

STEAM in the Classroom Summer Challenges

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH



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RING WING GLIDER

For this challenge/activity you will need:

- Plain piece of paper or Ring Wing Glider Template (at end of instructions)
- Transparent Tape (optional)
- Ruler or tape measurer
- Additional types and sizes of paper for experimentation

Introduction:

For the month of February, we will be exploring contributions to STEM by historical African-American figures in honor of Black History Month. Before participating in this week's challenge, learn more about Bessie Coleman and how she became the first black woman to become a pilot.

After watching the video about Coleman, try to make your own Ring Wing Glider by following the instructions on the next page. What did you notice about the flight of your aircraft? Does it repeat the pattern each time you fly it? Make one change to your aircraft to enable a change in flight, then fly your aircraft several times. How did the flight characteristics change with your wing change?

Information Source: <https://www.jpl.nasa.gov/edu/teach/activity/ring-wing-glider/>
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RING WING GLIDER

Directions:

1. Fold a piece of 8.5- x 11-inch paper diagonally as shown in diagram 1.
2. Make a 1/2-inch fold along the previously folded edge as shown in diagram 2.
3. Make a second 1/2-inch fold as shown in diagram 3.
4. Curl the ends of the paper to make a ring and tuck one end into the fold of the other as shown in diagram 4.
5. Gently grasp the “V” between the two “crown points” with your thumb and index finger.
6. Toss the glider lightly forward. Note: The folds in the paper make the airplane’s front end heavy and the back end light. Curling the ends to make a ring changes the shape of the wing and improves the wing’s flight performance.

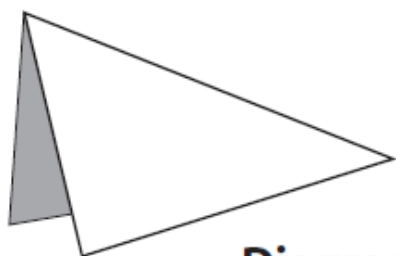


Diagram 1

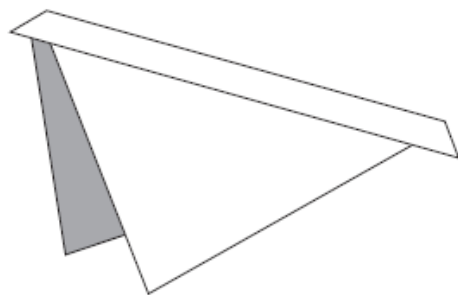


Diagram 2

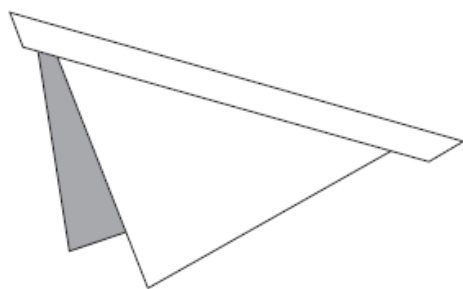


Diagram 3

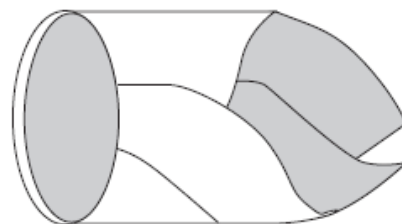


Diagram 4



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SOIL TEXTURE EXPERIMENT

For this challenge/activity you will need:

- Clear Jar
- Permanent Marker
- Ruler
- Watch or Stopwatch
- 1 Tablespoon of powdered dishwashing detergent

Introduction:

For the month of February, we will be exploring contributions to STEM by historical African-American figures in honor of Black History Month. Before participating in this week's challenge, learn more about George Washington Carver and how he became the first African American to earn a Bachelor of Science degree. He then went on to become an agricultural scientist researching alternative crops.

After watching the video about Carver, follow the instructions on the next page for the Soil Texture Experiment to see the percent of sand, silt and clay is in the soil around you and determine it's texture!

