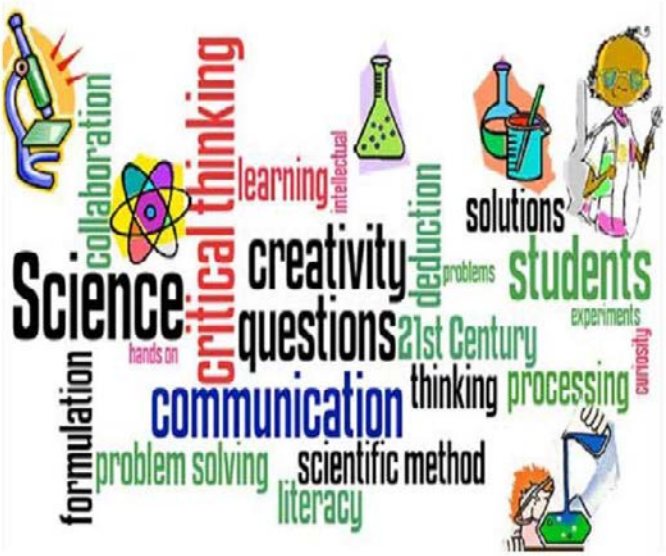
praxis

Hands on Science Experiments

by Grade and Alberta Elementary Science Curriculum Fit



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Grade 1

Topic A. Creating Colour

Jelly Bean Science

Materials

one bag of jellybeans (assorted colours)

two measuring cups

water

two science helper

white plate with a bit of lip on it to hold liquid

stop watch or timer

science notebook

pen or pencil

Procedure

1. Separate the jelly beans into colours. Place them in the appropriate piles.
2. Take two plates. Place one colour of jelly beans around the outside of the plate in a nice circle.
3. Place another colour of jellybeans on the other plate.
4. Have one science helper get ready with the timer.
5. Fill each measuring cup with 205 mL (one cup) of tap water.
6. At the same time, carefully pour the water into the centre of the plate(s).
7. Have your science helper start the stop watch.
8. Record the time when the jelly beans start to let their colour bleed into the water.
9. Which colour will begin to dissolve the fastest?
10. Record the information in your science notebook.
11. Test with other colours.

What is going on?

This experiment is not only a great one for all children, but younger children can really help out with this one. Picking up the jelly beans is great practice for those fine motor skills. Not to mention colour sorting with the different colours. What a great opportunity to get the entire family involved!

Extend the learning for the older children. Have them make a hypothesis. Which colour will start to dissolve the fastest and WHY or BECAUSE - have them think of a reason why they think that is going to happen.

A bit of science behind this experiment now…jellybeans are coated in food colouring and sugar. When you pour the water into the plate, the coating begins to literally **dissolve** and start to spread out or **diffuse** through the water.

Grade 1

Topic A. Creating Colour

Rainbow On The Wall

Materials

water

clear glass

window with sunlight shining through

mirror (that will fit in the glass)

Procedure

1. Fill the glass almost full of water and place on a sturdy surface near a window with the light shining in.
2. Place the mirror in the glass. You want the mirror to be positioned correctly so that the sunlight shines directly on the mirror. CAUTION: do not shine the sunlight in your eyes.
3. Look for the reflection on the wall.
4. Slightly adjust the mirror until you see a rainbow on the wall.
5. What colours make up a rainbow?

What is going on?

Rainbows appear in seven colors because water droplets break white sunlight into the seven colors of the spectrum (red, **orange**, yellow, **green**, **blue**, **indigo**, **violet**). You can only see a rainbow if the Sun is behind you and the rain in front.

The white light that emits from the sun can be broken down into the 7 colors of the rainbow in order:

- Violet
- Indigo
- Blue
- Green
- Yellow
- Orange
- Red

Grade 1

Topic A. Creating Colour

Psychedelic Milk

Materials

dish soap

homogenized milk

skim milk

food colouring (primary colours)

liquid soap

empty pie plate of shallow bowl that you can see the surface well in

flat, sturdy work surface

Procedure

1. Place the container on a sturdy table.
2. Place enough homogenized milk in the dish to cover the bottom and to a depth of approximately 1 centimetre.
3. Allow the milk to settle for a couple of minutes. It needs to be very still. Be careful that you do not bump the table.
4. Near the edge of the milk, place one drop of food colouring.
5. Place a different colour of food colouring on the opposite side of the milk.
6. Add one drop of liquid dish soap in the middle of the milk.
7. Wait and watch what happens.
8. Repeat this experiment with other types of milk – 1%, skim, cream even.
9. What happens?
10. Try using primary colours and allowing them to mix in the milk.
11. Observe what happens.

What is going on?

The food colouring should have stayed in one circle and not spread out much initially. This is because the food colouring is water soluble and does not mix very well with the high fat content in the homogenized milk. The surface molecules in the milk will begin to pull on the

puddles of colour. They will slowly begin to spread in all directions. By adding the liquid soap, you are weakening the pull of the water molecules in the centre, causing the stronger water molecules on the outside of the container to pull the puddles of colour toward them. The soap also breaks down the fat molecules allowing the food colouring and milk to mix.

Grade 1

Topic B. Seasonal Changes

Shadows

Objective: To show students that sunlight is an important part of life and that it changes with the seasons.

Materials

sunny day

chalk or markers

sidewalk or long sheets of paper

tape (if using paper)

watch or clock

Procedure

1. Discuss the importance of the sun in our everyday life.
   a. If we did not have sun, grass and trees would die. As a result animals (such as humans) would not be able to live because we would not have food.
   b. We would not be able to live on Earth because it would be too cold.
   c. Ask how much sun we receive during different times of the year. Winter, spring, summer and fall.
2. Find a good location outside on a sunny day to work.
3. Pair up students and have them find a good space to work – if you are using chalk, each pair will need an adequate space to draw on, if you are using paper, have them find a large space, and make sure you secure the paper down with tape so it does not blow away!
4. Have one person stand so they can see their shadow. The partner should use the chalk or marker and make the outline of the shadow. Write on the piece of paper the time of day.
5. The next day at a different time, have the students return and draw their shadow once again.
6. Compare the two shadows. Are they the same or different? Discuss.

What is going on?

Shadows change length **during** the day because as the earth rotates on its axes, the angle between the sun and any given point on the earth changes. the length of the daylight changes **during the year** because of the earths tilt.

Grade 1

Topic B. Seasonal Changes

Seasons

***Remember to ask an adult before doing this experiment.**

Materials

two science helpers

globe

masking tape

paper

protractor

flashlight

dark room

pencil

metre stick

Procedure

1. Find a room that you can make dark and work in.
2. Using the masking tape, tape a piece of graph paper over the Northern and Southern hemisphere on the globe.
3. Have your partner stand in the dark room and mark their location with a piece of masking tape on the floor. Have your helper stay in this place with the globe.
4. Measure one metre away from your partner and mark this place on the floor. This is your spot.
5. Using the protractor, have you science partner measure and tilt the Northern hemisphere of your globe towards you 23.5 degrees.
6. Have the second science helper stand beside your other partner and get ready with a pencil.
7. Shut off the lights.
8. Return to your mark on the floor.
9. Turn on the flashlight and shine it just above the equator.
10. Did you know that this is just the first step in how the earth and sun are positioned throughout the year which is also known as summer solstice (June 21)?

11. Tell your second science partner to trace the circle of light made by the flashlight on the paper. It will be difficult as the globe is a circle and not very smooth; just try your best.
12. Keep still, do not move the flashlight.
13. Ask your partner to lower the globe (be careful not to change the position, just move it lower). You want the circle of light to now be on the middle of the Northern hemisphere.
14. Repeat by having the second partner trace the circle of light in this area now.
15. I know it is hard, but keep steady.
16. Lower the globe once again. Now you want the flashlight shining on upper part of the northern hemisphere of the globe.
17. Next, ask your partner to raise the tilted globe so that the circle of light is now just below the equator. Make sure that this hemisphere is still tilted away from the flashlight.
18. Trace this circle of light made by the flashlight.
19. Keep the flashlight in the same position. Have your partner carefully lift the globe and place the circle of light on the middle of the southern hemisphere on the globe.
20. Trace this circle.
21. The final part is to raise the globe so that the light is near the bottom of the globe.
22. Trace this circle on the paper.
23. Finally, you are done!
24. Turn on the lights.
25. Discuss how the flashlight may have looked on the globe as you changed the position.
26. Carefully remove the paper and look at the differences in the circles you drew.

What is going on?

By drawing the circles on the paper, you were able to see many changes: how the light spread out (more of an oval) or was quite concentrated (more circular) throughout the globe. This gives us a visual of how the light shines onto the earth in different locations. As you moved the flashlight over the globe, you probably noticed that the circle you drew was quite round and the light bright nearest the equator. That makes sense since it is so hot and tropical in this part of the world. I hope that the circle you drew became bigger and the light was not as bright as it moved it toward both the north and south poles (disappearing completely at the South Pole!). As well, when the light moved farther south, you may also have noticed that it was not as bright as it was in the northern hemisphere. This is because the tilt of the earth creates seasonal differences in light intensity too! Due to the earth tilting towards the sun in the northern hemisphere, you should have noticed that the circles were much smaller and the flashlight was brighter. As you know, this results in the earth being much warmer during the season of summer here.

Grade 1

Topic C. Building Things

Catch a Leprechaun

***Remember to ask an adult before doing this experiment.**

Materials

large popsicle/craft sticks

rubber bands

empty water bottle lid

double sided tape or glue

small net or Kleenex to fit in the lid (to catch the Leprechaun)

Procedure

1. Take six of the popsicle sticks and stack them on top of one another.
2. Secure them in place by wrapping a rubber band around each end. You may have to use two so it is nice and tight.
3. Using two more popsicle sticks, stack them on top of each other. Again, secure them together using a rubber band on ONE end. Make sure it is tight and secure.
4. Slide the large stack of popsicle sticks in between the two sticks. You will make a cross looking design. Secure all of the pieces together using more rubber bands.
5. Using the double sided tape, tape the empty water bottle lid on the opposite end of the two popsicle sticks; the end that is sticking in the air. You are making a basket to hold your net to catch a Leprechaun.
6. Try this out so you are well practiced – you do not want the Leprechaun to get away this year.
7. Place your net in the lid.
8. Using your finger, gently pull the popsicle stick back and release.
9. Observe what happens.
10. Did it go far enough?
11. Is the net heavy enough do you think to stop the Leprechaun in his tracks?
12. Make any modifications you may need and keep practicing!

What is going on?

Making a catapult is a great STEM (science, technology, engineering and math) activity for the classroom or at home on a chilly day! A catapult uses math, science and engineering in a really fun way. Did you know that a catapult is a simple machine design that uses a lever? You add force by pushing the lever

arm down so it moves around the fulcrum that you let go. The fulcrum point is the point that does not move.

They are quite amazing machines as catapults store energy until you hit the trigger! The energy remains stored in the rubber band every time you stretch it out. The pull that you are feeling as you stretch the rubber band out is called potential energy. The catapult stores potential energy by stretching the rubber bands. The more energy you store, the farther your net will go. GOOD LUCK and let me know if you are willing to share your Leprechaun if you are successful!

Grade 1

Topic D. Senses

Wind Chillll

***Remember to ask an adult before doing this experiment.**

Materials

liquid hand sanitizer (not the lotion type)

hands

Procedure

1. Squeeze a small amount of hand sanitizer in the palm of your hand and rub thoroughly on both the back and front of your hands.
2. Using your senses, how do your hands feel?
3. Allow your hands to dry.
4. Place another small amount of hand sanitizer in the middle of your hands and rub thoroughly.
5. This time, wave your hands through the air REALLY fast.
6. Using your senses, how do your hands feel this time?

What is going on?

The first time you put the sanitizer on your hands, they should have felt a bit cooler, but nothing you could not handle. When you repeat the experiment and wave your hands through the air, you are simulating what it would be like if there was wind blowing on your hands. They should have felt MUCH colder this time. This is due to **evaporation**. Evaporation is a cooling process and adding wind allows the process of evaporation to occur much faster AND feel much colder. This is why when you hear the weather in the winter reported as with the "wind chill". The wind causes moisture on your skin to evaporate much faster, making it feel much colder. It is also much more dangerous as your skin cools off at a much faster rate and you could get frost bite. Pay attention to the weather in the morning before you leave for school and dress appropriately!

Grade 1

Topic D. Senses

Noses

***Remember to ask an adult before doing this experiment.**

Materials

raw apple

raw potato peeled

two small bowls

masking tape

marker

grater

helper

blindfold

Procedure

1. Label the bowls using the masking tape and marker. One potato and one apple.
2. Grate a small amount of each into the proper labelled bowl.
3. Have your helper blindfold you. This is so you cannot see what is in each bowl.
4. The helper will now mix up the bowls so you do not know which one is which.
5. Hold your nose so you cannot smell.
6. Take a small amount from each bowl and taste it.
7. Can you tell what it is? Apple or potato?
8. Repeat, this time DO NOT hold your nose.

Explanation

The sense of smell and sense of taste work hand in hand. Your nose and mouth share the same air passage; the pharynx. The pharynx is a cavity at the back of the mouth where the oral and nasal cavities meet. When you smell something the odor also helps you distinguish what the food is. Of course, your taste buds on your tongue also assist in helping you determine what the food is.

When you have a cold, you are all stuffed up and your ability to smell/tell different odors apart is greatly diminished, which also makes your sense of taste diminish.

