

LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies.

Science News

Dear Parents,

Our class is beginning a new science unit using the **FOSS Ideas and Inventions Module**. We will be learning techniques for observing things that would otherwise be difficult to see. It looks like we have an interesting and exciting couple of months ahead.



In this module, children will explore the techniques of rubbing, carbon printing, chromatography, and mirror imagery. After learning each technique, the children will be challenged to use insight and creativity to come up with an invention of their own. Be sure to ask your child what inventions he or she has created. Children sometimes have difficulty coming up with invention ideas. Talk with your child about inventions that have helped make your life easier. Many invention ideas involve ways to do something more safely or more efficiently.

We will also be learning about great inventors throughout history. Some are well known, and some are lesser-known “kid inventors” who have made valuable contributions to society. Ask your child to share the inventor stories they have been reading, as some are quite surprising. Many inventions that you use every day were initially labeled mistakes or failures. Perseverance and insight are two dimensions of invention.

From time to time I will be sending home/school connection activities home with your child. These describe ways for family and friends to make some rubbings and carbon prints, including fingerprints, to join in the invention activities. You may find it interesting to look at familiar objects and materials in new ways.

Our classroom will be even livelier than usual in the next several weeks. If you have any questions or comments, call or come in and visit our class.

Comments _____

PROJECT IDEAS

- Research an inventor and prepare a short oral report for the class.
- Find out more about the vacuum cleaner. Who invented it and why?
- Research who invented frozen food.
- Find out why jeans were invented and by whom.
- How do police detectives collect fingerprints from a crime scene?
- How did Native Americans use food dyes? See if you can dye something using food.
- You have to leave your home in a hurry and can take only one item. What would you take and why?
- How do magicians use mirrors to create illusions?
- Use rubbings to look for hidden messages on a food product.
- What do you consider the most useful invention in your life and why?
- Research how mirrors are viewed in certain cultures. In Judaism when a person dies, all the mirrors in the house are covered. Find out about this tradition and others.
- Who invented the steam engine and why was it such an important invention?
- Pick a common object such as a cup and modify it to make it into something different.
- Look at *FOSS Science Stories* or books in the library for ideas about projects you might like to present to the class.
- Think about a mistake you have made. Can you turn it into a useful invention?
- Invent a toy for a young child that uses mirrors.
- Find out how many failures at flying happened before the airplane was finally invented.
- Discover a new way to use rubbings to solve a mystery.
- You have been stranded on an island where there is no running water or electricity. What is the first thing you would invent in order to survive? Why?

Name _____

Date _____

PROJECT PROPOSAL

.....

1. What is the question or the project that you are proposing?

2. What materials or references will you need to complete the project?

3. What steps will you follow to complete the project?

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking, you will see the *green card* held up for 2 1/2 minutes. When you see the *yellow card*, you have 30 seconds left. When you see the *red card*, it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

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Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 1: RUBBINGS

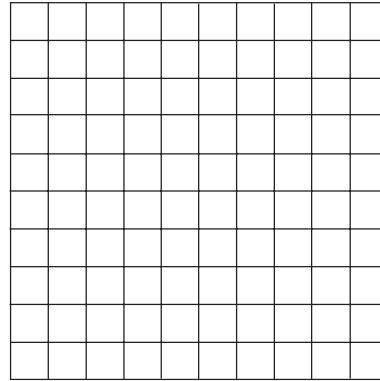
Using the grid below and the rubbing technique, figure out the area of four common American coins. Figure out a way to count squares so that your answer is the closest whole number.

The area of a penny is _____ squares.

The area of a nickel is _____ squares.

The area of a dime is _____ squares.

The area of a quarter is _____ squares.



What is the **largest** number of coins you can use to equal a total area of 73 squares?

What is the **smallest** number of coins you can use to equal a total area of 73 squares?

Most coins		Fewest coins	
Pennies _____	Area _____	Pennies _____	Area _____
Nickels _____	Area _____	Nickels _____	Area _____
Dimes _____	Area _____	Dimes _____	Area _____
Quarters _____	Area _____	Quarters _____	Area _____
Total coins _____	Total area _____	Total coins _____	Total area _____

What combination of coins would you select to equal a total area of 103 squares?

Use each coin at least once.

Pennies _____	Area _____
Nickels _____	Area _____
Dimes _____	Area _____
Quarters _____	Area _____
Total coins _____	Total area _____

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: CARBON PRINTING

Teresa's third-grade class all made carbon fingerprints. They figured out what pattern each of their fingers had and made a chart.

	T	I	M	R	P	Here is what the letters stand for.
Jessica	L	L	L	A	L	Fingers
Kyle	A	W	L	L	L	T = thumb
Spencer	L	L	L	L	W	I = index finger
Jasmine	W	W	L	L	L	M = middle finger
Eric	A	L	W	W	L	R = ring finger
Claire	L	L	W	A	L	P = pinky
Mason	A	A	L	L	L	
Dwight	L	A	W	L	A	
Alanna	L	L	A	L	L	
Sai	L	A	L	W	L	
Jason	A	L	L	L	L	Patterns
Mack	L	L	A	A	A	L = loop
Felice	A	L	W	L	L	A = arch
Serena	W	W	L	L	L	W = whorl
Harry	L	L	L	L	L	

Make a graph that represents the data for the class index-finger patterns. Use a separate piece of paper to make your graph patterns.