Information Source: <https://hgic.clemson.edu/factsheet/soil-texture-analysis-the-jar-test/>
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SOIL TEXTURE EXPERIMENT

Directions:

1. Fill your jar 1/3 full with soil.
2. Fill the rest of the jar with clean water, leaving some space at the top.
3. Add in your 1 tablespoon of powdered dishwashing detergent
4. Screw the lid on tightly and shake the jar until all of the soil, detergent and water are mixed thoroughly.
5. Set on a level surface and wait for 1 minute.
6. After 1 minute, use your permanent marker and mark on the jar where the top of the layer of sand has settled at the bottom.
7. After marking the first layer, leave on the level surface for 2 hours.
8. Mark the top of the next layer that has settled with your permanent marker. This layer is the silt.
9. Leave the jar on the level surface for 48 more hours.
10. Once the jar has sat, mark the last layer that has settled with your permanent marker. This layer is the clay.
11. Using a ruler, measure and record the height of each layer as well as the total height of all three.
12. Use the soil texture analysis below and on the next page to see what soil type you have!

Height of sand layer _____ inches/ cm

Height of silt layer _____ inches/ cm

Height of clay layer _____ inches/ cm

TOTAL height of layers _____ inches/ cm

% of Sand= (sand height)/(total height) x 100= _____ % sand

% of Silt= (silt height)/(total height) x 100= _____ % silt

% of Clay = (clay height)/(total height) x 100= _____ % clay



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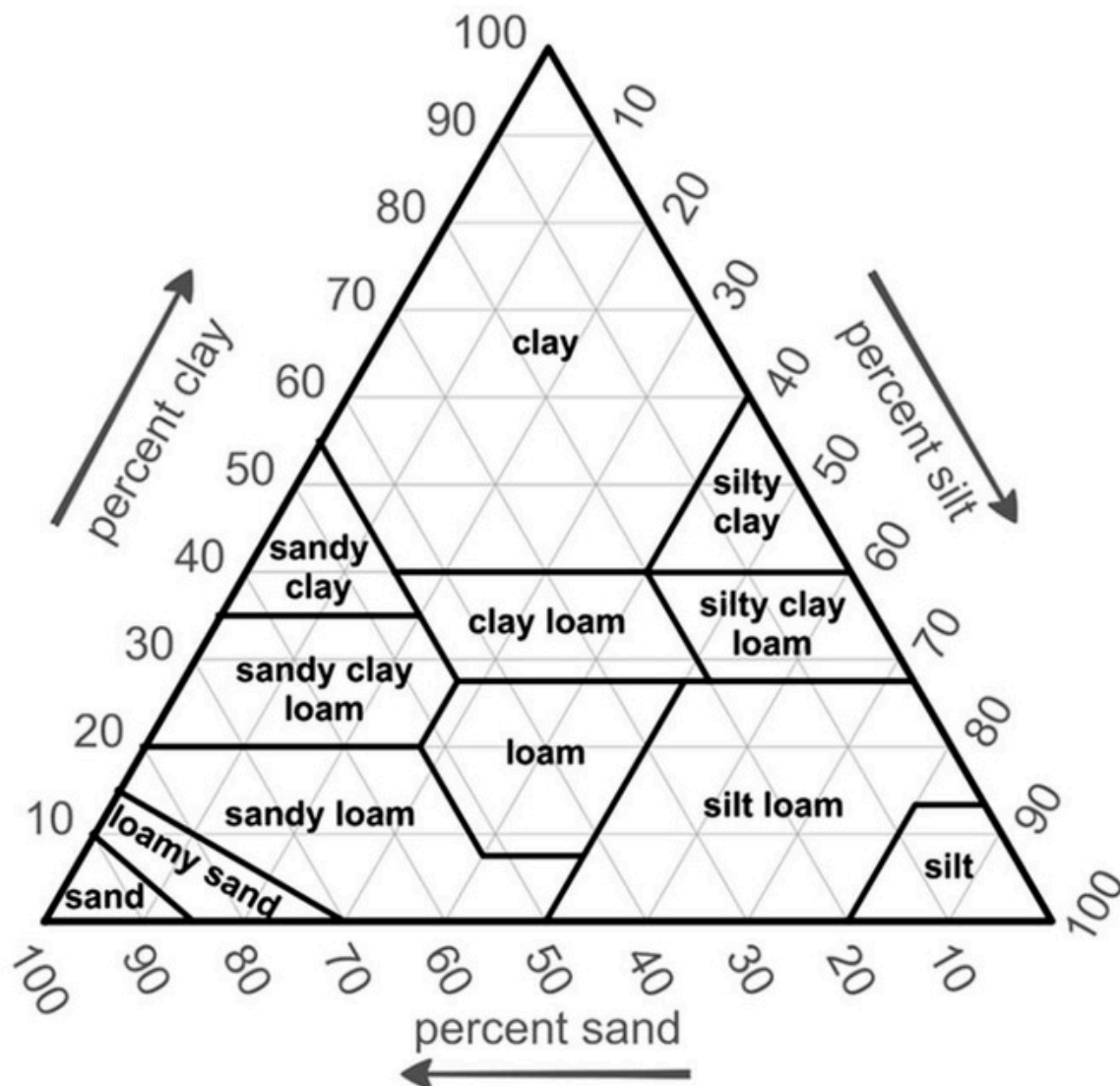
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THE JAR TEST

