Be an Engineer!

Engineers design things. They also explain things.

When you buy something, you get directions that tell you how to use it.

An engineer wrote the directions.

Can you be an engineer? Explain how to be safe on your playground.

Make a poster to help children use the playground safely.

You can draw a picture or take a photo.

Use science words on your poster.

Here are some ideas you could use:

Don't ____ too hard.

When you push someone, make sure that ________________________________ .

Look under your swing. The ground should be ______________________________ .

Don't ____the slide.

Try It!

You can **push** or **pull** a cart.

A spring scale measures a pull.

When you attach a spring scale to a cart, you can measure how much pull it takes to move the cart.

Look at the numbers on the spring scale. Can you count them aloud?

Hook the spring scale to a cart.

How much pull do you need to move it?

____

Put one book on the cart. How much pull?

____

Now put two books on the cart. How much pull?

____

Predict: How much pull will you need for three books?

____

Now test your prediction.

Was your prediction right?

____

Isaac Newton: STEM Star

Have you ever sat under a tree? Did something fall?

Long ago, a scientist named Isaac Newton sat under a tree. He saw things fall. He wondered why.

Once an apple fell near Isaac. He wondered, "Why did the apple fall down from the tree? Could anything fall up?"

Gravity is the pull we feel from Earth. It makes things fall.

Newton continued to wonder. He found answers by doing experiments. He talked about gravity. He wrote three rules that describe motion of all objects.

Scientists today continue to use Isaac Newton's rules to predict how pushes and pulls work.

Have you ever sat under a tree and wondered? What did you want to know? ______________________

____

Pretend you are sitting under a tree. Tell a story of what you see around you. What do you hear? What do you feel? What do you smell? ____

____

____

What is falling from the tree? ____

____

Dear Families:

To begin our study of physical science, we are studying pushes and pulls. These are common experiences for children everywhere they go. You can help support our science investigations by using appropriate language as you provide company for your children.

A force is a **push** or a **pull**. It changes the movement of an object—sometimes speeding it up or slowing it down, sometimes changing the direction of its movement, sometimes changing its position. An object in motion remains in motion until forces like friction slow it down.

Almost every time you enter a door of a commercial building, there will be a sign saying "Push" or "Pull." Read these signs as you demonstrate their meaning to your child. While you are at home, ask your child to help you push or pull. The grocery cart, the lawn mower, and the vacuum cleaner can all be tools for learning. We are using a spring scale to measure pulls.

Pushes and pulls are especially important in sports. We push a bat or a soccer ball. We pull when we wrestle or play tug-of-war. We are also marking the pushes and pulls we feel on photos of children as they play. When we use science words to reinforce these ideas at home, it makes learning a lot more fun.

Many of our science lessons integrate science with technology, engineering, and mathematics. You might be familiar with the acronym STEM, which stands for **s**cience, **t**echnology, **e**ngineering, and **m**ath. STEM is not a separate subject, but a way of thinking. STEM learning emphasizes problem solving and innovation. Your children may take the ideas from our lessons and apply them to questions that they invent themselves. "How hard do I have to push to make a big box move?" "What happens when I pull on the chain for this ceiling light?" When the experience is safe, encourage your children to try! And in the conversation that follows, make sure that you leave room for ideas that include measurement and invention.

Thanks for being great STEM partners. And have fun.

Dear Families:

We are studying more physical science. This unit's topic is gravity! We are exploring how things fall. Of course, they always **fall down**.

Things fall all the time all around us. Most of the time, we don't want that to happen! But you can experiment with falling by dropping soft things such as pillows and toys or safe things such as clay or soap onto a table or floor. You can also ask children to observe the shape of something that falls, such as a lump of pizza dough. A force pushing up (from the table or floor) stops the dough from falling and changes its shape, too.

The falling that we observe is the result of what we call gravity. In fact, every bit of matter attracts every other bit of matter. But a planet pulls far harder than anything on it. So our lessons have focused on the pull of Earth. Our vocabulary words for the week are "**force**," "**fall**,"and "**down**." Can something fall up? Not on a planet. But it's fun to think about how things can act when gravity is very low. We'll be watching a video from NASA called *Toys in Space*, showing how common toys can work in a place where there is very little gravity. You can find it on YouTube if you search "toys in space."

