and stick them together (you may need to wet the rims first). Try to separate them. Why is it so hard? When you rammed them together, air was forced out of the cavity that the insides make when pushed together, leaving you with a lower air pressure pocket inside, compared to the surrounding air pressure of 14.7 pounds per square inch (psi) outside the plungers. Higher pressure always pushes and thus is keeping the plungers together.



Magic Coin

Taken from http://www.kids-science-experiments.com/magiccoin.html

Materials you will need:
- Bowl of cold water
- Coin (bigger than the bottle opening)
- Glass Coke Bottle (with a small opening/mouth)

Steps:
1. Fill a bowl with some cold water.
2. Place the bottleneck and coin in the bowl of water to chill them. This helps to make an airtight seal when you place the coin on the top of the bottle.
3. Place the coin on the top of the bottle.
4. Wrap your hands around the bottle and wait for several seconds.

What happens to the coin?

5. Remove your hands from the bottle and wait.

What happens to the coin now?

Why does the coin jump? When you hold the bottle with your hands, the air inside the bottle heats up. The warm air pushes harder than the cool air that is outside the bottle so it forces the coin up. When the air inside the bottle cools down the coin will stop jumping.

Karate Air

Taken from http://www.stevespanglerscience.com/experiment/00000077

Materials
- Several pieces of pine wood or wood paneling (1" wide x 36" long x 1/4" thick)
- Several large sheets of newspaper
- Work gloves
- A table

1. Place the piece of wood on a table and let one end hang over the edge about 4 inches. Ask the spectators, "What will happen if I hit the piece of wood that is hanging over the edge of the table?☐" Make sure everyone is out of harms way as you karate-chop the stick. Of course, the stick goes flying end over end just as expected.

2. Return the stick to the table allowing about 4 inches of the stick to hang over the edge. "Let's use a piece of newspaper to help secure the stick in place."☐ Show a single sheet of newspaper and fold it in half 3 or 4 times. Place the folded newspaper over the end of the stick that is lying on the table. Again, make sure everyone is standing away from the table as you hit the end of the stick that is hanging over the edge of the table. What happened? Did the newspaper help to hold the stick in place? Of course the answer is "NO."☐

3. Finally, show the spectators a new sheet of newspaper and use it to cover the portion of the stick that is lying on the table. Make sure that the newspaper is flush with the edge of the table. "What do you think will happen now if I hit the stick with the unfolded newspaper covering the stick?"☐ You might anticipate an answer like, "The newspaper will go flying...or the sheet of newspaper will tear apart.☐" Smooth down the newspaper with your hands so that there are no pockets of air under the sheet of paper. Put on your karate-chopping glove to protect your hand. Strike the protruding edge of the stick with your hands with a sudden sharp hit. To everyone's amazement, the stick breaks. F[illegible]nd t[illegible]audience that the weight of flat newspaper is exactly the same as the folded newspaper, ye[illegible] fla[illegible]er h[illegible] the newspaper in place. That's amazing... but how does it work?

Writing Prompts

Here are some sample writing prompts that relate to the properties of air activities from STARBASE.

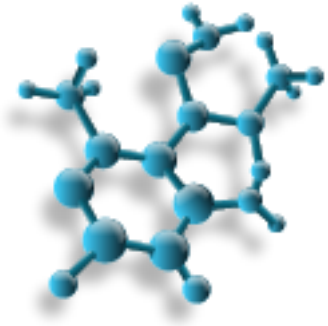
- Why didn't the inside of the jar get wet when it was dunked under water?
- How did the air keep the water in the jar when it was turned upside down?
- How are air and water similar to one another? Think of the properties of air you learned at STARBASE.