- The clay percentages are listed on the left side of the triangle.
- The silt percentage is on the right side.
- The sand percentage is on the bottom.

Track the lines with the percentages measured and find the spot on the triangle where all three lines intersect. Where these lines intersect indicate the soil type present.



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CONTAINER CLOUDS

For this activity you will need:

- Glass jar with a lid
- 1 cup of very hot water
- Blue food coloring
- Hairspray
- 3-5 cubes of Ice



Directions:

1. Pour one cup of hot water into a glass jar.
2. Add blue food coloring to the water and stir.
3. Spray hairspray into the jar on top of the water and immediately close the lid of the jar.
4. Place 3-5 cubes of ice on top of the lid of the jar.
5. Now observe what happens! As time passes you will see a cloud start to form in the top of the jar.
6. After observing your cloud, open the lid of the jar and watch your cloud float off into the air.

Resource:

<https://coolscienceexperimentshq.com/make-a-cloud-form-in-a-jar/>



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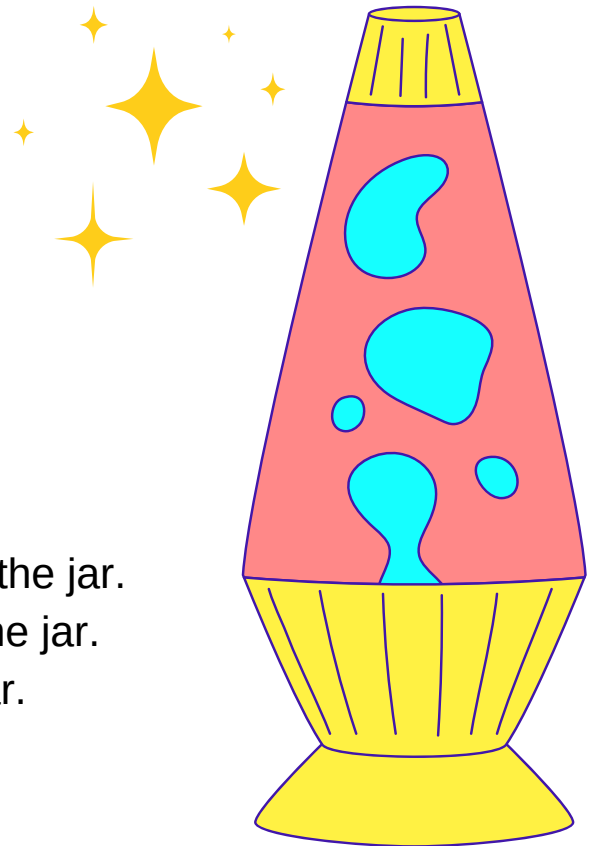
LAVA LAMP

For this challenge/activity you will need:

- 1 Jar or bottle
- 1 cup of water
- 1/2 cup of oil
- Food coloring of your choice
- Alka Seltzer tablet

Directions:

1. Measure out 1 cup of water and add it to the jar.
2. Measure out 1/2 cup of oil and add it to the jar.
3. Add 5 to 6 drops of food coloring to the jar.
4. Add 1 Alka Seltzer tablet.
5. Watch the chemical reaction take place!
6. If you want to see the reaction again, just add another tablet to your jar!
7. Once the oil and water has settled, place the lid on your jar to store for later use!