Grade 1

Topic D. Senses

Creatures Of The Night

***Remember to ask an adult before doing this experiment.**

Materials

outside area to go for a walk in
flashlight
red cellophane and tape (optional)
sugar
measuring cup
water
stove
heat proof pot
wooden spoon
fruit roll up
bug collection boxes
science notebook
pen or pencil
ribbon
jar
paintbrush
tweezers
partner

Procedure

1. During the day, plan out the route you will take in the evening. Along the route, make sure you find a nice big tree and tie a ribbon around it so you can remember which one you want to use. Write all of this information down in your science notebook.
2. Return home and ask permission and help to use the kitchen stove.
3. Measure 125 mL of sugar. Carefully pour this into the pot.
4. Measure 250 mL of water and pour into the saucepan.
5. Unwrap the fruit roll up and place in the sugar water mixture. Stir well.
6. Place the pot on the stove over low to medium heat, stir well until the fruit roll up dissolves and you have nice thick syrup.

7. Remove from the heat and allow the mixture to cool completely.
8. Pour the mixture into the jar.
9. At least one hour before your "hike" take the jar of syrup and paintbrush back to the tree you found during your route planning.
10. Paint several layers of syrup on the tree.
11. As it becomes dark out, take your flashlight, notebook, pen and your walking partner on the route you planned.
12. Be careful and QUIET! Keep all of your SENSES alert.
13. Listen for the call of animals that are nocturnal (come out at night). You may hear crickets chirping, coyotes yipping, howling foxes, frogs croaking, owls hooting, just to name a few. Record these in your notebook.
14. Use your flashlight to catch glimpses of bats swooping to catch bugs or the glow of a cat's eye. Shine the light on insects as well; some have compound eyes that will reflect and refract if you shine the light across them at about 90 degrees.
15. Do not forget to go to the tree you painted with syrup.
    a. Insects will be attracted to the syrup. They will be having a "snack" as you observe them.
    b. How many different kinds of insects and creatures can you find?
    c. Use the tweezers to take some home to study further.

What is going on?

You need to keep all of your senses alert in the dark because not all of them will work as well as they do in the daytime. Your senses include; sight, hearing, taste, touch, smell. For instance, you will not be able to see as well once you go outside. It will take some time for your sense of sight to adjust in the dark night. Take a moment and be careful so you do not fall and get hurt. Turn on your flashlight, just do not look at it directly as this will affect your night vision. Even better, if you have a piece of red cellophane, cover your flashlight with it as this will help preserve your night vision.

Take some time to look and listen. Do not be afraid of the creatures out in the night just because you cannot see them. Many different insects and creatures come out at night that you may never have the chance to see unless you get out and investigate! Have fun!

Grade 1

Topic E. Needs of Animals and Plants

Green Leaves

***Remember to ask an adult before doing this experiment.**

Materials

large green leafy plant

scissors

paper clips

black construction paper

tape

Procedure

1. Cut two pieces of black construction paper out that are large enough to cover one leaf on the plant.
2. Place one piece of paper on the back of the leaf and the other piece on the front – you are making a leaf sandwich! Hold in place with paper clips.
3. If the leaf is not entirely covered or you can see in through the holes in the black construction paper, use some tape to close it up. You want to make sure the leaf does not get ANY sunlight at all.
4. Wait for five days.
5. Uncover the leaf.
6. Observe.
7. What does the leaf look like?

What is going on?

When you uncovered the leaf it should not have been a nice green colour. It likely looked kind of sickly or even yellow and dying. This is because if the plant does not get enough sunlight, they cannot make chlorophyll which is the chemical that give the leaves their beautiful green colour. Without the sunlight hitting the leaf, the green pigment chlorophyll is all used up and cannot be replaced.

Observe the leaf after a week or so in the sunlight again. What happens??

Grade 1

Topic E. Needs of Animals and Plants

Design An Animal Home

Objective: Students will design and build a shelter for an animal of their choosing.

Materials

toy or stuffed animal

assortment of building materials (tree branches, cardboard, rocks, feathers, cotton balls, leaves)

glue

scissors

string

elastic bands

playdough

Procedure

1. Have the students choose an animal to build a shelter for. You may want to do some pre-investigation by taking a mini fieldtrip outside to look at animals in their natural habitat. A trip to the park, backyard, ravine, meadow etc.
2. On the fieldtrip, the students could also collect materials to build their "shelters" with.
3. Lay out all of the materials to build with (a suggested list above) and something to secure these materials with (suggested list above).
4. Use your imagination and build.
5. Once completed, test the design by asking the following questions:
    a. Will the shelter keep the animal safe/warm in the spring, summer, fall and winter? Test this out and modify as necessary.
        i. Is it adequate to store food in the winter during hibernation?
        ii. Does it provide shade from the hot sun in the summer?
    b. How strong is the shelter? Test.
    c. Will the shelter withstand weather?
        i. Blow on it to see if wind will affect it.
        ii. Pour some water over top – will it withstand rain?
    d. Will the shelter protect the animal from predators? Is it camouflaged enough?

Grade 1

Topic E. Needs of Animals and Plants

Do Plants Really Die

Materials

2 whole fresh carrots with the leaves still on the top

knife

cutting board

sturdy work surface

2 zipper type bags large enough for the carrots to fit in

vegetable peeler

pencil

Procedure

1. Find a sturdy work surface to work on.
2. Have an adult assist you with this step – using the cutting board and knife, cut off the leaves of the carrot. Cut about 2 cm down the carrot so the leaves will stay intact.
3. Place the carrot in the zipper bag and seal it up.
4. Using the pencil poke several holes in the bag.
5. Take the carrot you did not cut and place in a zipper bag and seal well.
6. Poke several holes in this bag as well.
7. Place the carrots side by side in the refrigerator. Find a shelf that they will not get disturbed on.
8. After one week, remove the carrots from the refrigerator.
9. Observe the carrots. Do they look the same? How do they smell?
10. Find a volunteer of take a bite of the carrot that no longer has any leaves on it.
11. Repeat with the other carrot.
12. Is there a difference?

What is going on?

I hope that the carrot without the leaves on it tasted and looked much better! This is because a freshly picked vegetable is still living. When the leaves are left on the carrot, nutrients and water from the carrot will continue to feed the leaves of the carrot. Remember if you purchase carrots at the grocery store or farmer's market with the leaves still on them, make sure you remove them if you want them to taste fresh and delicious for a longer period of time.

Grade 1

Topic E. Needs of Animals and Plants

Hitchhikers

***Remember to ask an adult before doing this experiment.**

Materials

pair of shoes

pair of old wool socks that are too big for you

backyard, field or an area to walk around in

tweezers

magnifying glass

sheet of white paper

Procedure

1. Pull the wool socks on over the shoes that you are wearing.
2. Go outside to a field or an area that you can walk around in for a little while.
3. Once you are done walking, take the socks off very carefully.
4. Place the socks on the sheet of white paper.
5. With the tweezers, gently pull off all of the seeds that have "hitchhiked" onto you.
6. Observe the seeds with the magnifying glass.
7. Do you recognize any?

What is going on?

What kinds of seeds can you identify? How did the seeds get there? Why are these seeds called hitchhikers?

Seeds really lead a secret life. Without legs, seeds need ingenious ways to get around. Animals and birds spread seeds unknowingly as they pick up fruit and berries and carry it off to their nest or resting location to eat it. They will discard the seeds as often times they are too hard for them to eat; they just want the fruit that surrounds it. Trust me, I know as I have been hit in the head a time or two as the birds eat the chokecherries off of the trees and sit on my house eating them!

Did you know that seeds often have small barbs or hooks on them? These hooks attach themselves to animals

or anything that comes by them. When you go for a walk outside, they can attach to you (your clothes for instance) and then get carried to a new location. In this expe3riment, they easily attached to the wool socks that you were wearing over your shoes. This is where the idea for the experiment came up and what I mean when I say that some seeds "hitchhike" or catch a free ride with you to a new location.

Some seeds can often travel in other ways as well. "Parachuters" such as dandelions, and "winged" seeds, like those from maple trees, are so light that they are blown easily from place to place. There are also "shooting" seeds which are formed when pods burst open and fire the seeds out. Who knew there were so many different kinds!! Have fun exploring.

Grade 2

Topic A. Exploring Liquids

The Big Thaw

***Remember to ask an adult before doing this experiment.**

Materials

four clear drinking glasses or shallow bowls

measuring cps

measuring spoons

salt

sand

sugar

water

ice cubes

marker

masking tape

timer

science notebook

Procedure

1. Using the masking tape and marker, label each of your four glasses: salt; sugar; sand; control.
2. Place one ice cube in the bowl labelled salt.
3. Sprinkle 15 ml (one teaspoon) of salt over the first ice cube. Start the timer.
4. Once the ice cube has completely melted, record your results in your science notebook.
5. Repeat with the sugar; sand and control. Record your results each time.

What is going on?

In this science project, you were able to investigate different substances in order to see how they affect how fast the ice will melt. I chose several easy to find and inexpensive substances. There is nothing wrong with this at all. You will learn that often things labelled with "fancy" names are common household ingredients or things we may have on hand already. You were able to test substances such as salt and sugar which are soluble in water as well as insoluble substances such as sand.

What were your results? Which substances melted the ice the fastest?

Can you think of any other substances to try?

Grade 2

Topic A. Exploring Liquids

Snow Globes

Materials

recycled jar with a tight fitting lid (a mason size works well)

Styrofoam pieces

small Christmas OR themed toys, animals or plants (that will fit into the jar)

purified/distilled water

glue

measuring spoon

glycerin

ecofriendly glitter

glue/glue gun/epoxy

Procedure

1. Arrange all of your plants or animals how you would like them on the lid of the jar.
2. Using the glue, glue the figures firmly in place.
3. Allow the figures o dry completely before moving on.
4. Fill the jar almost to the top with distilled water.
5. Add a couple pinches of glitter to the jar. This step is up to you as you can add as much or as little as you wish. Personally I love to see a LOT of glitter falling like the snow gently falling outside in the winter.
6. Put the lid on the jar.
7. Flip the jar upside down.
8. What happens?
9. Now, measure and pour into four tablespoons of glycerin into the jar.
10. Put the lid on the jar.
11. Flip the jar upside down.
12. What happens this time?
13. After the addition of the glycerin you should have observed your glitter falling much more slowly in the snow globe. Let me help you understand the science behind this!

What is going on?

I am sure many of you are thinking a snow globe, what does that have to do with science? Well, the science is all about what is in the jar and how it happens. Let me explain. You did not simply add water

to your snow globe and there was a reason for that. When we added the glycerin to the water, it increased the **viscosity**. ***Viscosity is the measure of friction in liquid.*** In simple terms, it describes how fast a liquid moves. By adding glycerin, you increased the viscosity which allowed the glitter to float around more freely in the snow globe and fall just like it is snowing outside!

Grade 2

Topic A. Exploring Liquids

Solid, Liquid or Both?

***Remember to ask an adult before doing this experiment.**

Materials

cornstarch

water

measuring cups

spoon/stir stick

large bowl or container

Procedure

1. Measure 250 mL (one cup) or cornstarch. Carefully pour this into your bowl.
2. Add 125 mL (1/2 cup) of regular tap water.
3. Stir well. All of the cornstarch should be mixed into the water. If it is not, add a bit more water until it is fully incorporated.
4. Observe.
5. Get your hands in there, squeeze it. Let go.
6. What happens?

What is going on?

I absolutely love this mixture! It can provide literally hours of fun. Some mixtures have TWO forms such as this. The first form is known as ISOTROPY. This is when a liquid becomes a solid when moved. On the other hand, THIXOTROPY is the opposite. It is when the mixture becomes more liquid as it moves.

In this experiment, when you squeezed the mixture, it should have turned into a hard ball between your fingers. Wait for it…when you let go, it should have oozed out through your fingers and dropped back into the bowl. Pretty awesome – right!

Can you think of any examples of this in real life? What about quick sand or even wet sand on the beach? When you first start walking, the sand feels quite firm under your feet. Then it becomes kind of liquid like as your feet sink into it as you are moving. Running across the sand will make it feel more sturdy or hard, but if you walk slowly, it will feel like you are sinking and could disappear!

Grade 2

Topic A. Exploring Liquids

Bubble Tricks

***Remember to ask an adult before doing this experiment.**

Materials

liquid dishwashing detergent (I prefer the blue Ultra Ivory Dawn®)

water

large pail

glycerine

large wooden spoon

measuring cups

hands/fingers

straws

bubble wand

science helper

Procedure

1. The first thing you need to do is make my "famous" bubble solution – trust me it is failsafe and works like a dream. I have been using it for years!
2. Measure approximately 1.5 L (6 cups) of water. Pour the water into the pail.
3. Slowly add 500 mL (2 cups) liquid dish soap.
4. Add 125 mL (1/2 cup) of glycerine.
5. Using the wooden spoon, gently mix all of this together. You do not want to shake it up too vigorously as it will start to foam up all over.
6. Try making bubbles just with your hands. Make a circle with your index finger and thumb. Slowly dunk this into the bubble mixture. GENTLY blow a bubble. How big can you blow one?
7. A bubble caterpillar is amazing BUT a bit tricky to do. Dip the one straw and the bubble wand into the bubble mixture. Make sure they are coated very well. Hold the straw just on the underside of the wand and gently blow until you have a bubble. Wet the straw again. Blow a bubble just underneath the first one. Continue until your caterpillar is as long as you want it. The key here is to keep wetting your straw. As long as the straw is wet, the bubble above should not break when you poke it in and you can continue on.

8. This is the hardest one yet (at least I think so). A bubble inside a bubble. Have your science helper wet their hands with bubble solution. Make a VERY large bubble as big as you can get it into the hands of your science helper. Wet the straw with bubble solution once again. GENTLY poke the straw into the first bubble. Slowly blow another bubble inside of the first. WOW! If you can get this to work it is so amazing to see!!

What is going on?