Matter

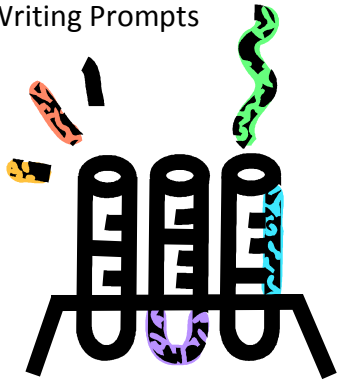
Our objectives (based on National Science Education Standards) on the properties of air are as follows:

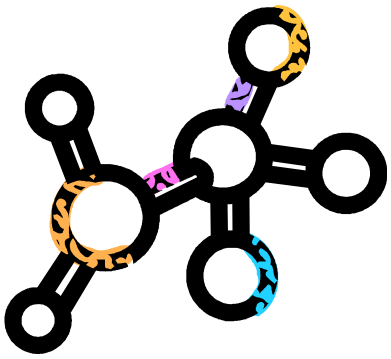
- The learner will conclude there are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for all living and non-living substances.
- The learner will demonstrate that atoms combine to form molecules and molecules formed from different atoms combine to form compounds.
- The learner will recognize a substance has characteristics, such as density, viscosity, boiling point, and solubility, all of which are independent of the amount of the sample.

We have designed our matter lesson to meet these goals. We propose the following extension activities for your classroom:



- Chemistry Scavenger Hunt
- Element Brochure
- Moving Molecules
- Tom Lehrer's *The Elements*
- Periodic Table Online Games
- Yummy Phase Changes
- Writing Prompts