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FLOWER BINOCULARS

For this challenge/activity you will need:

- Two Toilet Paper Rolls
- White Acrylic Paint
- Paint Brush
- Single Hole Punch
- Twine or String
- Scissors
- Tape
- Glue
- Flowers from Outside



Directions:

1. First coat the outside of your two toilet paper rolls in white acrylic paint.
2. Once dry, punch one hole near the end of both toilet paper rolls.
3. Collect some flowers from outside and use glue to attach them to the outside of your toilet paper rolls! You can use any flowers and decorate it how you'd like!
4. After the glue is dry take one end of your string or twine and thread it through the hole punch on one of the toilet paper rolls. Tie a knot to make sure the string is secure. Repeat this step with the other end of your string or twine with the other toilet paper roll. This is your strap.
5. Lastly, tape your two toilet paper rolls, side by side, with the hole punches on the outside of your binoculars.



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LEAPING POLLEN

For this challenge/activity you will need:

- Scissors
- Construction Paper
- Balloon

Introduction

Bees and flowers have a very special relationship. Pollination is the transfer of pollen from one flower to another causing fertilization and reproduction. Bees and other insects are called pollinators when they carry pollen on their bodies and help pollinate. This activity shows how a charged balloon behaves like the body of a bee making a pollen leap from a flower.

Directions:

1. Make a flower - Use scissors to cut a flower shape out of the construction paper.
2. Make your pollen – Cut or tear pieces of tissue into small confetti like pieces and make a pile in the center of your paper flower.
3. Make the bee – Blow up your balloon and tie the end. You are welcome to decorate the balloon like a bee. Rub your “bee” on your hair or sweater for at least 10 seconds.
4. Hunt for pollen – Hold your “bee” near the flower with the pollen but don’t actually touch them together. What happens?



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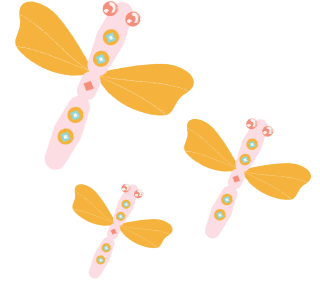
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DIY BUG HOTEL

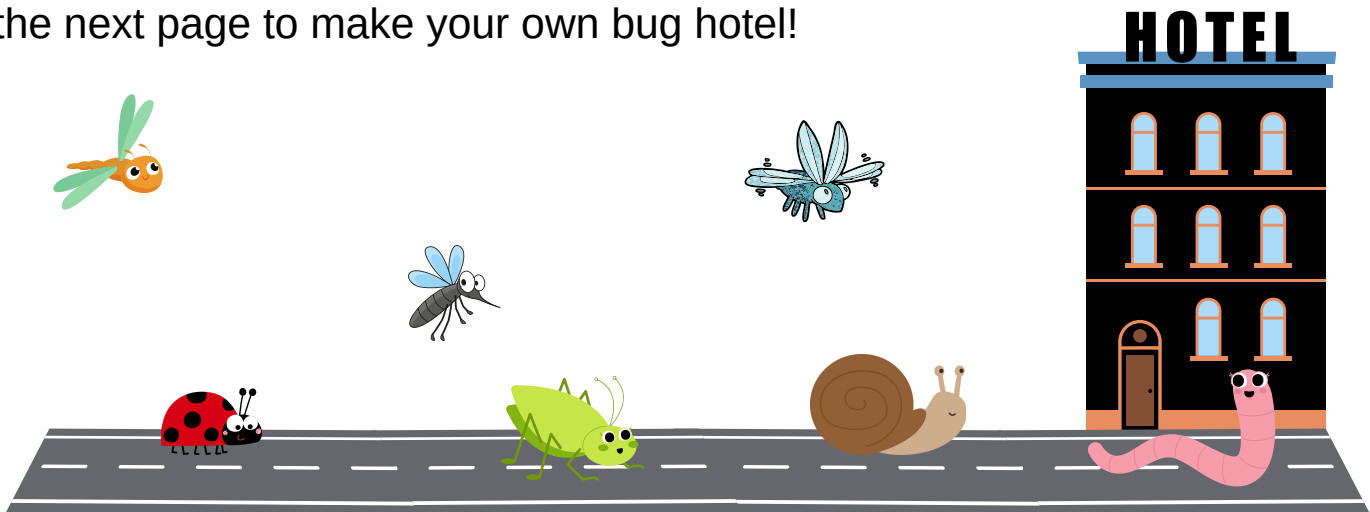
For this challenge/activity you will need:

- Milk carton, milk jug, or any other water proof container
- Natural materials (twigs, leaves, flowers, etc.)
- Recyclables (toilet paper roll, popsicle sticks, etc.)



Introduction:

Saturday, April 22nd is Earth Day, so what better time than now to make a DIY Bug Hotel! Whether you like bugs and creepy crawlies or not, they play a very important role in our ecosystem. Building a house for the bugs around you gives them protection from the elements. Insects are needed for pollination of flowers and vegetables and help protect against bugs that may damage the land. Even if you live in a city, creating a home for bugs is just as important! Allowing shelter for pollinators in urban centers is crucial for the environment. Follow the instructions on the next page to make your own bug hotel!



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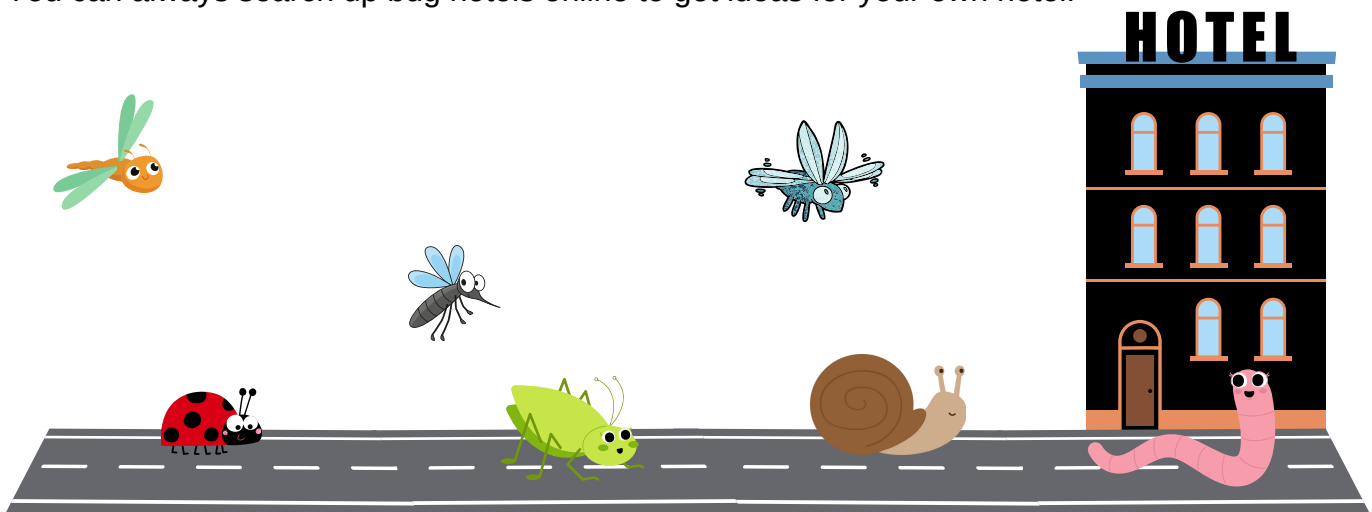
DIY BUG HOTEL



Directions:

1. First, go out into your yard, garden, or a park near you. Using a bag or box, collect as many natural materials as you think you'll need to make your bug hotel. Some examples would be twigs, shells from nuts, leaves, pinecones, flowers, grass, and more!
2. Next, check your recycling for a milk jug, milk carton, or another recycled item big enough for your hotel that is also waterproof.
3. While checking your recycling, see if you can find any other materials to put inside your bug hotel like toilet paper rolls, cardboard, popsicle sticks, etc.
4. Now it's time to build! Be inventive! If you are using an item like a milk carton for your hotel, you may need to cut one side to allow bugs to enter and a place to put your materials.
5. If you feel like it, you can always decorate the outside of your hotel and even give it a name!
6. Once you are done, find a place in your yard, garden or porch to set up your bug hotel. Now your hotel is open for business!