Well, if you did not already know this I absolutely LOVE bubbles! There are so many things that you can do with a simple inexpensive solution of soap and water. Try some other variations and send me a note to share your success – I am always looking for some new "tricks" with bubbles.

How do bubbles work though? The science behind bubbles involves surface tension. Surface tension is basically an invisible bond that holds the hydrogen and oxygen atoms together in the water (H20). Unfortunately, the surface tension of water is too strong just by itself to blow bubbles – go ahead and try it…likely not a great deal happened. Add a little bit of soap to the water and WOW the surface tension is broken. This detergent allows for the surface tension of the water to "relax" or make it "stretchy" allowing bubbles to form.

Grade 2

Topic A. Exploring Liquids

Properties of Ice

***Remember to ask an adult before doing this experiment.**

Materials

ice cube tray

water

access to a freezer

vegetable oil

tall, clear glass

food colouring

medium size bowl

spoon

measuring cups

sturdy work surface

Procedure

1. Find a good sturdy work surface to do this experiment on.
2. Measure two cups (500 mL) of water and pour into the bowl.
3. Add a couple of drops of your favourite food colouring to the water. Stir well. Note: add enough food colouring until the water is VERY dark.
4. Carefully pour the coloured water into the ice cube tray.
5. Place the ice cube tray in the freezer and allow the cubes to freeze solid. Depending on how fast your freezer works, you may have to wait overnight.
6. Fill the tall clear glass approximately ¾ cup (175 mL) of oil.
7. Gently place one of the ice cubes in the glass.
8. Observe what happens.
9. Wait for the ice cube to start to melt.
10. What happens now?

What is going on?

Water is an amazing substance. It has so many properties; liquid, solid, gas. In this experiment we are investigating water in the solid form. As you may already know, when water freezes, it turns to ice. Did you know that as water freezes, and forms ice, it begins to take up more space?

In this experiment many of you likely thought that the oil should float on top as it normally does when you pour it into water. Due to the unique properties of water, when it is in the solid form or ice, it is less dense than the oil. As a result the ice will float on top of the oil. As the ice cube begins to melt, you will see that the water will begin to sink to the bottom of the glass. The oil will not mix with the melting water. This is because water in it's liquid form is much more dense than oil and just sinks down into the glass.

Grade 2

Topic B: Boats and Buoyancy

Diver Science

***Remember to ask an adult before doing this experiment.**

Materials

empty soda bottle

water

pipette

glass

Procedure

1. Fill the soda bottle almost to the top with water. Room temperature will be just fine.
2. Fill the glass full of water.
3. Suck in a few drops of water into your pipette.
4. Test the pipette out. Once you have a few drip of water in it, try and get it to float in the glass of water. The bulb (or top) of the pipette should just be floating above the water line.
5. Adjust the amount of water in your pipette to get it to float. If it sinks, squeeze a few drops out. If it is not floating high enough in the glass, remove it and suck in a few more drops of water. Be patient as you do this, it could take a bit of time to get it just right!
6. Once the pipette is floating in the glass, CAREFULLY remove it, and place it in the soda bottle.
7. Place the lid on the soda bottle and tighten it WELL.
8. Squeeze the bottle.
9. Observe what happens.
10. Let go of the bottle.
11. Observe what happens.

What is going on?

This experiment can be attributed to one of my favorite Greek philosopher's Archimedes! Rumor has it, he discovered the scientific principle of buoyancy while taking a bath…simply put, he noticed that the upward force that water exerts on an object, is equal to the weight of the volume of water the object displaces.

This principle applies to the experiment you just did because as you squeeze the bottle, you are increasing the pressure in the bottle. This high pressure forces more water into the pipette which causes the pipette to displace less water; decreasing buoyancy and causing the pipette(diver) to sink.

When you let go of the bottle, the pressure decreases and the air inside the pipette expands once again. The buoyancy increases and the pipette (diver) rises back to the surface of the water.

When I volunteer to go to schools and talk to students about buoyancy, I relate it to SCUBA diving. If you ever want to learn how to dive, you need a good understanding of buoyancy and how it all works. After all, you need to be able to both sink and float in the water!

Grade 2

Topic B: Boats and Buoyancy

Buoyancy

***Remember to ask an adult before doing this experiment.**

Materials

outdoor kiddie pool filled with water

tin foil

ruler

rocks/marbles/large washers

marker

scissors

science helper

Procedure

1. Measure a 20 cm x 20 cm square of aluminum foil. Cut this out.
2. This is where your imagination comes into play; the challenge is to fold your boat into a shape that will hold the most weight. Feel free to make this into a competition with your science helper to see who can design the best boat. If you want to make it even more competitive, I only give five minutes for this step!
3. Place the boat in the pool of water.
4. Slowly add the weights one at a time to the boat.
5. How many will your boat hold before sinking?
6. Who has the better design?
7. Try changing your design to see what will hold more weight.

What is going on?

In this experiment, you are learning about the scientific concept of BUOYANCY. Simply put, buoyancy is the force that a liquid exerts on a floating object. When you place your boat on top of the water in the pool, it pushes water out of the way, or displaces it. I know that this may be difficult to see (trust me!). If the weight of the boat is less than the weight of the water it displaces, it will float! The displaced water pushes back in to the space where the boat is and that is what creates the upward force keeping the boat afloat on the surface of the water.

I have often wondered how those large ships float in the water. They are so big! Did you know there are three factors that will affect a boat's ability to float: shape, size and the material from which it is

made? As you know, boats come in all kinds of sizes and shapes; canoes, rafts, tug boats, cargo ships, etc. In this activity, you tested different boat shapes. The larger the surface area of the boat bottom, the more water it displaces and the higher it will sit in the water. The purpose of the boat plays a major role in its shape. An oil tanker, for example, carries a very heavy load of oil and travels through shallow waters in harbors, so it must float higher in water. Therefore, it is very long and narrow, giving it a large bottom. The depth of water a boat needs to float is called its draught. A large ship with a load can draw up to 20 meters of water.

Grade 2

Topic D. Hot and Cold Temperatures

Cocoa Science

***Remember to ask an adult before doing this experiment.**

Materials

kettle

water

ice

three spoons

three cups

timer

three packages of cocoa

measuring cup

kitchen thermometer (optional)

science notebook

pencil

tape

marker

Procedure

1. Like any good scientist, you should take a moment and make a hypothesis in you science notebook. Try to base your hypothesis on this question: *Does the temperature of the water affect how fast the cocoa will dissolve in the water?*.
2. Label the three cups with the tape and marker: tap water, boiling water, ice water.
3. Measure and fill one cup with 250 mL (one cup) of tap water.
4. Have your timer ready.
5. Open the package of cocoa and add it to the mug.
6. Start the timer, and carefully stir constantly.
7. Record the time it took for all of the cocoa to dissolve in the mug.
8. Set aside.
9. Repeat with the second cup. This time use ice water.
10. Record your results.

11. Repeat one more time. Have an adult help you boil the kettle and measure 250 mL (one cup). CAREFULLY pour this water into a mug.
12. Start the timer, and carefully stir constantly.
13. Record the time it took for all of the cocoa to dissolve in the mug.
14. Enjoy the cocoa!!

What is going on?

You should have discovered that the hot water took the LEAST amount of time to dissolve the package of cocoa. This is because hot water contains more energy. The molecules in the water are moving MUCH faster, which helps break the cocoa down a lot faster.

Grade 2

Topic D. Hot and Cold Temperatures

Snowman Science

***Remember to ask an adult before doing this experiment.**

Materials

black sharpie (or marker that will not rub off)

orange sharpie (for the snowman nose of course)

small plastic zipper bag (sandwich size)

snow

Alka-Seltzer tablets™

Procedure

1. Draw a fun snowman face on the zipper baggie using the markers.
2. Fill the zipper baggie full of snow (make sure you can still close it tightly). If you have too much, just dump some out.
3. Add three Alka-Seltzer tablets™ to the bag.
4. Zip the baggie up tight!
5. Set the snowman in a warm location BUT one you do not mind if it gets a bit dirty. You may even want to place the snowman in a bowl…
6. Observe.

What is going on?

In this experiment you should have observed that as the snow melted, it turned to a liquid. Water is truly an amazing substance. It can be in gaseous form (steam), solid (ice), or liquid (water). When the snow begins to melt, it turns to a liquid. As this liquid begins to mix with the Alka-Seltzer tablets™, you should have observed the baggie beginning to grow, and grow, and grow until there was no more room for it to grow and it EXPLODED!! Hmm…why did it explode? Well, the Alka-Seltzer tablet™ is made up of citric acid and sodium bicarbonate (baking soda). The citric acid, is an acid, and the sodium bicarbonate is a base. As these two powders mix with water, they react and form a gas called carbon dioxide. This is a chemical reaction that actually fills up the baggie because it has nowhere to go!

Grade 2

Topic D. Hot and Cold Temperatures

Penguins

Materials

large size zipper baggies

one package of shortening (they usually come in 454 gram packages)

ice

thermometer

bucket

stop watch or timer

science helper

Procedure

1. Place the package of shortening in the zipper bag and set aside for now.
2. Fill the bucket full of ice water. Allow it to sit for a few minutes so it can get really cold. You want it to be similar to the water the penguins would swim in while they are in the Antarctic waters.
3. Take the temperature of the ice water periodically so you can see what it is at.
4. Allow the temperature to get down to freezing in the bucket of ice water.
5. Set the timer and have your science helper place their hand in the freezing bucket of water.
6. Record how long they can keep it in there.
7. Now, have the science helper place their hand in the middle of the bag of shortening. Rub it all over so the hand is entirely covered up.
8. Place your hand covered in blubber in the bag into the bucket of ice water.
9. Set the timer to see how long the science helper can keep their hand in the water this time.

What is going on?

In this experiment, when you placed your hand in the water, you likely could not keep it here very long – probably less than 20 seconds. If you were to jump in the ocean in the Antarctic, this is likely what it would feel like. Did you know that surface temperatures average about -10 °C but can plunge to -68 °C further inland! This is why many animals and birds need to adapt to living in this environment. They have what I like to refer to as a layer of insulation under their fur or feathers. This layer of fat or blubber is what is able to keep them warm. In this experiment, you pretended that the shortening was like a layer of blubber when you stuck your hand in it before you placed it into the icy water. You likely could keep your hand in the water much longer when it was insulated by the “blubber”.

I also did a bit of research on some interesting facts about penguins. Did you know?

- There are 18 species of penguins and four of these live in the Antarctic.
- Penguins are native to the Southern Hemisphere but Galapagos penguins live right on the equator and so there are a few penguins living in the northern hemisphere.
- There is a penguin called the Macaroni penguin!
- Penguins are birds not mammals although they cannot fly. Penguins fulfill all of the biological requirements to be classified as birds; they have feathers, they lay eggs and they are warm blooded.
- Penguin feathers are shorter and stiffer than other birds. This allows them to have better insulation and propel through the frigid waters at amazing speeds.
- They have knees.
- Penguins have dense bones unlike other birds. This allows them to swim and dive much better.
- A penguin can dive up to 535 metres. Although they generally stay at about 10 metres.
- They can swim at speeds of up to 35 kilometres (22 miles) per hour.

Grade 3

Topic B. Building With A Variety of Materials

Catapults

***Remember to ask an adult before doing this experiment.**

Materials

large popsicle sticks (the kind that look like tongue depressors at the doctor's office)

rubber band

empty water bottle lid

double sided tape or glue

toy plastic animals or small balls to launch

Procedure

1. Take about eight of the popsicle sticks, line them up/stack them and put a rubber band on each end to hold them securely together.
2. This time, take two popsicle sticks, stack them on top of each other and place a rubber band just on one end. Make sure it is tight and secure.
3. Slide the large stack of popsicle sticks in between the two sticks. You will make a cross looking design. Secure in place with a rubber band.
4. Using the double sided tape, tape the empty water bottle lid on the opposite end of the two popsicle sticks; the end that is sticking in the air. You are making a basket to hold your items.
5. Place an object in the lid.
6. Using your finger, gently pull the popsicle stick back and gently release.
7. Observe what happens.

What is going on?

In this experiment, you made a simple catapult. When you push down on the popsicle stick, it is bending and you are providing it with energy. When the popsicle stick is released, the energy is also released, transferring it to the object in the "basket". The harder you push down, the more force you are using and the object will go further.

Grade 3

Topic C. Testing Materials and Designs

Amazing Cups

***Remember to ask an adult before doing this experiment.**

Materials

plastic drinking straw

ruler

marker

scissors

Procedure

1. Measure 20 centimetres from one end of the straw. Place a mark here.
2. Draw a notch on each side of the straw.
3. Cut these notches out – they will look a bit like a triangle on each side.
4. From the other end of the straw, measure tee centimetres, place a mark, measure three more centimetres from this mark and put a line here; measure three more centimetres and place another mark here.
5. Using the scissors cut a slit at each of these marks. Please be careful you do not cut yourself, it can be a bit tricky.
6. Place your mouth just above the top of the straw where you cut the triangles. Place your fingers over the holes.
7. BLOW!
8. What do you hear?
9. Try adjusting your fingers over different holes at different times.
10. Does this make a difference?

What is going on?

You made a musical instrument called an OBOE in this experiment. Just like a real Oboe, needs in order to work, you made a reed. This is at the top of the straw where you cut out the triangle shapes. Just like a real Oboe, the reed opens and closes at a very high speed as you blow into it. This is a bit tricky and may take a bit of practice to get it so you actually hear some sound. The reed also allows the air to flow into the straw and then stop the flow. It is this vibrating air that makes the sound.

Did you know that each time you blow into your oboe you can hear a different sound? By moving your fingers over or off of the different holes, you are regulating the length of the air column and this in turn decides the PITCH. The shorter the air column, the faster the straw will vibrate and the higher the note.