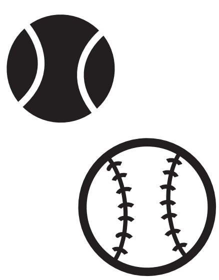
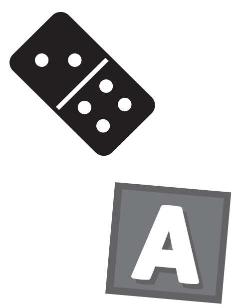
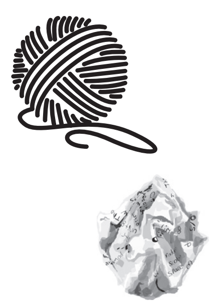
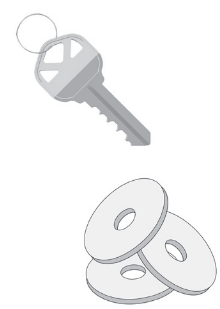
For our engineering challenge, we are going to experiment with packaging that might prevent an egg from breaking when it falls. You can help your child prepare for this activity by taking a walk through the grocery store. Look for packages that protect cookies and eggs. Or in a gift store, ask the clerk to explain how things that could break easily are protected when they go home.

Thanks for being great STEM partners. And have fun.

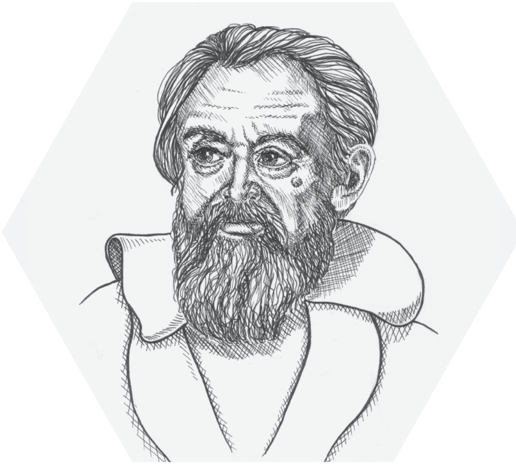
Try It!

Find things of similar size and shape that cannot break easily. Predict which will fall first. Then try it!

Dropping Races

Predict! Draw what you think will happen.			
Tennis ball *vs.* **softball**	**Domino** *vs.* **alphabet block**	**Yarn ball** *vs.* **crumpled paper**	**Key** *vs.* **washers**
			
Observe! **Draw what happened.**			

Galileo Galilei: STEM Star



Galileo was a scientist. He was an engineer, too.

He lived four hundred years ago in Italy.

He was curious about just about everything!

In church, he wondered why the lamps swung back and forth.

He wondered about planets farther away than the ones he could see.

When something fell, he wondered why it went down and not up.

Some people say that Galileo held dropping races from a tower near his home.

Imagine that you could talk to Galileo. You want to ask a question:

"What happens when heavy and light things fall at the same time?"

What would he say?

Dear Families:

This week we are learning about weight, which is a property of matter. We are classifying objects as **heavy** and **light** . You can help by extending this experience at home and practicing our new vocabulary at home and in the community. Pick one safe object in the kitchen and ask your child to feel it, then to find something heavier. Gravity is a force that pulls things toward the earth. The children are experimenting with pairs of objects of similar size and shape but different weights. We describe these objects as **heavy** or **light** . We test for these properties with our senses.

If you have a home bathroom scale, ask your child to stand on it, note your child's weight, and then find something (like a pile of books) that is about the same weight. Or while you're cooking, use a small food scale to find something that is almost as heavy as another small object, such as a salt shaker. You can also ask your child to weigh small boxes or cans on a food scale. Your child might help you group heavy things to put on low shelves and lighter things to put on higher shelves.

For a group activity, we will need many small, clean plastic food containers (such as those that contain deli foods). We'd appreciate extra containers if you have them. We'll be filling them with different objects that are **heavier** or **lighter**. You can do the same at home. Fill the containers, then ask your child to compare the weights of the containers. Challenge your child to put a relatively light object in one container and fill the other container with something heavier.

In our engineering challenge, we are building a fishing line with a bobber (a plastic float) and a sinker (something heavy to make the fishing lure sink). If you have the opportunity to go fishing with your child or watch a movie about fishing, please share it with us!

Thanks for being great STEM partners. Have fun.