*You can always search up bug hotels online to get ideas for your own hotel!



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MAKE YOUR OWN KITE

For this challenge/activity you will need:

- 1 kite template on colored paper
- 1 wooden skewer or straw
- String
- Ribbon
- Scissors or hole punch
- Tape

Directions:

1. Start by folding along Fold 1. Have Fold 1 on the outside after you have folded it.
2. Place the fold to your left. Pull the top corner of the open edge down and fold along Fold 2.
3. Flip the paper over so the fold is on your right. Pull the top corner of the open edge down and fold along Fold 3.
4. Open Fold 2 up so that it is flat and tape along Fold 3 all the way down.
5. Push the bottom folded layer to the left. Lay a skewer across the kite and tape it in place. You'll probably have to cut the skewer down to size with your scissors. Flip the kite back over and pinch to crease the "spine".
6. Mark a spot about a third of the way down the spine, and about half an inch from the fold. Put tape over this mark to reinforce it on both sides.
7. Use your hole punch or scissors to make a hole in this spot.
8. Tie your kite string through this hole. Make sure to use a good knot!
9. Tape a length of ribbon to the back of the kite, at the bottom.
10. If you use light ribbon like surveyors tape, the tail can be 6-10 feet long. Heavier ribbon should be shorter. You can experiment with the length; if it seems the kite can't hold up your ribbon as it flies, just trim it shorter.



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MAKE YOUR OWN KITE

For this challenge/activity you will need:

- 1 piece of paper
- 1 wooden skewer or straw
- String
- Ribbon
- Scissors or hole punch
- Tape

Directions:

1. Start by folding your paper in half short ways. Put the fold on your left.
2. Mark a point along the top edge of the paper about one inch from the fold.
3. Mark a point along the bottom edge of the paper about one inch from the open side.
4. Draw a line connecting these two dots.
5. Flip the paper so that the fold is on your right and repeat steps 2,3, and 4.
6. Fold the top corner of the paper down along the line that you've just created.
7. Next, flip the paper over and fold the other side down to match the side you just folded.
8. Flip the paper back over so that it looks the way it did in Step 6, with one side folded down and one side out. Tape along the middle seam.
9. Push the bottom folded layer to the right. Lay a skewer across the kite and tape it in place. You'll probably have to cut the skewer down to size with your scissors. Flip the kite back over and pinch to crease the "spine".
10. Mark a spot about a third of the way down the spine, and about half an inch from the fold. Put tape over this mark to reinforce it on both sides.
11. Use your hole punch or scissors to make a hole in this spot.
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Rainbow Bubble Snake



Method

1. Cut off the bottom of the water bottle.
2. Slide the sock over the cut hole on the bottom of the water bottle.
3. Secure the sock tightly to the water bottle with a rubber band or duct tape.
4. Pour dish soap into a wide, shallow dish, filling the bottom. Add a little bit of water and gently mix together.
5. Dip the sock-covered end into the shallow dish. Add a few drops of food coloring onto the end of the sock that was dipped in solution.
6. Gently blow into the opening of the water bottle and watch your rainbow snake appear!

You will need:

Empty water bottle

Duct tape or rubber band

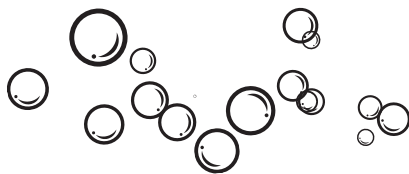
Sock (a thick fuzzy one seems to work best!)