Grade 3

Topic D. Hearing and Sound

Sound Science

***Remember to ask an adult before doing this experiment.**

Materials

plastic drinking straw

ruler

marker

scissors

Procedure

1. Measure 20 centimetres from one end of the straw. Place a mark here.
2. Draw a notch on each side of the straw.
3. Cut these notches out – they will look a bit like a triangle on each side.
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Grade 3

Topic D. Hearing and Sound

Gobbling Turkeys/Clucking Chickens/Screaming Ghosts

***Remember to ask an adult before doing this experiment.**

Materials

large red plastic drinking cup (or another colour of choice)
thin butcher type string
buttons
sponges
scissors
water
nail

Procedure

1. Take the cup and place it on a sturdy surface upside down. Using the nail, punch it gently through the cup. Do not force it too hard as you will just crack the cup. Make another hole straight across from the first hole.
2. Cut a piece of string about thirty centimetres long – longer is better, we can always trim it up.
3. Flip the cup right side up. Looking at the inside, thread the string through the first hole, up out and over and back down through the second hole. Your string will be on the INSIDE of the cup now. Tie it in a knot and leave the excess string dangling like a pendulum string out the bottom of the cup.
4. You did it correctly if when you hold the cup upside down, the string will be dangling out from the middle of the inside of the cup.
5. Using the scissors, cut a piece of sponge about 5 cm x 5 cm. Note: I like the sponge that is kind of thin and even a bit rubbery feeling for this experiment, not the soft, thick fluffy ones.
6. Have an adult help you poke a hole through the centre of the sponge with the scissors. Pull the string through this hole in the sponge.
7. Now, tie a large button onto the end of this piece of string. You want it to be like a stopper so the sponge will not pull off of the string.
8. Dip the piece of sponge in a bit of water and squeeze it out so it is just moist, not dripping wet.
9. Pull the sponge to the top of the string.
10. Wrap/fold the wet sponge around the top of the string.
11. Gently squeeze the sponge against the string as you move the sponge down the string using jerky movements. You will hear a sound that closely resembles what a turkey may sound like! Enjoy!

What is going on?

Although the sponge is wet, there is still enough friction caused between the sponge and the string allowing the string to vibrate. As you pull the sponge down the string, you will feel it skip and bounce down. This irregular touching on the string produces tiny taps that force the string's molecules to move back and forth. The vibrating string strikes the molecules in the cup, and the cup's molecules strike the air molecules causing them to move back and forth in rhythm with

the cup and string. The sound is made louder because the inside of the cup acts like a megaphone that concentrates the sound waves and sends them out in one direction.

Grade 4

Topic A. Waste and Our World

Plantable Paper

***Remember to ask an adult before doing this experiment.**

Materials

two packages of your favorite flower seeds

newspaper

blender

water

fine mesh strainer

sponge

absorbent towel

baking sheet

wooden spoon

sink

science helper

Procedure

1. Find a good sturdy flat surface to work on.
2. Place the baking sheet on the flat surface.
3. Lay the towel on the baking sheet.
4. Set aside for now.
5. Rip up enough newspaper to fill the blender about half full. Push it down gently; you do not want it too tightly packed in there though.
6. Fill the blender almost to the top with warm water.
7. Pulse the newspaper shreds/warm water mixture for about ten seconds. Go slow. You may have to take the lid off and stir it up a little bit to get it moving.
8. Blend for about thirty seconds or until very smooth and you can no longer see any shredded up newspaper.
9. Sprinkle the seeds into the pulp mixture. DO NOT BLEND. Stir gently to distribute them evenly.
10. Have your science helper hold the mesh strainer over the sink.
11. SLOWLY pour the pulp mixture into the strainer.
12. Gently push the mixture around with your hands or the spoon to try and squeeze as much water out as possible.

13. Carefully turn this mixture out onto the towel.
14. Using a damp sponge gently spread the pulp mixture out as thin as you can.
15. Be creative here; make different shapes if you wish.
16. Set the baking sheet aside to dry.
17. Once the top is dry, flip it over so the other side can dry.
18. These make great Mother's Day cards!!
19. When you are ready, take your paper outside and plant it in a location for your beautiful flowers to grow.
20. Do not forget to water the seeds so they can grow into flowers!

What is going on?

In this experiment you made plantable paper. This is a biodegradable paper made with post consumer materials. What that essentially means is that no trees were harmed when you made this paper. You recycled the newsprint that you likely had just lying around the house. The new paper you made is extra special because you embedded seeds in it. When you are finished with this paper (writing on it, or using it for cards etc), take it outside and plant it in the soil (or in a pot) and the paper will compost away. All that will be left are the beautiful flowers.

Grade 4

Topic A. Waste and Our World

Composting

***Remember to ask an adult to before you do this experiment.**

Materials

empty two litre CLEAR bottle

soil

food scraps (orange peels, lettuce, coffee grounds – NO meat or dairy products)

ruler

scissors

marker

masking tape

Procedure

1. Measure about 5 cm from the top of the bottle and draw a line around the bottle.
2. Cut this section off and save it for later.
3. In the bottom of the plastic bottle place a few handfuls of soil. It can be potting soil or soil you dug up from outside, wither will work just fine. DO NOT push down or compact the soil.
4. Place some food scraps on top of the soil.
5. Cover the scraps with a few more handfuls of soil.
6. Have an adult help you carefully poke about 5 air holes in the cut off piece of the bottle. Be careful you do not poke or hurt yourself.
7. Place the two pieces together now.
8. Securely tape in place using the masking tape.
9. Place the bottle in a sunny location.
10. Carefully shake the bottle once a day and observe.

What is going on?

In this project you are making a mini composter at home. We made it in a clear bottle so that you can see how to recycle plant waster. Over the next couple of weeks, you will shake the

bottle once a day. This is to represent the turning that would occur if we had a backyard compost pile. You need to allow the air and moisture to circulate through all of the scraps.

Composting is often described as nature's way of recycling. It breaks up organic waste such as grass trimmings, leaves, fruit and vegetable peels, coffee grounds etc. into useful humus like substance by organisms such as bacteria and fungi.

I have been told that a healthy compost contains a balance of one-quarter green material such as: vegetable scraps, coffee grounds, grass clippings or manure—to three-quarters brown material such as: leaves, straw, grass clippings, shredded paper, coir fiber, wood pellets, or sawdust. In other words, ¼ green matter to ¾ brown matter. Composting is a great way to reduce waste at home!

Grade 4

Topic C. Building Devices and Vehicles That Move

Slow and Steady

***Remember to ask an adult before doing this experiment.**

Materials

scissors

sheet of white paper

pencil

bottle with a narrow neck on it

good sturdy table

ruler

Procedure

1. Your goal here it to remove the paper out from under the bottle without tipping the bottle. Is it possible? What science is involved here?
2. Using the ruler measure a piece of paper about 10 cm x 30 cm. Cut this strip of paper out.
3. Place the strip of paper on the edge of the table. Have about 5cm hanging out over the edge of the table.
4. Set the bottle upside down on this strip of paper.
5. Take the pencil and CAREFULLY roll it up onto the pencil.
6. Slowly keep rolling the pencil WITHOUT tipping the bottle over.
7. Is this possible?

What is going on?

In this activity you investigated **inertia**. As you pull the paper out (and yes, it is possible), the bottle will stay motionless due to inertia. You are unable to tip the bottle over (as long as you go slowly) because inertia keeps it exactly in the place you started with.

Grade 4

Topic D. Light and Shadows

Refraction/Bending of Light

***Remember to ask an adult before doing this experiment.**

Materials

one tall clear GLASS drinking glass
water
index cards
black Sharpie marker
sturdy work surface
science helper

Procedure

1. Find a good sturdy work surface to do the experiment on.
2. Take a blank index card and draw a large horizontal arrow in the middle of the card with the marker.
3. Have your science helper place the note card behind the glass of and slowly move the index card back and forth.
4. What is going on?
5. Bend/sit down and look through the glass from the front and observe the arrow.
6. Does anything happen to the direction of the arrow?
7. Fill the glass three quarters full of water.
8. Place the index card behind the glass of water and slowly move the index card back and forth.
9. Bend/sit down and observe the arrow through the glass from the front.
10. What appears to happen to it?
11. Try this with different shapes.
12. What happens?

What is going on?

How does the glass of water do that? No, you aren't going crazy and you haven't found yourself with Alice in Wonderland staring at arrows pointing in opposite directions. In fact, you have just demonstrated a physics concept called refraction, the bending of light.

When the arrow is moved to a particular distance behind the glass, it looks like it has reversed itself. Did you know that when light passes from one material to another, it can bend or refract? In the experiment that you just completed, the light had quite a journey; it traveled from the air, through the glass, through the water, through the back of the glass, and then back through the air, before hitting the arrow. Anytime that light passes from one medium, or material, into another, it refracts. Just because light bends when it travels through different materials, doesn't explain why the arrow reverses itself. To explain this, you must think about the glass of water as if it is a magnifying glass. When light goes through a magnifying glass the light bends toward the center. Where the light all comes together is called the focal point, but beyond the focal point the image appears to reverse because the light rays that were bent pass each other and the light that was on the right side is now on the left and the left on the right, which makes the arrow appear to be reversed.

Grade 4

Topic D. Light and Shadows

Solar Cookers

***Remember to ask an adult before doing this experiment.**

Materials

empty cardboard pizza box

scissors

aluminum foil

packing tape (the clear kind)

plastic film wrap

black construction paper

ruler

pencil

Procedure

1. Measure 2 cm from each side of the box and mark it. Using the ruler, draw your outline. You will now have a small box on the cover of the pizza box.
2. You will need an adult to help you. Using the scissors, cut along three sides, leave the top uncut. Fold the flap up so it stands open and you can see inside of the pizza box when it is closed.
3. Cover the inside of this flap with aluminum foil. You should be able just to wrap it around and push it into place. If needed, tape it on the back of the flap.
4. Open the box up. On the back of the hole you cut the flap out of (it now looks like a window) cover well with the plastic film wrap and tape it in place. Do a double layer so it is insulated well.
5. On the inside of the pizza box, cover with the black constriction paper and tape it in place. This is where you will place your food to cook.
6. Get ready to cook – start with something simple – a turkey dinner probably is not a good idea, but something like s'mores would work well! Use your imagination – bake some cookies, a potato, toast…Be careful when you remove the food though – it will be hot!
7. Remember the best time to cook in this oven is when it is sunny outside and between the hours of 11:00 a.m. and 3:00 pm..

What is going on?

The sun has a great deal of energy that we can use – even to cook with. In this experiment, the heat energy from the sun is trapped inside of the pizza box solar oven. As the cover sits in the direct sunlight, rays of sunlight are reflected off of the tin foil on the lid bouncing the rays into the opening of the box. Once it goes through the plastic wrap, it heats the air inside of the box. It is now trapped in there. The black paper you placed on the inside of the box further absorbs the heat keeping it all inside and heating the food up that you are cooking.

Grade 4

Topic E. Plant Growth and Changes

Sprout Science

***Remember to ask an adult before doing this experiment.**

Materials

grass seed or other fast germinating seeds you may have on hand

six sponges

scissors

plastic container with a lid (large enough to fit your garden in

water

sunny location

black marker

sink

spray bottle filled with water

Procedure

1. Take the sponges and put them in a design – use your imagination. These will be what you are going to grow your seeds on. I cut mine into the shape of a house with a wall beside it!
2. If necessary, use the marker to draw shapes that you want to cut out.
3. Once you have your "garden" designed, have an adult help you with the sharp scissors to cut the shapes out.
4. Rinse the sponges out under warm running water. Squeeze most of the water out. You want them to be wet, but not dripping.
5. Arrange the sponges on the lid of your plastic container.
6. Spray the sponges once again with a light misting of water.
7. Sprinkle the seeds over ALL of the surfaces of the sponge.
8. Carefully mist the seeds so they "stick" in place.
9. Place the bottom of the plastic container loosely over the garden. You do not want it to fit tightly, but you need to create a warm moist environment for the seeds to grow in. You are simulating a greenhouse with the container.
10. Place the garden in a warm sunny location.

11. Be patient, in a few days, you should see some sprouts coming up.
12. Make sure you keep your garden damp by regularly spritzing it with water.

What is going on?

Did you know that you can grow plants without soil? This is call hydroponics and it is a fast growing industry. Hydroponics is a method of growing plants without soil and instead uses minerals and nutrients in the water.

This is a great way to start plants if you have a limited area to start your seedlings inside. You provided all of the other essentials to get the seeds germinating or growing: water, sunlight, and a warm environment. The possibilities are endless on what you can grow on your sponges – lettuce, herbs, mustard greens. Use your imagination and happy gardening!

Grade 4

Topic E. Plant Growth and Changes

Let's Get Gardening

***Remember to ask an adult before doing this experiment.**

Materials

bean seeds

water

scissors

tape

cardboard shoe box with a lid

extra cardboard pieces

small clay pot

potting soil

sunny location

Procedure

1. Inside of the shoebox, make a maze with the spare pieces of cardboard. Be creative, using your scissors, carefully cut the pieces into different shapes and sizes and secure them in place using a good brand of tape. You want it to be very secure, but also able to move freely through the maze.
2. On one end of the box, carefully cut a hole so you can see into the inside of the box.
3. In the small clay pot, add some soil and a couple of bean seeds. Cover with soil and water.
4. Place the plant in the far end of the shoebox maze. It has to be in the corner opposite the hole you cut in the shoebox.
5. Place the cover on the shoebox.
6. Find a nice warm sunny location to place the shoebox. Make sure that you place the shoebox just so the hole in the shoebox is getting the most sunlight.
7. Do not forget about your plant – check a couple of times a week and water as needed.
8. Regularly observe what happens as the plant grows.
9. Be patient, this may take a few weeks to finish.