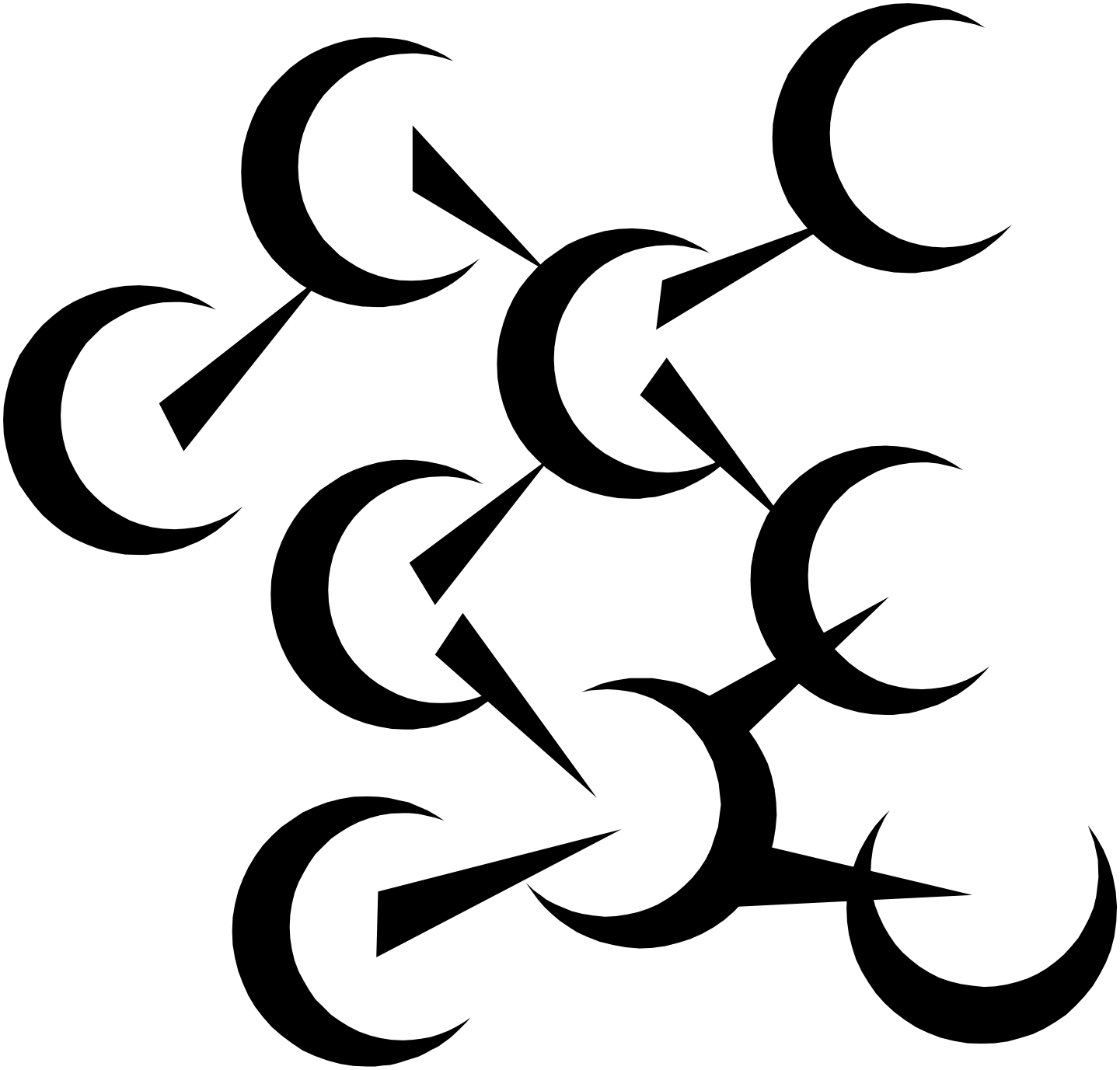


Chemistry Scavenger Hunt

Taken from http://www.sciencespot.net/Media/chemscavht.pdf

This is a great scavenger hunt involving the Periodic Table and states of Matter.

Go to http://www.sciencespot.net/Media/chemscavht.pdf and download the scavenger hunt and it contains directions to complete it. It does require Internet connection.



Element Brochure

Taken from http://www.nclark.net/ElementBrochure.html

This is an interesting way to get students to look into the periodic table and get them to explore their creativity at the same time. It can be altered to meet your students' abilities. Go to http://www.nclark.net/ElementBrochure.html to learn more.

Moving Molecules

Taken from http://wow.osu.edu/experiments/statesofmatter/psm1/movmol.html

The purpose of this experiment is to observe molecular motion within liquids and the effect of temperature change on that motion will also be noted.

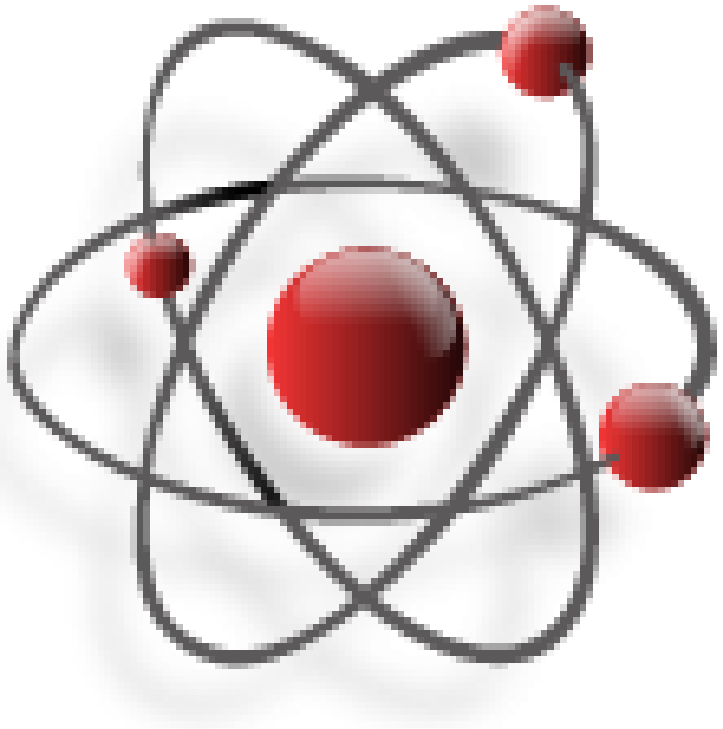
Go to http://wow.osu.edu/experiments/statesofmatter/psm1/movmol.html to read the experiment.