Dish soap

Food coloring

Wide, shallow dish

Water



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Bubble Snake

For this challenge/activity you will need:

- Empty water bottle
- Rubber band
- Sock (fuzzy one works best)
- Dish Soap
- Water
- Wide shallow dish

** Optional- food coloring*

Directions:

1. Carefully cut off the bottom of the water bottle.
2. Slide the sock over the cut end of the bottom of the water bottle.
3. Use the rubber band to hold the sock onto the water bottle.
4. Pour dish soap into the shallow dish and add a small amount of water. Gently mix the soap and water together.
5. Dip the sock covered end into the dish. (A few drops of food coloring can be added to the sock after it has been dipped in the water)
6. Gently blow into the opening of the water bottle and watch your bubble snake appear.



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WATER BALLOON PARACHUTE

For this challenge/activity you will need:

- Plastic bag, disposable tablecloth, plastic wrappers
- Scissors
- Tape
- String or yarn
- water Balloons

Directions:

1. Fill up those water balloons as much as possible. The bigger they are, the greater the challenge!
2. Tie off each balloon and then tie a piece of string to the knot of the balloon.
3. Build a parachute using a sturdy, lightweight material such as a plastic bag or a piece of a disposable tablecloth, or whatever else you can find around your home.
4. Attach your parachute to the water balloon using string and tape.
Tip: Tie the string or yarn of your parachute to the knot at the end of the water balloon.



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WATER BALLOON PARACHUTE

Directions continued:

5. Find a high place where it is safe for you to stand, such as a slide, treehouse or balcony. Make sure no one walks under your experiment area, unless they would like to get splashed.

6. If you don't have a safe place to stand, simply hold your water balloon and parachute together, and throw them in the air as high as you can.

7. Launch your water balloon parachute and observe what happens.

- Did the water balloon break?
- Did the parachute stay attached?
- Did the parachute open?
- Were you successful on your first try?
- How quickly did the water balloon fall?

8. Continue experimenting with different materials, shapes and sizes for your parachute, as well as different-sized water balloons.

*Resource: <https://www.invent.org/blog/stem-activity/water-balloon-parachute>



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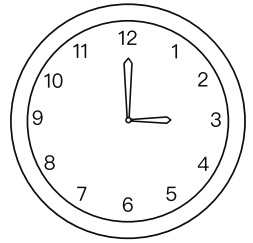


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HULA HOOP CLOCK

For this challenge/activity you will need:

- Hula Hoop
- Chalk
- Sticks, wooden spoons or pool noodles for hands
- Large concrete area



Directions:

1. Lay the hula hoop down flat on a large concrete area.
2. Use chalk to label your clock. Start at the very top with the number 12 and directly opposite at the very bottom the number 6.
3. Next add the number 3 on the right side, halfway between the 12 and 6.
4. Then add the number 9 on the left side, halfway between the 6 and 12.
5. Add the numbers 1 and 2 between 12 and 3, 4 and 5 between 3 and 6, 7 and 8 between 6 and 9, and 10 and 11 between 9 and 12. Try to evenly space each set of numbers.
6. Find two sticks, pool noodles, or wooden spoons to use for the “hands” of your clock. Put them in the center to show the time.

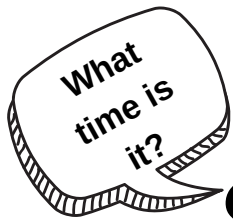


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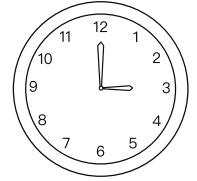
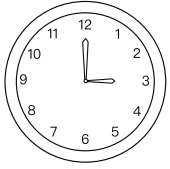
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STEAM in the Classroom

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH



HULA HOOP CLOCK

Let's Tell Time!

Well, Hello! My Name is Mr. Owl, and I need help! Can you help me tell time? I have so much to do today!

DIRECTIONS: Help Mr. Owl find out what time he is supposed to run his errands for the day. Use your hula hoop to help you point to the right time.