What is going on?

Plants are absolutely amazing. As the seeds sprout and begin to grow inside of the dark shoebox, the plant begins to search for the sunlight. Plants have a powerful urge to seek out the sun. It is quite hard but it will begin to twist and turn around the maze you created in the shoebox. Eventually you will see the plant poking out of the hole you cut in the side of the box! It finally found the sunlight!! They do this because plants make their own food through a process called photosynthesis. To power the process, the plant uses the energy of sunlight. It truly is amazing how smart a plant is…

Grade 4

Topic E. Plant Growth and Changes

Smart Plants

***Remember to ask an adult before doing this experiment.**

Materials

bean seeds

water

scissors

tape

cardboard shoe box with a lid

extra cardboard pieces

small clay pot

potting soil

sunny location

Procedure

1. Inside of the shoebox, make a maze with the spare pieces of cardboard. Be creative, using your scissors, carefully cut the pieces into different shapes and sizes and secure them in place using a good brand of tape. You want it to be very secure, but also able to move freely through the maze.
2. On one end of the box, carefully cut a hole so you can see into the inside of the box.
3. In the small clay pot, add some soil and a couple of bean seeds. Cover with soil and water.
4. Place the plant in the far end of the shoebox maze. It has to be in the corner opposite the hole you cut in the shoebox.
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Grade 5

A. Electricity and Magnetism

Ice Tray Batteries

***Remember to ask an adult before doing this experiment.**

Materials

white vinegar

copper wire

five galvanized nails

ice cube tray (plastic)

wire cutters

ruler

LED light bulb (small bulbs you can purchase at the hardware store)

Procedure

1. Have an adult assist you in cutting the copper wire. Measure 10 centimetres and cut. Repeat so you have five wires total.
2. Take one of the nails, and starting just under the head, wrap the wire tightly around the nail, once you are at the end, and allow a small piece to hang down.
3. Repeat until all of the five nails are covered in copper wire.
4. Carefully pour white vinegar into six of the ice cube wells.
5. Place one nail in the well of the ice cube tray.
6. You are going to create a circuit now. Pull the end of the copper wire from the nail into the next well. Make sure it is in the vinegar. Place a new nail in this ice cube well.
7. Repeat until all of the nails are used up.
8. Place one "leg" of the LED lightbulb into the well with only a copper wire inside it and place the other LED "leg" into the well with only a nail in it.
9. If the bulb lights up, you "nailed" it! If the bulb does not light up try again by flipping the legs around.

What is going on?

In order to make the battery, you had two different metals (copper wire and zinc nails) suspended in the acidic solution (vinegar). The two metals you used are just like the electrodes in a battery. The electrical current enters and leaves through here. The current flows through the wire, into the nail and it is all

passed through the acidic solution in the ice cube tray. You created a complete circuit once you place the LED lightbulb into the tray!

Grade 5

A. Electricity and Magnetism

Find Your Way Home

(Compass Making)

***Remember to ask an adult before doing this experiment.**

Materials

clear shallow bowl

water

magnet

needle

compass (optional)

permanent marker

scissors

parchment paper

Procedure

1. Fill the bowl about three quarters full of water and set aside.
2. Cut a small circle out of the parchment paper. Set aside for now.
3. Take the needle and mark one end of it with the permanent marker.
4. Using the NORTH end of the magnet, run the magnet over the needle in ONE direction 50 times.
5. Flip the needle over and now using the SOUTH end of the magnet repeat.
6. Thread the magnetized needle over through the parchment paper.
7. CAREFULLY float the needle/parchment paper on the surface of the water in the bowl.
8. Observe.
9. What happens?

What is going on?

When you observed the needle in the bowl, it should have pointed north. If you are not sure, use the compass and verify this.

In this experiment, you made a simple compass. By rubbing the needle with the magnet, you left some magnetic material on the needle essentially magnetizing it. Magnets interact with one another, and as a result, this magnet can interact with the Earth's magnetic field.

When you go out hiking, be sure not to forget your compass as if there is one tool that is sure to give you guidance if you get lost and that is a compass!

Grade 5

B. Mechanisms Using Electricity

Fruit Batteries

***Remember to ask an adult before you do any science experiment.**

Materials

galvanized (zinc) nail

sandpaper

apple

18 gauge copper wire (it comes on a small roll)

wire strippers (optional)

scissors

voltmeter

ruler

Procedure

1. Using the sandpaper, gently rub the end of the galvanized nail. Clean the surface well.
2. Measure and cut a 10cm strip of wire.
3. Strip the insulation off of each end (about 1cm). Use the wire strippers, but if you do not have them, carefully snip a little piece being careful not to go all of the way through the wire and then peel back the plastic with your fingernails.
4. Gently sand the ends of the copper wire just to clean them off.
5. Carefully push the nail into the apple. It does not have to be all of the way through about 2cm deep should be fine.
6. Push one end of the copper wire into the apple. It should be very close to the nail, but DO NOT touch the nail.
7. You now have two terminals in the apple battery!
8. Turn the voltmeter on.
9. Take the red lead from the voltmeter and touch it to either the nail or the wire. Use the black lead and touch it to the other terminal.
10. Read what the voltmeter says. Note: if it does not display anything, simply switch the leads, you have them backwards!

What is going on?

The voltage you read on the voltmeter is the amount of electricity the apple battery is producing. The juice of the apple acts as an electrolyte through which ions can flow. Although this type of fruit does not have enough power to light a bulb for instance, it is clearly producing electricity!

Note: You should be able to purchase all materials listed in this experiment relatively inexpensively at a local hardware store.

Grade 5

A. Mechanisms Using Electricity

Conductive Dough

***Remember to ask an adult before you do this experiment.**

Materials

measuring cups

measuring spoons

mixing bowl

missing spoon

flour

cream of tartar (found in the spice section at the grocery store)

food colouring (optional)

led lights

9V battery

wires with alligator clips

vegetable oil

salt

sugar

stove top or hot plate

pot to cook the mixture in

sink (to clean up)

plastic containers or zipper bags (to store dough in)

Procedure

1. Into the pot, mix the following: one cup (250 mL) of flour, one cup (250 mL) of water, ¼ cup (60mL) of salt, three tablespoons (45 mL) of cream of tartar and one tablespoon (15mL) of vegetable oil. You can also add some food colouring at this point. I would advise colouring one of the dough mixtures so you can tell them apart. Stir well and place over medium heat.
2. Allow this mixture to cook until the dough pulls away from the sides of the pot.

3. Remove the dough from the heat and allow it to cool until you can handle it.
4. At this point you may have to knead a bit more flour into it the dough so it can be molded into various balls or shapes. This is your conductive dough.
5. Place the dough in a sealable container until you are ready to use it and then it will not dry out.
6. You need to make the insulating dough.
7. In a clean pot, mix the following: one cup (250 mL) of flour, ½ cup of (125 mL) of sugar), three tablespoons (45 mL) of vegetable oil and ½ cup (125 mL) of water.
8. Repeat steps 2 -5.
9. Build your circuit now!
10. Take one piece of conductive dough and roll it into a nice ball. Repeat so you have two balls of conductive dough.
11. Repeat, making one ball of insulating dough.
12. Place the dough balls together with the insulating dough in the middle.
13. Take the led light and gently separate the prongs on the bottom. Place one prong in one ball of conductive dough and the other prong into the other ball of conductive dough. You are doing this to ensure the electricity will flow into the led light.
14. Take the alligator clips and attach one to each post of the 9v battery.
15. Place a penny on one end of one alligator clip and a paper clip into the other alligator clip.
16. Gently insert the penny into one of the conducting balls and the paper clip into the other conduction dough ball.
17. Watch what happens.

What is going on?

In this experiment you made conductive dough first and insulating dough in the second part of the experiment. When I first tried this, I thought it was pretty amazing myself – but that is likely the inner science geek talking! It is amazing though if you really think about it. What looks like plain old dough can transfer electricity…HOW does this happen??

In the conductive dough the salt and water allow electricity to flow and light up the bulb. Conductors allow the electricity to pass through them.

On the other hand, insulators do not allow electricity to easily pass through them. Resistance is a measurement of how insulating something is. This dough is resistive which means little electricity can flow through it.

Once you have mastered creating these simple circuits try to make parallel and series circuits. You can also try to make buzzers work, or fans move. Check out what they may have at the electronics store as the possibilities are endless!

Grade 5

Topic C. Classroom Chemistry

Steel Wool

***Remember to ask an adult before doing this experiment.**

Materials

steel wool (not the kind with soap in it)

clear glass jar with a lid

thermometer (make sure it will fit in the jar)

vinegar

bowl

stopwatch/timer

science notebook

pencil

Procedure

1. Place the thermometer in the jar and put the lid on.
2. Set your timer for five minutes.
3. Take the temperature and record in your science notebook.
4. Place the steel wool in the bowl.
5. Cover the steel wool with vinegar and allow it to sit for one minute.
6. Open the jar up and remove the thermometer.
7. Remove the steel wool from the vinegar and squeeze out as much liquid as you can. Wrap the steel wool around the bulb of the thermometer.
8. Carefully lift up and place the thermometer with the steel wool wrapped around it back in the jar.
9. Place the lid on the jar tightly.
10. Set the timer for five minutes.
11. Record the temperature.

What is going on?

You should have discovered that the temperature increased in the is experiment due to the chemical reaction you created. When you place the steel wool in the vinegar, it removed the protective coating it that is placed on it. Now that the steel wool no longer has a protective coating, it will start to rust. Rusting begins to happen when the moist iron in the steel wool comes into contact with oxygen in the air. As this chemical reaction is occurring, heat is actually being released and you should have been able to see this with the help of the thermometer.

Grade 5

Topic C. Classroom Chemistry

Holiday Crystals

***Remember to ask an adult before you do this experiment.**

Materials

Alum (find it in the spice section of the grocery store)

water

measuring cups

measuring spoons

heat proof cup (preferably clear)

popsicle stick or pencil

string

red, pink, purple pipe cleaners

kettle

Procedure

1. Have an adult help you fill the kettle in and get it boiling.
2. Fold your pipe cleaner into a special Valentine Shape/Christmas Shape/Spring Shape/holiday shape ect.
3. Tie one end of the sting to the pipe cleaner and the other end of the string to the popsicle stick or pencil.
4. Test the length of your string out. Place the pencil or popsicle stick on the edge of the cup and wind the string up so that the holiday shape just sits in the cup, NOT touching the bottom.
5. Measure 45 mL (three tablespoon) of Alum and put it into the cup.
6. Once the kettle boils, measure 175 mL (3/4 cup) of water and pour it into the cup.
7. Carefully stir well. You may notice that not all of the Alum dissolves. This is OK.
8. Place the pipe cleaner in the solution.
9. Check your crystals every day. If you have a clear cup, you will easily be able to observe what is going on. DO NOT disturb your crystals. Be patient, this can take several days to happen, that is why we are making it early.

What is going on?

In this experiment, you made a SUPERSATURATED SOLUTION by adding a solute (ALUM) to the hot solvent (WATER). You may have noticed that not all of the Alum dissolved. Essentially, there was no more room for the Alum crystals to dissolve in the water molecules. All of the space was gone. Crystals will grow from a supersaturated solution because there is actually too much of the solute or in this case

Alum in the solution. The extra Alum will take the form of crystals. As the solution begins to cool down and evaporate, crystals will begin to form on your awesome holiday shapes.

Grade 5

Topic C. Classroom Chemistry

The Science of Chocolate Chip Cookies

***Remember to ask an adult before doing this experiment.**

Materials

adult science helper

oven

mixing bowls

mixing spoons

measuring spoons

measuring cups

oven mitts

baking pan

all purpose flour

brown sugar

vanilla extract

salt

egg

chocolate chips (your favorite)

butter

milk

baking soda

Procedure

1. Have an adult help you turn the oven on to 190° C (375° F).
2. Measure 175 mL (3/4 cup) of butter and put into a large mixing bowl. Add 300mL (1 ¼ cups) lightly pack brown sugar. Mix until well combined and light and fluffy.
3. Beat in one egg, 30 mL (2 tablespoons) milk, and 10mL (2teaspoons) of vanilla extract. Mix until well combined.
4. In a separate bowl measure 500 mL (2 cups) of all purpose flour. Add 5 mL (one teaspoon) of salt and 3 mL (3/4 teaspoon) of baking soda. Add to the wet ingredients and mix well.

5. Gently stir in 250 mL (one cup) of chocolate chips.
6. Drop by spoonsfuls onto the baking sheet.
7. Place in the oven and bake for 10 minutes (for a chewy cookie) or 13 minutes (for a crispy cookie).
8. Allow to cool on the baking sheet for a couple of minutes before placing on a baking rack to cool.
9. Enjoy!!

What is going on?

So many things can affect a simple little chocolate chip cookie These can include: temperature, butter and sugar. After much experimenting, I have learned that for a crispy cookie, you need to use granulated sugar and butter (no substitutes). You also have to bake the cookie for the full time indicated in the recipe. Store these in an airtight container so they stay nice and crispy. Now if you are like me, and like a chewier almost caramel tasting cookie, you MUST use brown sugar and when you measure it pack it in firmly. When it comes to baking it, I slightly under bake it so it is still soft and chewy! There are others that like a more cake like cookie. This is an entirely different ball game, as you need to change the flour up. Use cake or pastry flour. This type of flour is made with a different type of grain (a whole other science lesson!). This in turn affects the texture and even gluten content which affects the structure and even texture of the cookie. Oh my, I am running out of time this week, and better stop there on the science behind the ultimate chocolate chip cookie!! Stay tuned, I may investigate this further in the future!! Hmm…leaveners….???