Try It!

Put heavy things in a box marked *H*.

Put light things in a box marked *L*.

Trade boxes with a friend.

Then draw what's inside each box.

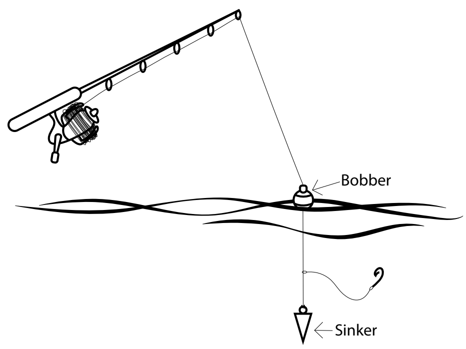
What's in the heavy box?

What's in the light box?

Be an Engineer!

When you go fishing, you want a hook to go down just far enough in the water to attract the right fish, but not too far! A fisher puts a heavy weight near the hook so it will go down. That's called a sinker.

Then the fisher puts a lighter thing that floats, a bobber, higher on the string. You want just the right amount of string to reach the fish. The bobber holds up the hook so it doesn't drop too deep in the water.



Design your own fishing pole. Find a light thing that will float for a bobber and a heavy thing that will pull the hook down for a sinker. Then test your fishing pole in water.

Draw a picture of what you have built.

Juliana Berners and Charles Kirby: STEM Stars

Cats and bears love fish.

So do people.

The first people probably knew how to catch fish to eat.

They used short sticks, spears, nets, or even their hands!

An *angle* is a pole. People who fish are called *anglers*.

Juliana Berners lived in England five hundred years ago. She wrote a book with a very odd name: *The Treatyse of Fysshynge wyth an Angle*.

That means "a story about fishing with a pole"! This story helped people catch fish better.

Charles Kirby lived in England four hundred years ago. He invented the bent fishhook that lots of people use.

Why do you think a hook is good for fishing? ______________________________

____

____

What other invention could help people catch more fish? ______________________

____

____

Rolling Balls

There are many ways to measure the distance a ball rolls after it leaves a ramp. Children can use wide ribbons, then hang them at the front of the room to compare. They can also use rulers, meter sticks, or trundle wheels, depending on what's available. This sample graph is numbered 1 to 10, but you can use any number of units and any unit of measurement. The end result should be a bar graph that you can discuss as a group.

How Far Did It Roll?

Measured with ________________

10						
9						
8						
7						
6						
5						
4						
3						
2						
1						
Object						

Try It!

Does a heavier car go farther than a lighter car? Get two cars that are the same size, shape, and weight. (They don't have to be the same color.) Tape weights to one of the cars. See if making the car heavier makes it go farther.

I am measuring my car's path in ______________________________.

	Car with 0 weights	Car with 1 weight	Car with 2 weights	Car with 3 weights	Car with 4 weights
Distance in __________					

Dear Families:

This week we are studying things that **roll**. We are testing all sorts of things, from balls and blocks to toy cars. It's easy to extend these activities at home.

Set up anything for a ramp. It could be a piece of wood, a cookie sheet, or an ironing board. And then encourage your child to try testing things at home. (Of course, think about safety and breakage. Something that would break at the end of the roll, such as an egg, wouldn't be a good choice—unless you'd like to try a new way of scrambling eggs.)

Classification is a key skill for early childhood. This activity is ideal for practicing sorting. Ask your child to make two piles of things: those that roll and those that don't.

Another way we ask children to think like scientists is asking them to **predict** and then test a prediction. Making piles of things that roll is a step in modeling. It's like building a theory of how things work in the world. Models help us predict.

Find a new object that your child hasn't tested yet. Ask, "What do you think? Will it roll?" And then ask, "Why do you think that?" (Patience! It may take time for those modeling thoughts to come out as words.)

Then, of course, do the test. Remember, experimenting isn't really about being right or wrong. It's about persistence. So always remind your child to try again.

We'll also read about the man who invented the safety helmet. He called it a "Hard Boiled Hat." Remind your young bikers to always wear their helmets!

Thanks for being great STEM partners. And have fun.

E. W. Bullard: STEM Star

E. W. Bullard was a soldier. He wore a metal hat to protect his head when he was at war.

His father had a factory. The factory made soft helmets for workers.

When E. W. came home from the war, he told his father how to make a better helmet.