Which fingerprint pattern is the most common on the index fingers of the students in Teresa's class? _____

Make graphs of the data for the other four fingers.

NOTE: If each member of your group makes one graph, you will have all of the fingerprints graphed.

Which fingerprint is most common in Teresa's class? _____

Which fingerprint is least common in Teresa's class? _____

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 3: COLOR WRITING

Natalie has ten watercolor markers in a box. They all look exactly alike, but four pens have red ink, and six pens have black ink.

How many markers would Natalie have to take out of the box to be sure she had

1. At least two pens of the same color? _____
2. At least two pens that are red? _____
3. At least two pens that are black? _____

Explain how you figured out each answer.

1. _____

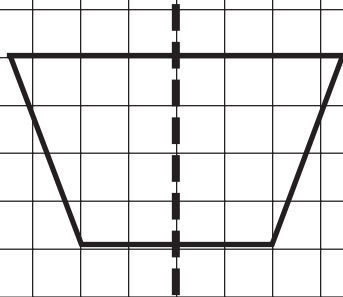
2. _____

3. _____

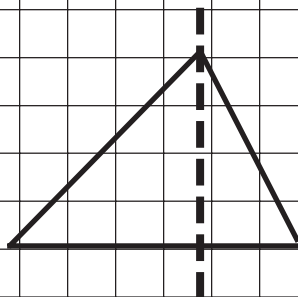
MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 4: REFLECTING

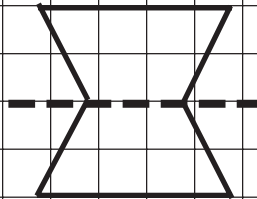
Is the dashed line a line of symmetry in these four figures?



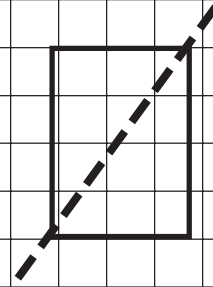
1.



2.

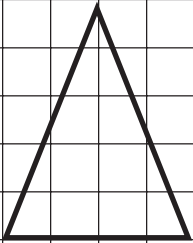


3.

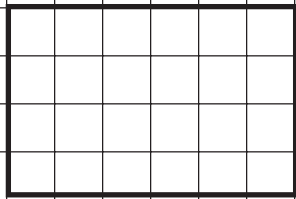


4.

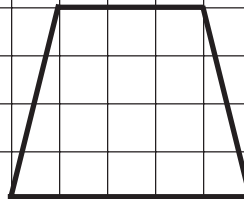
How many lines of symmetry does each figure have?



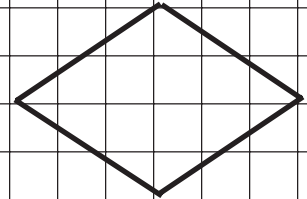
5.



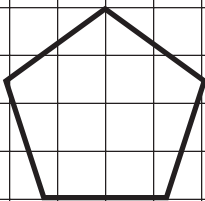
6.



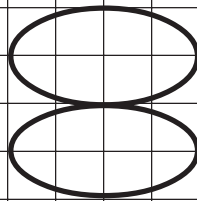
7.



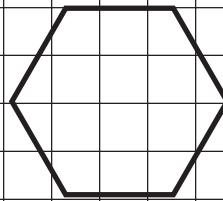
8.



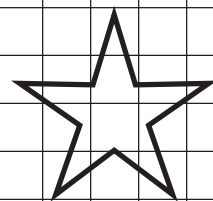
9.



10.

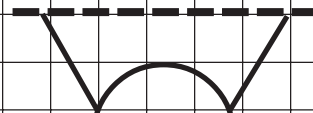
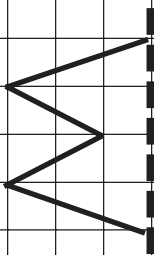


11.



12.

Complete each figure so that the dashed line is a line of symmetry.



Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 1: RUBBINGS

Rubbing is a technique used to record the pattern of textured surfaces. Find several interesting textures around your home or neighborhood and make rubbings of them in the spaces provided below. Don't record the source of the rubbing with the rubbing itself—record the sources on a separate sheet. Back at school show the sheet to other students to see if they can guess where the rubbing came from.

1.	2.
3.	4.
5.	6.

EXTRA ACTION: If you find something BIG and interesting, like a plaque on a building, get a big piece of paper and a crayon and make a big rubbing.