Grade 5

Topic C. Classroom Chemistry

Homemade Plastic

***Remember to ask an adult before you do this experiment.**

Materials

stove

measuring cups

measuring spoons

saucepan

homogenized milk

vinegar

stirring/wooden spoon

adult science helper

fine hole strainer

clean empty container to store your science project in

Procedure

1. Have an adult help you with the first part of your science project as you will be using the stove.
2. Measure 125 mL (1/2 cup) of milk and pour it into the saucepan.
3. Over medium heat, stir the mixture until it begins to simmer. Be patient, and keep a close eye now – once the mixture begins to get lumpy, remove from the heat.
4. Carefully stir in 45 mL (three tablespoons) of vinegar.
5. Stir well.
6. If the mixture is not a bit gooey like slime at this point, stir on 15 mL (one tablespoon) of vinegar at a time until you get a nice slimy mixture.
7. Have an adult pour the mixture in a strainer. Be careful it is hot.
8. Pour the left over mixture in the strainer into your container to cool. DO NOT touch it yet, it is REALLY hot. Allow it to cool.
9. Once the mixture is cool, play with it just like slime. Keep it in a sealed container and it will last a bit longer than if you just leave it out unwrapped.
10. Let me know what you think – is this better than slime??

What is going on?

In this experiment you made a plastic like substance due to a chemical reaction. There is a protein in the milk called casein. This reacts with the chemical you added called acetic acid or vinegar. When these

two substances are mixed together, the milk separates into a liquid and a solid. This in turn makes long "rubbery" like molecules that are flexible – until you leave them out, and they become HARD!

Grade 5

Topic C. Classroom Chemistry

Polishing Silver

***Remember to ask an adult before doing this experiment.**

Materials

several pieces of dirty silver

large glass bowl

aluminum foil

kettle

baking soda

water

measuring cups

Procedure

1. Using the aluminum foil, line the INSIDE of the glass bowl.
2. Place the pieces of sliver you would like to clean in the bottom of the bowl on top of the aluminum foil. It is very important that the silver touches the aluminum foil.
3. Have an adult help you fill and boil the kettle with water.
4. Measure 1 L (4 cups) of boiling water and pour it into the bowl.
5. Add 125 mL (1/2 cup) of baking soda SLOWLY to the bowl. Be CAREFUL as it may foam and froth up, you do not want to get burned by the hot water.
6. Allow the silver to sit fully submerged in the water/baking soda mixture for about 15 minutes.
7. Remove and polish with a soft dry towel.

What is going on?

You have probably noticed that each time you pull out those beautiful pieces of silver from the cupboard they are all black or stained. Perhaps you also have some jewelry that has black on it. It is probably silver as well. Well, silver is usually a bright shiny metal but it becomes stained or tarnished when it reacts with the sulfur in the air causing those black spots or silver sulfide you probably see.

In this experiment you caused a chemical reaction to change the silver sulfide back to silver. It all started when the silver started touching the aluminum foil. The sulfur atoms moved from the silver pieces to the aluminum foil. This frees the silver metal and now makes aluminum sulfide. A chemical reaction takes place when they are both in the baking soda solution. The baking soda solution carries the sulfur from the silver to the aluminum. The aluminum sulfide is able to stick to the aluminum foil and away from those beautiful pieces of silver now. Do not forget that the silver and aluminum must be touching one another for the reaction to occur because there is actually a small electrical current

flowing between them, or an electrochemical reaction. Who knew it was such a complicated process just to get beautiful sparkling forks and knives and jewelry?!!

Grade 5

Topic C. Classroom Chemistry

Make Your Own Root Beer

***Remember to ask an adult before doing this experiment.**

Materials

sugar

measuring cups

measuring spoons

root beer extract

yeast

empty 2L soda bottle

funnel

water (preferably distilled)

permanent marker

towel

Procedure

1. Make sure that the 2L bottle is clean. Personally, I like to sterilize my equipment that I will be using in boiling hot water. It is essential to have clean materials as any foreign substances (such as bacteria) will destroy your whole batch of Root Beer.
2. Place the funnel in the bottle.
3. Measure one cup (250 mL) of sugar and pour it into the bottle.
4. Add ¼ teaspoon (1.25 mL) of yeast and add it to the sugar.
5. Fill the bottle 3/4 full of water. Leave a little bit of space at the top.
6. Measure and add one tablespoon (15 mL) of Root Beer extract to the bottle.
7. Using the permanent marker, place a mark on the bottle where the water is filled up to.
8. Place the cap on TIGHTLY (do not make this mistake!). Mix, shake and mix some more.
9. Set the bottle aside for three or four days covered with a towel. You want it to be kept at room temperature.
10. Check the bottle every day. Give it a GENTLE squeeze. If it feels hard, and the water level has gone down about five centimetres or so, it is finished! CAUTION: you do not want it to sit too long it could explode.
11. Refrigerate.
12. Enjoy!!

What is going on?

In this activity, you tried a little bit of home brewing! In order to make any soda, you need a heavily sugared base which you made using water and white sugar. THEN you added the yeast, and let it sit out for a few days - something kind of magic happened. A process called fermentation. As the Root Beer ferments, the yeast eats the sugars and as this is working its magic, a gas called carbon dioxide also begins to be produced. This is what makes your Root Beer fizzy when you drink it. It is also what could cause your bottle to explode if you leave it for too long…too much pressure will build up in the bottle and it will have nowhere to go, causing the bottle to explode, so be CAREFUL.

Grade 5

Topic C. Classroom Chemistry

Exploding Art

***Remember to ask an adult before doing this experiment.**

Materials

outdoor location (preferably a sidewalk)

zipper baggies

tissue

liquid chalk (available at craft and discount stores)

baking soda

measuring cups

measuring spoons

cornstarch

vinegar

scissors

Procedure

1. Take one tissue and separate the layers. Carefully pull the two sides apart and you will get a nice thin piece of tissue. Cut this in half.
2. Measure and place 30 mL (two tablespoons) of baking soda in the middle of the square of tissue you cut out. Fold this into a nice little package, tucking in all of the corners so that the baking soda stays inside. Set aside for now.
3. Measure 125 mL (1/2 cup) of vinegar and pour it into the baggie. Zip it up.
4. Measure 125 mL (1/2) cup of liquid sidewalk chalk) and pour it in with the vinegar. Make sure the bag is closed tightly, and shake it up a bit.
5. Add 30 mL (two tablespoons) of cornstarch to the vinegar/paint mixture. Squish it around until it is mixed up.
6. Make sure you are outside now – add the little package of baking soda to the bag. Zip it up QUICKLY and throw it out onto the sidewalk.
7. Stand back and observe.

8. If you did this on the sidewalk, you have a two in one activity – get out there and use the mixture to draw and write on the sidewalk.

What is going on?

I must confess that exploding baggies never get old! These experiments are a bit messy, but SO MUCH fun in the summer! Luckily for us, there is also some science behind this activity. When you mix the vinegar (acetic acid) and baking soda (sodium bicarbonate) a chemical reaction occurs and a gas called carbon dioxide is produced. This gas grows and grows and grows until the bag explodes sending your chalk mixture all over the sidewalk.

Grade 5

Topic C. Classroom Chemistry

Iron For Breakfast

***Remember to ask an adult before doing this experiment.**

Materials

strong magnet (preferably a neodymium bar magnet or a "cow" magnet)

water

measuring cups

medium clear zipper baggie

cereal (probably a flake type that is high in iron)

Procedure

1. Measure and pour 250 mL (one cup) of cereal into the zipper baggie.
2. Zip the bag closed and GENTLY crush the cereal to make a fine powder.
3. Add 500 mL (two cups) of water to the baggie of cereal.
4. Zip the bag closed.
5. Gently shake the baggie to combine the water with the crushed cereal.
6. Place the baggie on a sturdy flat surface.
7. Gently rub the magnet along the outside of the bag.
8. Observe where the magnet is touching the baggie.
9. What do you see?

What is going on?

Depending on the kind of cereal you are testing, you should have at least a FEW flakes of iron attracted to the magnet through the zipper baggie. It will look like a black powdery substance. Did you know that most breakfast cereals made today are fortified with vitamins and minerals? Cereals in particular have a food grade iron particles added as a mineral supplement. Do not worry; in these tiny amounts it will not harm you at all. Metallic iron is easily digested in the stomach and absorbed by your small intestine. We also get iron from other food sources as well in order to maintain a healthy body.

The chemical symbol for iron is Fe. Metallic iron is digested in the stomach and eventually absorbed in the small intestine. If all of the iron from your body was extracted, you'd have enough iron to make only two small nails.

Grade 5

Topic C. Classroom Chemistry

Easter Egg Geodes

***Remember to ask an adult before doing this experiment.**

Materials

plastic eggs (empty)

measuring cups

measuring spoons

white glue

paintbrush

Epsom salts

water

kettle/pot (to boil water)

food colouring (optional)

empty clear heat proof jar or cup

Procedure

1. Paint the plastic egg shell with white glue.
2. Sprinkle the WET glue with some of the Epsom salts. You want them to stick to the shell.
3. Allow this to dry.
4. Fill the kettle with water and allow it to boil.
5. Have an adult help you measure 250 mL (one cup) of boiling water.
6. Slowly add 15 mL (one tablespoon) of the Epsom salts to the water. Stir well.
7. Continue to add 15 mL (one tablespoon) of Epsom salts stirring well after each addition until the Epsom salts will no longer dissolve it the water.
8. If you wish, you may add some food colouring at this point. Stir it well.
9. Place your "egg shell" into the mixture. Make sure it is completely submerged.
10. Be patient! It may take a day or so for your crystals to form.
11. Remove once you have enough crystals on your egg.
12. Enjoy showing off your beautiful geodes!!

What is going on?

In this experiment you made a supersaturated solution. This means that you cannot dissolve anymore of the Epsom salt crystals into the water. You are able to make a solution like this because you heated up the water which allows the molecules to move farther apart. As they are farther apart those sneaky Epsom crystals are able to move in and dissolve until there is no more room. As the solution cools and

Grade 5

Topic C. Classroom Chemistry

Acids and Bases

***Remember to ask an adult before doing this experiment.**

Materials

small head of RED cabbage

distilled water

heat source (kettle/hotplate/microwave/stove)

knife

cutting board

spoon

heat proof container to put the cabbage in (pot/bowl)

strainer

storage container/small dropper bottles

Procedure

1. You may need to have some help here, as you need to use a sharp knife. Cut up the head of cabbage into large slices.
2. Place the cut up cabbage into a bowl or pot.
3. Either pour the boiling water over the cabbage or fill a container with water and let the mixture come to a boil.
4. If you are boiling it on the stove or hot plate, once the cabbage has boiled, remove from the heat.
5. Let the mixture sit for approximately 30 minutes. Observe. What is happening? You will see the water turning purple.
6. Once the mixture is cool and the water is a nice deep purple colour, strain the cabbage out of the liquid.
7. Discard the cabbage.
8. You can put the indicator into small dropper bottles or in a large container and use a medicine dropper to dispense the liquid.
9. Test for the presence of acids and bases in some common household items. A suggested list is provided below:

What can I test?

- baking soda dissolved in distilled water
- lemon juice

- ammonia/window cleaner
- tap water
- milk
- pop
- fruit juices
- egg whites
- anything else you can think of

10. Take a small amount of the liquid that you would like to test and place it in a glass or on a plate.
11. Add a couple of drops of the cabbage indicator.
12. Observe what colour the solution turns.

What is going on?

Red Cabbage juice is a chemical indicator. It is a substance that turns colour in the presence of acids and bases. When you added the vinegar (acetic acid) to the cabbage juice, it turned red. The darker the red colour indicates that it is a stronger acid. When you added the baking soda solution (sodium bicarbonate) which is a base, it should have turned green. Water, which is neutral (neither an acid nor a base) will not have turned any colour, it should have stayed purple.

In our kitchen at home we can find many acids and bases. Lemons, limes, apple juice, coffee and of course vinegar are all acids. Baking soda and egg whites are basic.

Grade 5

Topic C. Classroom Chemistry

All Wrapped Up

***Remember to ask an adult before doing this experiment.**

Materials

coloured chalk

sheets of plain white paper

rolling pin

plastic zipper bags

vinegar

water

vegetable oil

empty cups

measuring spoons

stirring sticks/spoons

baking trays (or something to lay your paper on to dry)

large empty bowl

disposable plastic tablecloth (or something to protect your work area)

warm dry location to dry the paper

Procedure

1. Cover your work area with the plastic cover as this is going to get messy!
2. Place pieces of coloured chalk in the zipper bags. Keep them separate and choose as many colours as you want. Zip the bags up.
3. Using the rolling pin or something heavy, GENTLY crush the pieces of chalk. Once the chalk is a nice powdery consistency you are done.
4. Pour the chalk powder into a cup. Keep the colours separate in each cup.
5. Measure 15 mL (one tablespoon) of vegetable oil.
6. Add this to ONE cup of chalk powder. Mix well.
7. Repeat for the remaining colours of chalk.
8. Set the chalk mixture aside for now.
9. Fill the bowl with tap water.
10. Set the bowl in the middle of your work area.

11. Measure 30 mL (two tablespoons) of vinegar.
12. Pour the vinegar into the water.
13. Pour the chalk/oil mixture into the water. This is where you can be as artistic as you want. Choose the colours that you like best together. Allow the chalk mixture to swirl on top, or give it a bit of help to make it look HOWEVER YOU want.
14. Take one sheet of white paper and carefully lay it on top of the water for about 10 seconds.
15. Remove the piece of paper and carefully lay it on the baking tray.
16. Repeat with as many sheets of paper as you need to wrap your present with.
17. Allow the paper to dry in a warm location undisturbed for about 24 hours.