He called the new hat a "Hard Boiled Hat." It was stronger. It protected heads better.

Race car drivers wear helmets. Bicycle riders wear helmets. Baseball players wear helmets.

Who else wears a helmet? ____

____

____

____

When should you wear a helmet? ____

____

____

____

Dear Families:

More pushes and pulls this week! We are studying how **friction** can slow down something that is **sliding**. While children may not know the word "friction," they can feel the effects of friction. And when friction is very low, children know that slipping and sliding can happen.

One way we are exploring friction is to compare the soles of people's shoes. Most children wear athletic shoes with rubber soles. The friction between the shoe and the floor is pretty high.

When golfers or baseball players want good shoes, they look for very rough soles! They may buy shoes with cleats to dig into the soil so that the shoes don't slip at all.

But when we go dancing, we want our feet to slide. And at a party, we might wear a shoe with a metal heel.

Can you help our study of friction by helping your child observe shoes and their soles? You might do it at home or take a walk through the shoe department of a store. Ask, "Which shoes are slippery? Which shoes will help you keep from slipping?" Just as we did last week, classifying items such as shoes into groups is a great skill to practice.

Thanks for being great STEM partners. And have fun!

Try It!

First, measure the time it takes to go down a slide.

We can count together using a tool that makes a loud click. The tool is called a metronome. Musicians use it to help keep the beat in a song. We need to practice because it is difficult to measure something quick like a slider.

Then we'll try to make the slide slippery. We can use a special paper with wax on it or spray wax on the slide.

Can wax make the push of friction less? Try it.

TEACHER TIP

We've included several ways to maintain data here. Counting, averaging, and making histograms are appropriate for different ages. Remember that the object is to learn to collect data to make an argument, so high accuracy is less important than the concept that pushes and pulls can be measured.

Student	Counts on Slide	Counts on Slippery Slide

Student	Slide 1—No Wax	Slide 2—No Wax	Slide 3—Waxed	Slide 4—Waxed
	Add the two counts and divide in half. ________		Add the two counts and divide in half. ________	
	Add the two counts and divide in half. ________		Add the two counts and divide in half. ________	

(continued on next page)

(continued from previous page)

Student	Slide 1—No Wax	Slide 2—No Wax	Slide 3—Waxed	Slide 4—Waxed
	Add the two counts and divide in half.		Add the two counts and divide in half.	
	Add the two counts and divide in half.		Add the two counts and divide in half.	

Counts						
10						
9						
8						
7						
6						
5						
4						
3						
2						
1						
Student						

Be an Engineer!

Sometimes we want to make sure things do not slip.

Special shoes might be good for an icy hill.

Track shoes help a runner push to start fast.

Think of a way to make a shoe slip less.

Draw the new shoe!

Pretend you are selling your shoe to a friend. Why should they buy your safer shoe?

Help Lauren Explain Her Slide

Gravity pulls me ______________________________.

I feel ______________________________ when I slide down.

Friction makes me go ______________________________.

At the bottom of the slide, I stop because ______________________________

____

____

______________________________.

Adi and Rudi Dassler: STEM Stars

Once shoes were made of cloth, leather, or wood. But Adolf and Rudolf had a better idea.

They made shoes of rubber with cleats. They were for sports.

They started making shoes in their mother's basement. People loved the shoes.

Why would a shoe with bumps on the bottom be better?

Adi and Rudi made thousands of rubber shoes together. But then they had a fight!

Adi started a new company called Adidas.

Rudi called his new company Puma.

David Beckham wears Adidas when he plays soccer.

Usain Bolt wears Pumas when he runs.

What kind of shoes do you like best? ______________________________

____

Why? ______________________________

____

How could you test them? ______________________________

____

Be an Engineer!

Gloves are a very important part of winter wear.

They keep our hands warm. They keep us healthy.

Can you compare gloves?

Which gloves can keep your hands warmer?

A thermometer can measure temperature.

Put thermometers inside different gloves. Put the gloves in a refrigerator or put ice on top of them. (Be fair! Use the same number of cubes for each glove.)

How long should you wait? ____

____

When you are done, which glove is warmer inside? ___________________________

____

Dear Families:

The matter around us can be **solid**, **liquid**, or **gas**. This week we are comparing the properties of solids and liquids. Your children can learn a lot about matter with their senses.