Tom Lehrer's *The Elements*

Taken from http://www.privatehand.com/flash/elements.html

Tom Lehrer's classic science song recounts the elements and offers a fun way to remember all the known elements in Lehrer's day. This flash video is fun and adds the newer elements up to 2003.

Go to http://www.privatehand.com/flash/elements.html and play it for the class. You may even encourage students to create their own songs to remember scientific information.



Online Periodic Table Games

There are numerous options out there but here are a couple of options that challenges students' knowledge of the periodic table and the elements.

http://www.funbrain.com/periodic/index.html

http://www.sheppardsoftware.com/Elementsgames.htm

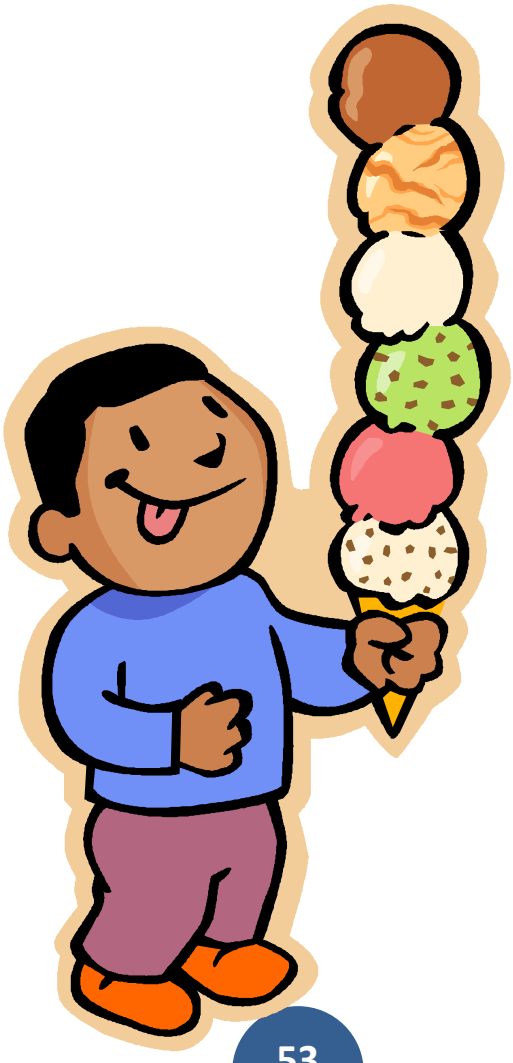
Yummy Phase Changes

Taken from http://tlc.howstuffworks.com/family/science-projects-for-kids-states-of-matter1.htm

What You'll Need:

- Can of frozen orange juice
- Pitcher
- Large spoon
- Water
- Paper cups
- Wooden craft sticks

Step 1: Open a can of frozen orange juice, and spoon it into a large pitcher. Touch the frozen juice to feel that it is both solid and cold.
Step 2: Add water according to the package directions to make orange juice.
Step 3: Fill several paper cups about 2/3 of the way with orange juice.
Step 4: Put a craft stick into the liquid in each paper cup.
Step 5: Being careful not to spill, put the cups of juice into the freezer.
Step 6: Check them after two hours. Can you gently pull out the craft stick, or has the liquid orange juice frozen solid around the stick?
Step 7: Once the orange juice has frozen, peel off the paper cups. You and your friends can enjoy a frozen treat!



Writing Prompts

Here are some sample writing prompts that relate to the matter activities from STARBASE.

- Describe the kinetic energy (motion) of molecules in a solid.
- Describe the way to change a material from one state of matter to another.
- Describe the change in the kinetic energy of water molecules as they go from a solid to a liquid to a gas.

Physical & Chemical Reactions

Our objectives (based on National Science Education Standards and National Council of Teachers of Mathematics) on physical and chemical reactions are as follows:

- The learner will conclude there are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for all living and non-living substances.
- The learner will demonstrate that atoms combine to form molecules and molecules formed from different atoms combine to form compounds.
- The learner will recognize a substance has characteristics, such as density, viscosity, boiling point, and solubility, all of which are independent of the amount of the sample.