What is going on?

You should have been able to create beautiful swirls of colour with this mixture. YES, science has a bit to do with this. In this experiment, you have negative and positive molecules which attract to one another. When you add the chalk (which is really a chemical known as calcium carbonate) and vinegar (a chemical known as acetic acid) and water (H20) they mix up and make a chemical bond. This chemical bond is what causes that beautiful streaky colour on your paper.

Grade 5

Topic C. Classroom Chemistry

Polishing Silver

***Remember to ask an adult before doing this experiment.**

Materials

several pieces of dirty silver

large glass bowl

aluminum foil

kettle

baking soda

water

measuring cups

Procedure

1. Using the aluminum foil, line the INSIDE of the glass bowl.
2. Place the pieces of sliver you would like to clean in the bottom of the bowl on top of the aluminum foil. It is very important that the silver touches the aluminum foil.
3. Have an adult help you fill and boil the kettle with water.
4. Measure 1 L (4 cups) of boiling water and pour it into the bowl.
5. Add 125 mL (1/2 cup) of baking soda SLOWLY to the bowl. Be CAREFUL as it may foam and froth up, you do not want to get burned by the hot water.
6. Allow the silver to sit fully submerged in the water/baking soda mixture for about 15 minutes.
7. Remove and polish with a soft dry towel.

What is going on?

You have probably noticed that each time you pull out those beautiful pieces of silver from the cupboard they are all black or stained. Perhaps you also have some jewelry that has black on it. It is probably silver as well. Well, silver is usually a bright shiny metal but it becomes stained or tarnished when it reacts with the sulfur in the air causing those black spots or silver sulfide you probably see.

In this experiment you caused a chemical reaction to change the silver sulfide back to silver. It all started when the silver started touching the aluminum foil. The sulfur atoms moved from the silver pieces to the aluminum foil. This frees the silver metal and now makes aluminum sulfide. A chemical reaction takes place when they are both in the baking soda solution. The baking soda solution carries the sulfur from the silver to the aluminum. The aluminum sulfide is able to stick to the aluminum foil and away from those beautiful pieces of silver now. Do not forget that the silver and aluminum must be touching one another for the reaction to occur because there is actually a small electrical current

flowing between them, or an electrochemical reaction. Who knew it was such a complicated process just to get beautiful sparkling forks and knives and jewelry?!!

Grade 5

Topic: D. Weather

Wind Chill

***Remember to ask an adult before doing this experiment.**

Materials

liquid hand sanitizer (not the lotion type)

hands

Procedure

7. Squeeze a small amount of hand sanitizer in the palm of your hand and rub thoroughly on both the back and front of your hands.
8. Using your senses, how do your hands feel?
9. Allow your hands to dry.
10. Place another small amount of hand sanitizer in the middle of your hands and rub thoroughly.
11. This time, wave your hands through the air REALLY fast.
12. Using your senses, how do your hands feel this time?

What is going on?

The first time you put the sanitizer on your hands, they should have felt a bit cooler, but nothing you could not handle. When you repeat the experiment and wave your hands through the air, you are simulating what it would be like if there was wind blowing on your hands. They should have felt MUCH colder this time. This is due to evaporation. Evaporation is a cooling process and adding wind allows the process of evaporation to occur much faster AND feel much colder. This is why when you hear the weather in the winter reported as with the “wind chill”. The wind causes moisture on your skin to evaporate much faster, making it feel much colder. It is also much more dangerous as your skin cools off at a much faster rate and you could get frost bite. Pay attention to the weather in the morning before you leave for school and dress appropriately!

Grade 5

Topic: D. Weather

Snowstorm In A Jar

***Remember to ask an adult before doing this experiment.**

Materials

baby oil

medium sized clean glass jar

glitter

white acrylic paint (the kind in a squeeze bottle)

water

measuring cups

measuring spoons

alka seltzer tablets

Procedure

1. Squeeze a good amount of white paint into the jar.
2. Measure 125 mL (1/4 cup) of water and pour it into that jar. Slowly pour the water into the jar.
3. Mix this very well – you want it to be quite saturated with white paint so do not worry if not all of it mixes with the water.
4. Measure 250 mL (one cup) of baby oil and pour it into the jar slowly down the side. You do not want it to mix up too much with the oil.
5. Sprinkle a good amount of glitter into the jar – this is entirely up to you – go crazy!
6. Break the alka seltzer tablet into smaller pieces.
7. Add a small piece one at a time into the mixture.
8. Observe.

What is going on?

In this experiment, you should be able to see the oil floating on top of the water. This is because oil is less dense than water. When you drop the alka seltzer tablet into the jar, it reacts with the water. This reaction that occurs creates pressure forcing bubbles upward but the oil stops the bubbles pushing backwards! You get a “snowstorm” due to this pressure.

Grade 5

Topic: D. Weather

Clouds

***Remember to ask an adult before doing this experiment.**

Materials

bicycle tire foot pump

cork

empty 2L pop bottle

70% rubbing alcohol

safety glasses

metal inflation needle (from the bicycle pump)

science helper

Procedure

1. Put on your safety goggles.
2. Make sure your cork fits in the pop bottle. It should be quite snug. You can purchase different sizes, so be careful that you measure correctly.
3. Have an adult assist you in pushing the metal inflation needle through the cork. It should be through just enough so you can pump air out of the end.
4. Attach the pump to the inflation needle/cork.
5. Pour enough rubbing alcohol in the pop bottle to cover the bottom. Swirl it around all the sides ensuring it is all coated.
6. Put the cork in the bottle.
7. Holding the cork firmly in place, pump the bottle up – it may take ten or fifteen pumps…the bottle will be really firm to the touch.
8. Remove the cork.
9. Observe.

What is going on?

Did you know that there are water molecules in the air around you – even if it is not raining? These invisible drops of water are actually called water vapour. The air you are pumping into the bottle is actually forcing the water vapour present in the bottle to squeeze together really tightly. They are just kind of hanging out there and then all of a sudden – WOW! When you pop the cork out of the bottle, you are releasing all of that pressure rather quickly allowing the air to expand. As this happens the temperature of the air cools down or condenses and you are able to see the cloud.

Clouds are quite complex to understand, but I will try to simplify it here for you. Basically, clouds forms when air which is warm and moist rises, cools and then expands high up in the atmosphere. This water vapor condenses to form tiny water droplets which in turn start the entire process of forming a cloud.

Grade 5

Topic: D. Weather

Rain Gauge

*Remember to ask an adult before doing this experiment.

Materials

empty 2L pop bottle

small pea size gravel

ruler

masking tape

permanent marker

ruler

water

exacto knife or scissors

level spot outdoors to collect rain

Procedure

1. Have an adult help you cut the top 1/3 of the empty 2L bottle off.
2. Place two or three handfuls of gravel in the bottom of the bottle. This will be helpful if it is windy out!
3. Take the top 1/3 of the bottle that you cut off, invert it, and place it in the bottom of the bottle.
4. Allow the cut edges to line up. Tape securely in place with masking tape.
5. Take another piece of masking tape and put it on the side of the bottle all of the way from the top (where you cut it) to the bottom.
6. Using the permanent marker put a line just above where you can see the pebbles.
7. Place your ruler on this line and make short line marks every half of a centimetre. (label accordingly, 1, 1.5, 2, 2.5, 3, etc. all of the way to the top).
8. Pour enough water in the bottle to cover the pebbles.
9. Place the rain gauge outdoors.

10. Wait for a rainy day BUT if it has not rained in a while, make sure the water is still covering the pebbles (or to your starting mark on the bottle) so you will have an accurate measurement.
11. Once the rain has finished record in your science notebook how much it rained.
12. Check to see how accurate your rain gauge is by listening to the weather report or logging onto a reputable website to see the total rainfall that occurred in your area.
13. How accurate was your rain gauge?

What is going on?

The rain will fall from the sky, enter your plastic bottle at the top and collect in the bottom where you can easily measure it. When you invert the pop bottle, you created a funnel to help you catch all of that beautiful rain falling from the sky!

Grade 5

Topic: D. Weather

Barometer

***Remember to ask an adult before doing this experiment.**

Materials

1 empty glass bottle with a plastic lid

straw

nail

hammer

funnel

food colouring

plasticine

cotton balls

water

measuring cup

Procedure

1. Have an adult help you poke a hole in the plastic lid with the nail and hammer. Be careful you do not hurt yourself. Make sure the hole is big enough for you to push the straw through.
2. Push the straw through the hole. Set aside for now.
3. Measure 50 mL of water.
4. Add a couple of drops of food colouring – make it nice and dark.
5. Using the funnel, carefully pour your coloured water into the glass bottle.
6. Put the lid on the bottle.
7. Check to make sure that the straw touches the bottom of the bottle and that you have at least ¼ of the bottle full of coloured water. If not, make the necessary adjustments.
8. Place a strip of plasticine on the outside of the lid. This is to make the bottle as airtight as possible.
9. Have an adult assist you here: slowly suck up all of the air out of the straw. Continue to suck until the mixture of coloured water is about half way up the straw. BE CAREFUL you do not suck too much – go slow!

10. Pull apart the cotton ball and stuff just enough into the straw to seal it off. This is to keep the water from evaporating.

What is going on?

Did you know that a **barometer** is an instrument meteorologists use to measure atmospheric pressure? Pressure can help them predict changes in the short term weather. This can tell us if the weather is going to be good or bad. When the atmospheric pressure rises, meteorologists often refer to this as "high pressure". The coloured water in your straw will descend. This means that we should have good weather that day. If the coloured water in the straw rises, there is low pressure and we may not have very good weather – possibly rain. Test your barometer and see how accurate it is!

Grade 5

Topic: D. Weather

Lightning

***Remember to ask an adult before doing this experiment.**

Materials

tin pie plate

styrofoam plate

thumbtack

new pencil with an eraser

small scrap of wool fabric

dark room

black marker

sturdy work surface/table

science helper

Procedure

1. Turn the pie tin over and mark the centre with the black marker.
2. Push the thumbtack through this spot.
3. Take the pencil and push the eraser onto the thumbtack. You have created a handle for the pie plate. Remember this as you can only pick it up by the handle. This is very important. Set aside for now.
4. Using the piece of wool, rub vigorously on the styrofoam plate. Do it really hard for about one minute.
5. Set the styrofoam plate upside down on the table.
6. Pick the pie tin up by the handle and carefully place it on top of the styrofoam plate.
7. Have your science helper shut the lights out.
8. Slowly touch your finger to the pie tin.
9. Observe what happens.
10. Did you feel anything?

What is going on?

Hmm…what does this experiment have to do with weather? Well, it all has to do with static electricity which you created in this experiment. Simply put, ``lightning occurs when static electricity builds up in

thunderclouds and the landscape beneath them``. Lightning is an electrical current. In a thunderstorm, the clouds are bumping into each other as they move around. All of this bumping around creates an electrical charge. As these charges build up, there are positive charges (protons) on the top of the cloud and negative charges (electrons) on the bottom of the clouds. As we all know, opposites attract and the connection is made as the protons rush to meet the electrons. At this point, we see the lightning bolt flash! The resulting spark you created in your experiment was like a mini lightning bolt.

Did you know: there are about 40-50 lightning strikes each second on Earth or nearly one and a half billion times a year. A single strike of lightning can light a 100 watt lightbulb for three months. Florida is considered the lightning capital of the world. Lightning is five times hotter that the surface of the sun.

Grade 6

Topic A. Air and Aerodynamics

Magic Cans

***Remember to ask an adult before doing this experiment.**

Materials

ruler

two empty soda cans

flat sturdy work surface

masking tape

one package of plastic drinking straws

Procedure

1. Using the ruler, measure one centimetre increments out on the table. Lay a straw at every centimetre mark. If you have a hard time remembering where the marks are, use masking tape to mark this off.
2. Place one straw on each of the marks. Try to make about 20 marks and have 20 straws on the table.
3. Place one can in the middle of the straws.
4. Set the other empty can beside the first one. Have some space between the two.
5. Take a straw, and blow one LONG stream of air BETWEEN the two cans.
6. Observe.
7. What happens?

What is going on?

I absolutely love experiments that seem like magic, but are also teaching fantastic science concepts at the same time. In this experiment, the unexpected happens. When you blow through a straw at something, it generally flies away – right? Well, in this case, that did not happen! The reason for this is that the air blowing through the straw was moving faster than the air on either side of the empty cans. According to Bernoulli's Principle, the faster moving air exerts lower pressure and the two cans are subsequently drawn toward each other.

Grade 6

Topic: A. Air and Aerodynamics

The Air Out There

***Remember to ask an adult before you do this experiment.**

Materials

two empty 500 mL clear water bottles

two balloons

nail

two science volunteers

Procedure

1. You will need to prepare the materials BEFORE your volunteers arrive.
2. Take one of the empty 500 mL water bottles and stretch a balloon over the mouth of it. The balloon should be hanging down into the bottle and the neck of the balloon around the rim of the water bottle.
3. Have an adult help you poke a hole in the bottom of the second empty water bottle.
4. Similar to before, place the balloon inside the bottle and have it ready to blow up.
5. Hand one bottle to each of your science volunteers.
6. On the count of three, have them blow the balloon up.
7. Observe.
8. What happens?

What is going on?