Many foods and cooking experiences can help children understand solids and liquids. Cook with your children. As you do, you can discuss the following concepts:

- Water goes from liquid to solid when it freezes.
- Popsicles melt from solid to liquid in your mouth.
- Liquid cake or pancake batter and eggs become solid when they are cooked.
- Gelatin can go from liquid to solid and then to liquid again.

We are also looking at how liquids can take on the shape of their container. Pouring an interesting liquid from a glass to a cup to another glass can be the start of a great conversation. When young children see a liquid poured from a small glass to a larger one (where the level will be lower), they often believe that there is less of the liquid in the larger glass. Pouring the liquid back and forth can spark some great conversations.

Using the methods of engineers, we are comparing gloves to see which work best to keep hands warm. If you have any odd gloves you can lend for our tests, we'd appreciate them! We will also be reminding your scientists that it's important to wear the right clothing in cold weather to stay healthy and safe.

We will read about the invention of the ice cream maker. Ice cream goes from liquid to solid, and if you wait long enough, it goes from solid back to liquid again. Have a cone for the sake of STEM.

Thanks for being great STEM partners. And have fun.

Try It!

Properties of Solids	Properties of Liquids

Examples of Solids	Examples of Liquids

Discuss the following words with children. Challenge the children to put each word in the appropriate space(s) in the chart or in a Venn diagram chalked onto the floor or pavement.

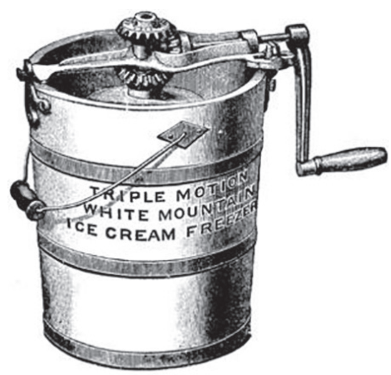
hard	visible	sugar cube	gelatin
soft	invisible	syrup	egg white
shaped	cool	ice	cooked egg
no shape	heavy	water	
warm	light	gelatin solution	

Nancy Johnson: STEM Star

Do you like ice cream? Once, only very rich people could have it.

Many years ago, before your great-great-great-grandparents were born, Nancy Johnson invented a machine. After that, with cream, some salt, and a little ice, anyone could make ice cream.

An ice cream machine has an outer bucket and a smaller bowl inside. Ice and salt go on the outside of the smaller bowl. The cream goes on the inside. Then you crank and crank. The cream becomes a solid. Cream is a liquid. But ice cream is a solid. People loved ice cream, so they didn't mind the work!



Ice cream needs flavors. Name as many flavors of ice cream as you can. Then find out where these flavors come from. Here's a hint for one: chocolate comes from a plant that grows in rain forests.

Try It!

Put some water in your dropper.

Hold the dropper up. Let the water fall. Look carefully!

What does a drop look like?

Draw your drop:

Put your drops on waxed paper. Do they look the same? ____

Make a path of drops.

Get a little cup.

How many drops fit in the cup? _______

Let a friend count them for you.

Try some soapy water.

How many drops fit in the cup? _______

Last, put some water in a can.

Put some ice in it. Stir. Watch for drops of water on the outside of the can. Where did the water come from?

____

How could you see if you were right?____

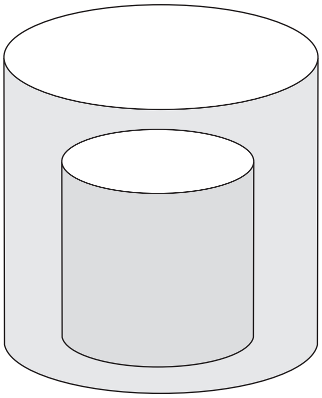
____

____

Be an Engineer!

Some materials can act like gloves. They can keep warm things warm and cold things cold.

Some people stay at the beach all day. They want to keep their soda cool. Can you invent a good package to keep the soda cool?



____

____

What did you put around the can? ______________________

Could it be like a glove? ____________________________

Could it be like an egg package? ______________________

Take the temperature of your drink after one hour. What is the temperature? _______________

Whose can stayed coolest? ____

Engineers try again and again. How could you improve your package? ___________________

____

____

____

____

Dear Families:

This week we are studying water. It's all around us—a special substance that can be **solid**, **liquid**, or **gas**. Most of our body is made of water. Without water, nothing on Earth could live.