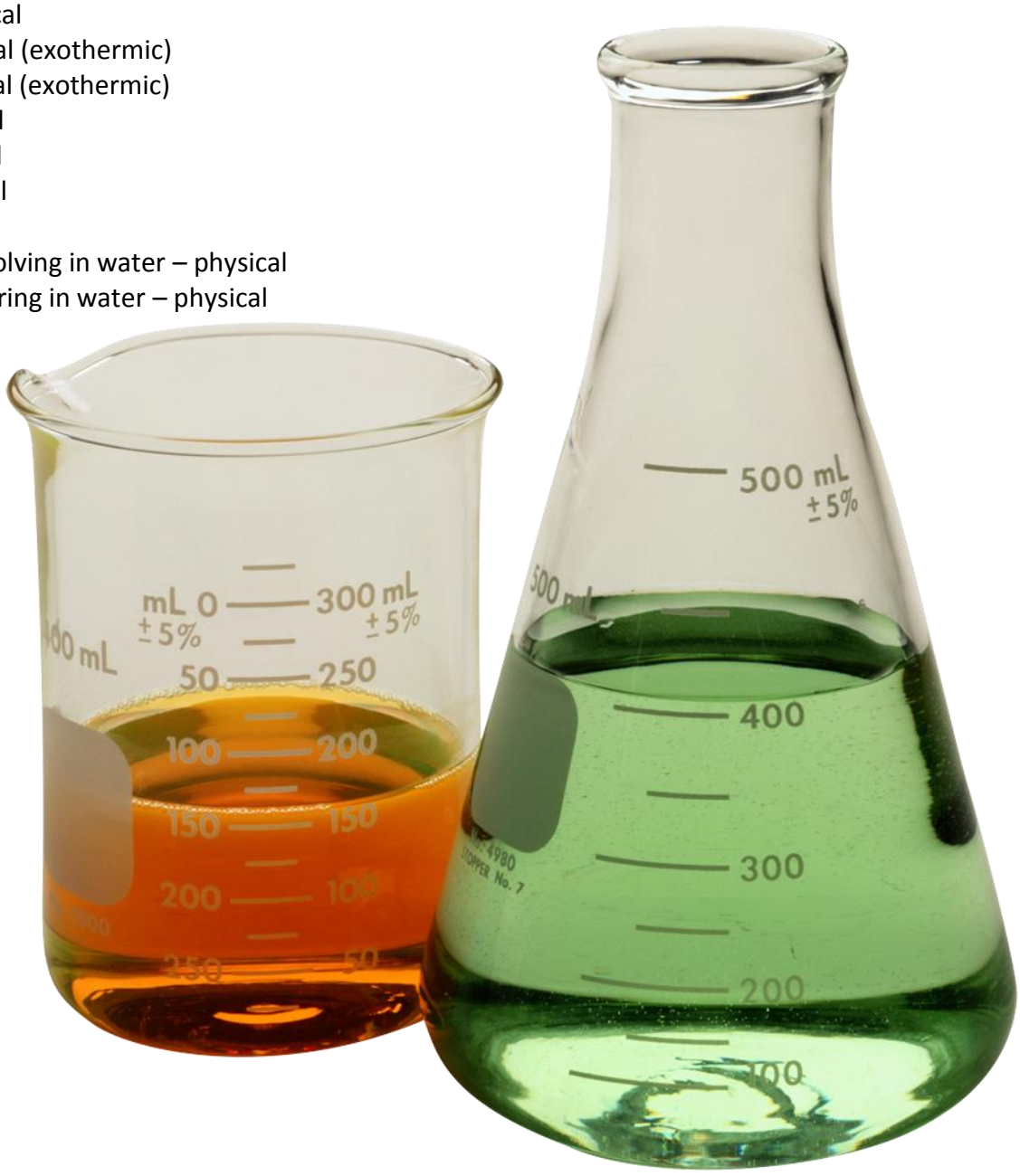
We have designed our physical and chemical reactions lesson to meet these goals. Unfortunately, many chemical reactions that can illustrate the differences between endothermic and exothermic reactions require the use of potentially hazardous chemicals or specialized scientific equipment. Due to this, we can only propose the following extension activities for your classroom:

- What's the Difference
- Writing Prompts

What's the Difference?