1. If Mr. Owl is supposed to meet Mr. Rabbit at 1:00 PM, and it is 12:50 PM right now, how many minutes left does he have before he will see his friend? Answer: _____ minutes left
2. Mr. Rabbit and Mr. Owl had such a great time! Now, use your hula hoop clock to find out what time it would be 30 minutes after 1: 25PM. This is when Mr. Owl is heading to the doctors for a check-up! Answer: _____ PM
3. OH NO! Mr. Owl's check up took too long! It is now 2:32 PM, but he was supposed to go get his feathers trimmed at 2:17PM. How late is he to get his feathers trimmed? HINT: We are solving a problem! When something is being taken away, what mathematical sign do we use? Answer: _____



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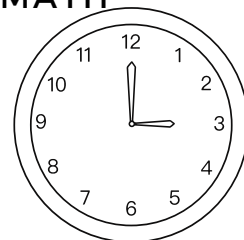
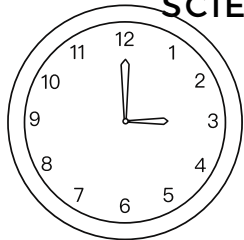
What
time is
it?

It's time
for
FUN!!

STEAM in the Classroom

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

HULA HOOP CLOCK



4. Wow, thank goodness! He got his feathers trimmed, grabbed some groceries, went to see his family, and is heading home. If it is 7:43PM right now, and it is a 15-minute flight to get home, what time will he get to his tree home? Answer: _____ PM

Great Job! You helped Mr. Owl accomplish his day! Mr. Owl has some final questions for us to answer!

Question 1: How did you solve number 1?

Question 2: How did the hula hoop clock help you visualize what you were looking for in each question?

Question 3: Do you think that we use time every day? When are sometimes that we use a clock in our own lives?

Question 4: How did we use a model to add and subtract numbers (or times on the clock)?

Write one word problem to make up an errand that Mr. Owl could have run today! Be Creative! Did he go to the baseball park? Dance class? Write out your problem, and then show your solution.

Thanks to <https://homeworks.auburn.edu/math-activity-plans/math-hula-hoop-clock/> for the activity.



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STEAM in the Classroom

SCIENCE-TECHNOLOGY-ENGINEERING-AGRICULTURE-ART-MATH

SORBET IN A BAG

For this challenge/activity you will need:

- Fruit juice (orange, grape, fruit punch)
- Quart ziplock bag
- Gallon ziplock bag
- Snow (crushed ice)
- Salt
- Gloves (optional)



Directions:

- 1) Pour juice into the smaller ziplock bag. Squeeze out extra air and seal tightly.
- 2) Place the juice filled bag into the gallon ziplock bag.
- 3) Fill the gallon ziplock bag with crushed ice so that it surrounds the juice bag.
- 4) Add salt to ice, sprinkling liberally over it.
- 5) Squeeze extra air out of the gallon ziplock and seal it tightly.
- 6) Gently press and squish the gallon bag so that the salted ice is constantly coming into contact with the inner juice filled bag.
- 7) After 5-10 minutes of squishing, observe how the juice has changed.



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STEAM in the Classroom

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SORBET IN A BAG

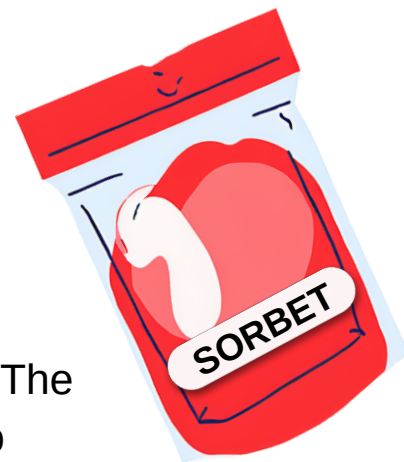
Directions Continued:

- 8) When the juice has hardened into sorbet, pour from the bag into a bowl.
- 9) Add a spoon and enjoy the frozen, fruity concoction.

The Scientific Explanation

Adding an impurity (salt) to ice lowers its freezing point. The ice wants to melt back to water, but to do this it needs to absorb heat from somewhere – in this case, the juice. Heat is transferred from the orange juice to the ice, freezing the orange juice.

This is an endothermic process (heat is absorbed).



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