Name _____

Date _____

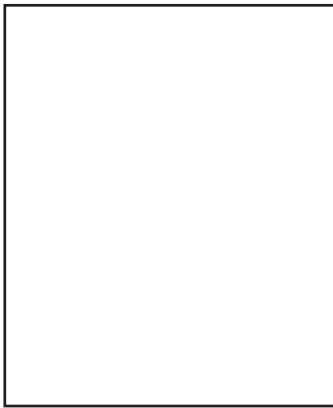
HOME/SCHOOL CONNECTION

INVESTIGATION 2: CARBON PRINTING

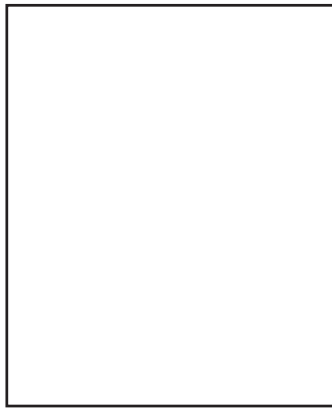
The carbon-printing technique is a great method for capturing the pattern of finely textured objects, like skin textures. In class we investigated fingerprints to see how they can be organized into similar groups. Do family members have similar fingerprints? Will they all be in the same group?

You will need a pencil and some clear tape. Make a set of prints from one hand of each of your family members and see if you can answer these questions.

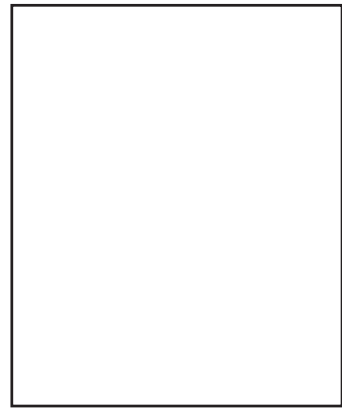
1. What was similar about your family's fingerprints? Did all of your family members have the same patterns?
2. Are kids' fingerprints more like each other, or more like parents'?



Whorl



Arch



Loop

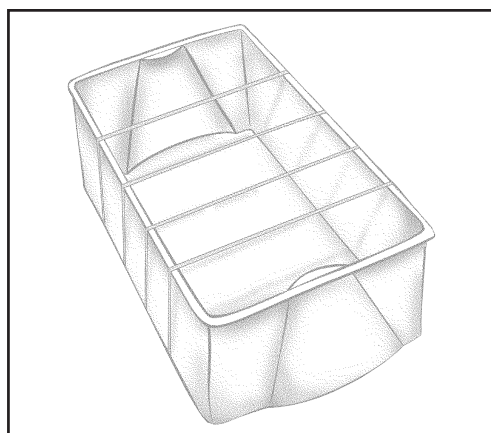
EXTRA ACTION: If you have pets as family members, make a set of their prints. Are there any similarities between pet prints and fingerprints?

HOME/SCHOOL CONNECTION

INVESTIGATION 3: COLOR WRITING

The different pigments used in colored pens makes them behave differently from one another. Some pigments are more soluble than others; some attach to paper fibers more tightly than others. You can use these behaviors to separate inks into their component pigments. This makes it possible to analyze inks...and to create some very pretty displays, too.

1. Round up some watercolor felt-tip pens. Dark colors (black, brown, gray) and earth colors tend to be most interesting, but get as many as you can.
2. Collect paper samples, the more porous the better. Try to get some coffee filters, paper towels, tissues, and anything else that looks interesting.
3. Set up a water bath—a shallow layer of water in a basin with a few rubber bands stretched around for clotheslines. Cut the paper in strips a couple of centimeters wide, and long enough to **just touch** the water when a strip is hanging on the line.
4. Put a color mark on the paper about 2 cm above the water end of the paper strip. Hang the strip on the line so that the tip of the paper **just touches** the water. The mark should be a little above the surface of the water.



Which ink had the most different pigments? Make a display of a couple of your results to share with the class. Tape your most interesting chromatograms in the space to the right.

EXTRA ACTION: Make your own inks by mixing drops of food coloring. Can you separate them using paper chromatography?

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Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 4: REFLECTING

Find a mirror at home. If it is not a hanging mirror, figure out how to position it at about eye height on a wall. Make the observations suggested below. Try to figure out why you see the images that you do.

- Stand close to the mirror, right in front of it. How much of your body can you see? What do you have to do to see more of your body, move closer or farther away? Or does it matter where you move? Can you explain what you see in the mirror?
- Stand a little bit off to one side with your face close to the mirror. Look at the scene you can see in the mirror. Move back from the mirror. What happens to the scene? Can you see more or less? What do you have to do to see more in the mirror? What does that tell you about using the rearview mirror in a car?
- Get a coin and two mirrors that you can work with on a flat surface. How can you position them to see multiple images of the coin? How do you position the mirrors to see the greatest number of images? How do you explain the multiple images?
- Make alien hands by placing the edge of a mirror in the palm of your hand and looking into the mirror at an angle. Can you make a hand with three fingers? Eight, nine, or ten fingers? What other bizarre images can you make? Look at another family member's face, a pet, your feet, and other interesting objects to see curious symmetric reflections.