The understanding that physical reaction or change is one that does not affect the molecular or atomic structure and a chemical reaction or change alters the molecular or atomic structure is the key to knowing the difference. So similarly to what is done in the STARBASE classroom asking students to think of common reactions and the classifying them as physical or chemical is a good way to check for understanding and exploration of beginning chemistry. Including examples of endothermic and exothermic reactions can expand this activity. Below are some examples.

Fire – chemical (exothermic)
Baking/cooking – chemical (endothermic)
Cutting – physical
Polishing – physical
Rusting – chemical (exothermic)
Rotting – chemical (exothermic)
Tearing – physical
Folding – physical
Melting – physical
Boiling – physical
Sugar or salt dissolving in water – physical
Putting food coloring in water – physical



Writing Prompts

Here are some sample writing prompts that relate to the physical and chemical reactions activities from STARBASE.

- Describe the difference between a physical and chemical change
- Describe the difference between an endothermic and exothermic reaction.
- Describe the change that takes place when physical reaction happens.
- Describe the change that takes place when a chemical reaction happens.

Innovations

Our objectives (based on National Science Education Standards and National Council of Teachers of Mathematics) on innovations are as follows:

- The learner will identify and define authentic problems and significant questions for investigation.
- The learner will plan and manage activities to develop a solution or complete a project.
- The learner will collect and analyze data to identify solutions and/or make informed decisions.

We have designed our innovations lesson to meet these goals. We propose the following extension activities for your classroom:

- Build a Better Backpack
- Build a Better Mousetrap
- Writing Prompts

Build a Better Backpack

Students often utilize a backpack and rarely do they think it is a wonderful device. Here is their chance to make it what they want. Have them focus on describing the problems with real world examples and how they would make a solution to that problem in their design. Have them make a blueprint of their design and label it to show all the features of what they see as the backpack of the future.

Build a Better Mousetrap

Mousetraps are often cruel devices that can cause suffering. Live trapping of animals is a humane option. Have students design a better mousetrap. Their design should allow for the safe trapping of a mouse so it can be released in the wild away from a house or building. The lesson can also be used to introduce simple machines by having students meet a requirement of X number of simple machines needing to be included in their design. The students can build a prototype or make a labeled blueprint.

Writing Prompts

Here are some sample writing prompts that relate to the innovations activities from STARBASE.

- Describe how your group's filter worked layer by layer.
- How would you clean up a major oil spill like the on in the Gulf of Mexico?
- Traffic in your neighborhood is becoming a real problem. How can you ease the trouble traffic is causing in your neighborhood while still allowing people to travel on your road?

Eggbert

Our objective (based on International Society of Technology in Education, National Science Education Standards and National Council of Teachers of Mathematics) on innovations is as follows:

- The learner will recognize the engineering design process is a method of problem solving used to create a system, a product, or a process that meet an identified need.

We have designed our Eggbert lesson to meet these goals. We propose the following extension activities for your classroom:

- Magic Bags
- Science Fair
- Writing Prompts

Magic Bags

We often use this activity but you can repeat it in your classroom by recreating bags. In each bag there is an everyday object and in groups, students must devise a new way of using the object for a specified field. This allows for students to address a problem and creativity solve it.

Science Fair

Holding a science fair is a great way to get students to think scientifically. Organizing it school wide fosters an academic climate in the school and helps celebrate students' interest in academia.

Writing Prompts

Here are some sample writing prompts that relate to the Eggbert activity from STARBASE.

- Using Newton's First Law of Motion, tell how a seat belt saves lives.
- Imagine you are a news reporter, tell the story of Eggbert's injury and return trip to Earth.
- Compare your seatbelt design with what you would find in a car.