The volunteer that had the balloon in the bottle with the tiny hole in it should have been able to blow it up with no problem at all. I hope the other helper did not pass out trying! In the first bottle, it would have been a lot easier to blow the balloon up because of air and the space it takes up. Let me explain this a bit further. In the bottle with no hole in it, three is air in the bottle and around the balloon. When you try to blow the balloon up it will not happen because of the air in the bottle already. There is nowhere for the air to go – it is taking up space even though you cannot see it. In the bottle with the hole in it, air is allowed to escape out that hole, even if it is a tiny one. As you blow into the balloon, it pushes the air out and there is room for the balloon to expand. This is a bit tricky to understand because you cannot see air. Trust me, it is there, and takes up space. Something else cannot move into the space air occupies, as you just learned!

Grade 6

Topic: A. Air and Aerodynamics

Bernoulli's Principle

***Remember to ask an adult before doing this experiment.**

Materials

cone shaped cup or funnel
ping-pong ball

scissors

Procedure

1. If you are using a paper cup, cut the tip off of the cup. You will now have a funnel.
2. Drop the ping pong ball into the funnel.
3. Hold the funnel directly over your head and blow into the small end.
4. The objective is to blow the ball out of the funnel.
5. Blow hard and steady. Be careful you do not pass out from blowing too hard!
6. Are you able to blow the ball completely out of the cone?

What is going on?

It should have been impossible for you to blow the ping-pong ball out of the funnel. This is because the passage of air around the ball makes it jump and bounce, but the ball will not be able to leave the funnel.

The ball will not leave the funnel because the air you blow into the funnel surrounds the ball; it does not push the ball up and out of the funnel. The ball will jump up and around in the funnel. At times, it may even appear as if the ball is going to jump out of the funnel. No matter how hard you blow, the ball will not be able to leave the funnel.

In this experiment, you were also testing a principle known as Bernoulli's principle. Bernoulli's Principle states that: the faster the flow or air, the lower the pressure. Try researching Bernoulli's Principle to find out how this principle can be applied to such things as how an airplane can fly.

Grade 6

Topic: B. Flight

Helicopters

***Remember to ask an adult before doing this experiment.**

Materials

ruler

pencil

paper

paper clip

scissors

Procedure

1. With the ruler, measure and cut a strip of paper that is 5cm x 20 cm.
2. Draw a straight line down the middle of the paper with a pencil.
3. Fold over the top third of the paper. Make a really good crease.
4. You are now going to make the "helicopter blades". Fold the paper back up so it is straight and flat. Using the scissors, cut down the line to the crease you made in the paper.
5. Using the ruler, draw a straight line ½ cm below the crease you made.
6. Make a mark in the middle of this line.
7. Make two more marks on this line; halfway between each edge.
8. Cut from the edge to the mark on one side.
   Repeat for the other side.
9. Fold one edge of the paper into the middle (to the pencil line). Make a really good crease.
10. Repeat for the other side.
11. Fold the bottom of the paper to the pencil line. Crease very well.
12. It is time to fold the blades. Fold one forward and the other one the opposite way.
13. Your helicopter needs a bit of weight; push a paper clip onto the bottom.
14. Does a test flight to see how well the helicopter works!

What is going on?

Although this is not as magnificent as a real helicopter, your very own flying coper allows you to see how a helicopter works. A helicopter is able to appear to float in the air because of their unique blades. As the helicopter attempts to land, each of the blades hits the air, forcing air outwards to one side. This makes the helicopter blades spin and slow down its fall as it lands.

Your helicopter works in a similar way. When your helicopter falls to the ground, air pushes up against the blades, bending them up just a little. When air pushes upward on the bent blade, some of that thrust becomes a sideways or horizontal push.

Why doesn't the copter simply move sideways through the air? That is because there are two blades, each getting the same push, but in opposite directions. The two opposing thrusts work together allowing your helicopter to spin.

Grade 6

Topic: B. Flight

Kites

***Remember to ask an adult before doing this experiment.**

Materials

2 pieces of wooden dowling (you can get this at the craft shop)

ruler

marker

garbage bag

scissors

glue

string

Procedure

1. Measure the wooden dowling and cut if necessary. One should be 80 cm and the other 100 cm or so. If you want your kite to be smaller, that is just fine – adjust your sticks as necessary!
2. Make a cross with the wooden dowling.
3. Using some of the string, tie the two sticks securely together.
4. Open up the garbage bag and lay it on a nice flat work surface.
5. Between each end of the cross, stretch some string so that you make a diamond shape. Secure this in place.
6. Place the cross on the garbage bag.
7. Using your marker and ruler, draw a diamond about 5 cm away from the outline you made with eth string. You will now have a diamond shape a bit larger than your cross.
8. Cut out the diamond shape.
9. Lay the cross back on the garbage bag.
10. Secure the garbage bag to the cross by folding over the edges and gluing them VERY well.
11. Tie four pieces of string to each corner of the kite, and join them in the middle with a knot.
12. Firmly attached the rest of your string to this knot – this is how you will fly your kite.
13. Your kite is ready to fly – be safe though – NEVER FLY your kite new a power line.

What is going on?

Kites are not just a toy; they have been used in scientific research. Did you know that Benjamin Franklin used a kite to study electricity? NASA has even used kites in their research according to their website! Kites rely on two scientific principles to keep them in the air: gravity and lift. When something is in the air, gravity is what pulls it back down to the ground. When you fly your kite in the air, gravity wants to bring it down. So what keeps it up? Wind! Wind creates lift. Lift is what happens when wind pushes against something and carries it up. When a kite is lifted by the wind, the wind pushes against the whole surface of the kite to lift it up.

Grade 6

Topic: C. Sky Science

Space Dust

*** Remember to ask an adult before doing this experiment.**

Materials

magnet

sheet of blank paper

magnifying glass

small paint brush

jar or container

Procedure

1. Find a place in your house (or if it is my house during the week – anywhere ;)) where there are bits of dust and those fine particles sitting there. A good place to look may be near the furnace registers, door jambs or window screens even.
2. Use your brush and gently "sweep" these particles into your container.
3. Find a good sturdy work surface to work on.
4. Lay out a piece of blank white paper.
5. Slowly shake out the contents you collected from around the house in your container.
6. Take the paper and roll the particles around until they are in a thin layer in the middle.
7. Lift the paper and take the magnet and place it under the paper.
8. Move the magnet around.
9. What happens?
10. Separate out the magnetic pieces from the non magnetic pieces.
11. Use the magnifying glass and observe.
12. What is left over?

What is going on?

The particles that were left over from the dust in your house were magnetic, that is why you could separate them out with the magnet. It I believed that these pieces could be space dust. Use your magnifying glass to more accurately identify the particles. Meteorites often have rounded and putted surfaces. Did you find any pieces?

Is this really possible? Where does this come from you might ask. Well, when we go outside, we track dirt and dust back inside on our shoes and clothes. This is then left behind all over our house. If a meteorite landed where you were walking, you could have easily transferred pieces of it back inside.

It is not entirely impossible as tons of space dust and debris hit the Earth every day!

Grade 6

Topic: C. Sky Science

Sundial

***Remember to ask an adult before doing this experiment.**

Materials

white paper plate

straw

pencil

red marker

blue marker

scissors

tape

sunny day

Procedure

1. Fold the paper plate in half. Make a nice sharp crease in the centre of the plate. Open and fold it in half again. When you open the late up, there should be an"x" pattern on the plate. This is going to be important.
2. Open the plate up and place it on a flat sturdy surface. Observe it. You should see the "x" pattern.
3. Follow the line from the centre to the end of one of the arms of the x" on the edge of the plate. Place a small circle here with the red marker.
4. Find the second arm of the "x" at the edge of the plate. Using the blue coloured marker place a circle here on the edge of the plate.
5. Repeat with the marker for the other two arms on the "x". You should now have one circle that is red and three that are blue.
6. These four marks will represent the time of day: 12:00, 3:00, 6:00 and 9:00.
7. Set the plate aside for now.
8. Cut the straw in half.
9. Make two slits in the end of the straw.
10. Fold open the straw so you have another "x" shape".
11. Tape this "x" onto the middle of the plate.
12. Go out to a sunny location and place the sundial down.
13. Try to tell the time without looking at a clock!
14. Make a mark with the pencil where the shadow is cast on the paper plate.

15. Check on your watch to see what time it is. This will help orient yourself when try to tell time again. Try to pick the same place and point the sundial in the same direction.

What is going on?

Sundials have been used to give an indication of time as long as anyone can remember. Research shows that Greeks, Egyptians, and other great civilizations used the position of the sun in the sky and the shadows it would cast as a measure of time.

A sundial is still a practical instrument for telling time in an exact location. The pointer or gnomon in the centre of the sundial casts a shadow on the surface of your plate then the sunlight hit it. As the sun moves through the sky throughout the day; you can even begin to divide the path into equal segments to make your time predications even more accurate.

Grade 6

Topic: C. Sky Science

Eclipse

***Remember to ask an adult before doing this experiment.**

Materials

tennis ball

ping pong ball (or a small plastic type ball)

flashlight

table

table cloth

measuring tape

dark room

science helper

masking tape

Procedure

1. Cover the table with a tablecloth.
2. Mark a spot near the edge of the table and place an "x" with masking tape. Place the flashlight here. This is going to be the sun.
3. From the "x" measure 30 cm. Place the ping pong ball here. The ping pong ball represents the moon.
4. Measure another 30 cm and mark it with a strip of tape. Put the tennis ball here. The tennis ball is the earth.
5. Have your helper go to the flashlight and turn it on.
6. Make the room dark.
7. Shine the flashlight onto the tennis ball.
8. Go to the ping pong ball and move the ping pong ball around the tennis ball.
9. Observe what happens as you move the ping pong ball between the flashlight and the tennis ball.
10. What happens when the ping pong ball moves behind the tennis ball?

What is going on?

In this experiment, you were replicating a lunar eclipse. You had all three necessary elements; the moon, sun and earth. In order for a lunar eclipse to happen, the Earth needs to be between the full moon and the sun. This is exactly what you did in steps # 8; you were moving the moon around the earth while the sun is shining on it.

Grade 6

Topic: D. Evidence and Investigation

Colourful Leaves

(Chromatography)

Materials

three or four leaves (as green as possible)
small jar
plastic wrap
rubbing alcohol
scissors
coffee filters
bowl or shallow pan
masking tape
marker
rubbing alcohol
safety goggles
hot tap water
wooden spoon
pencil

Procedure

Note: Remember science safety. It is important to remember that when you do science experiments you NEVER eat, drink or smell anything you are working with. This is for your own safety. Always wash your hands when you are finished.

1. Put your safety goggles on.
2. Find two or three green leaves and carefully pick them off of the tree.
3. Take the leaves and using the scissors cut them up into small pieces. Place the chopped up leaf in the jar.
4. Using the masking tape put a label on your jar "poison" do not drink rubbing alcohol. You want to make sure this is labelled clearly.
5. Pour enough rubbing alcohol into the jar so the leaves are completely submerged.
6. Cover the jar with plastic wrap.
7. Set aside for now.
8. Fill the bowl about half full of water.

9. Place your jar in the water for about thirty minutes. You only need the water to go about half way up the jar you do not want to sink your jar into the water or allow any water in with the rubbing alcohol.
10. Observe every five minutes, giving the jar a little swirl or stir with the spoon. If the water cools off too much replace this as it needs to stay hot. What do you see happening?
11. While you are waiting, cut the coffee filter into long strips.
12. Place the pencil on a flat surface. On the long side of the pencil, place the end of one of the filter paper strips. Roll this filter paper around the pencil.
13. After the leaves have sat for thirty minutes in the rubbing alcohol, remove. Take the plastic wrap off as well.
14. Place the pencil on the top of the jar.
15. Unwind the filter paper so that the tip is just sitting in the rubbing alcohol mixture.
16. Observe closely.
17. What is going on?

What is going on?

In this experiment you extracted the pigments from the green leaves. As the alcohol travelled up the filter paper, you should have seen different colours also stretching out. I hope that you were able to see some green, orange, yellow and even possibly some reds. It all depends on what type of leaf you collected. Try leaves from different trees to see the difference in the colour separation.

Did you know that the green pigments are from chlorophyll, the oranges from carotene, the yellows from xanthophylls and the reds from anthocyanin pigments? You begin to see these colours because as winter approaches, plants begin to photosynthesize much less. The plant realizes that it is wasting its valuable energy making chlorophyll as the cold winter temperatures approach. As photosynthesis slows down, the other pigments in the leaves begin to appear and they turn the beautiful colours we enjoy so much in the fall!

Grade 6

Topic: D. Evidence and Investigation

Fingerprints

***Remember to ask an adult for help before you begin.**

Materials

clear drinking glass
talcum powder
hand lotion
flat dish
paint or make up brush that is quite fluffy
clear packing tape (the really think type)
black construction paper
scissors

Procedure

1. Place a small amount of talcum powder in the flat dish.
2. Set aside.
3. Take a small amount of hand lotion and rub it into your hands well.
4. Take the glass and press your fingertips against the side of the glass.
5. Take the brush and lightly touch the talcum powder. You do not want very much, just a light dusting. If you have too much, gently tap the brush and allow some of it to fall off.
6. Gently brush over your fingerprints on the glass.
7. Gently blow the excess powder off.
8. Cut a small piece of tape.
9. Using the sticky side of the tape, "pick up" the finger print from the glass.
10. Gently press the tape onto the fingerprint and talcum powder.
11. Pull the tape off and press onto the black construction paper.
12. You should be able to see the fingerprint very easily.
13. Repeat the experiment on a different glass or the doorbell, something that someone else has touched.
14. Can you see the difference between the fingerprints?

What is going on?

The powder sticks to an oil that your fingertips leave behind on the glass. Every time you touch something, your fingerprints are left behind. Detectives can identify if you touched something because your fingerprints are unique. No one has a fingerprint that looks exactly like yours. This allows us to track down who the prankster was!!!