Water is also the easiest material to study. We will begin by seeing what can hold water. You can do this at home. Group things that can hold water (such as cups, pans, and bottles) and things that cannot hold water (such as colanders and coffee filters). Have a big towel ready when your scientists begin to test. Take a plastic cup, poke some holes in the bottom, and test it again. Most children will be able to sort the things that clearly can hold water from those that cannot. But there are some things in between. A fine-mesh kitchen strainer might hold a little water for a little time. You can pick up a little water in a thin straw, and it will stay there for a while, too. (Secret: That's because water is "cohesive" and has a tendency to stick to itself in drops.)

We are also looking at the shape of water drops and the places that water condenses around our daily environment. Take a walk with your child inside or outside your home to find water drops and condensation. You might have water condense on the windshield of your car if the air outside is warm and your car is blowing cooler air inside.

Finally, look for the water inside us. Breathe on a mirror or a cool window. Remember our patter: "What do you see or feel? Why do you think this is there?" Every answer is a good one.

Our engineering challenge is to design a package to keep a can of soda cold. If you use a thermos or a cooler, show it to your child.

Thanks for being great STEM partners. And have fun!

Lonnie Johnson: STEM Star

Lonnie Johnson loved to build things.

He built a robot for a science fair.

He powered a NASA probe.

But his favorite invention was a toy—he made the Super Soaker!

It wasn't easy. First Lonnie had to make the toy. It wasn't perfect. So he made it better. He had to get people to buy it. He knew people could have fun with it.

What is your favorite toy?

Draw it here:

How could you make it better? ________________________________

____

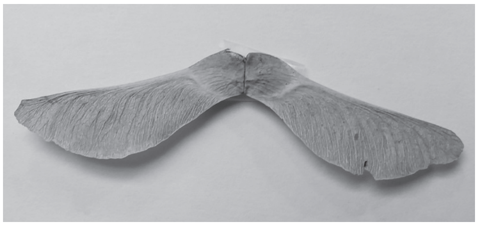
____

Why will your new toy be more fun? ________________________________

____

Try It!

Many living things use the air to help them move. Birds and bees fly. Some squirrels can glide. So can many kinds of seeds, like those of the maple tree. Some people call this part of the maple a "helicopter." The real name is "samara," named for a Japanese sword.



You can make a paper helicopter that falls like a maple seed. Fold a paper like this and put a paper clip on it.

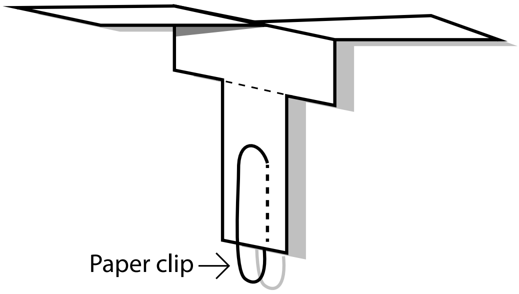
Hold your helicopter as high as you can and drop it.

How does it fall? ______________________________

____

How far does it fall? ______________________________

____



Now make a better helicopter. You can make it heavier or lighter, or make small cuts in the blades.

What did you do to make the helicopter fly better?

____

____

Have a helicopter race.

Draw a picture of the helicopter that flew the best:

Dear Families:

The matter around us can be solid, liquid, or gas. This week we are studying **air**, a gas. Of course, most of the time we cannot see it. But we feel the effects of air all the time—warm or cool, windy or calm, dry or moist.

Children can use their senses to discover things about air, using the same ideas they use to look at liquids. You can help by using old and new vocabulary as you encourage children to be more observant.

In our STEM lessons, we always try to make connections. When children use the same skills and vocabulary in different settings, they develop deeper understanding. We use the words "push" and "pull" all the time as we study science. You can help by using these words for air, too! If there is a wind, you might ask, "I wonder what's pushing it?" (Actually, it's the sun and its warmth.) If the room is too hot and you want to use a fan, you can use the same sort of conversation, saying, "Let's push some air around."

In a car, you might (safely) explore how air might pull a feather or tiny scrap of paper out of an open window. The air that goes through your vacuum pulls dust and dirt into the machine. Your hair dryer pushes air around to help dry your hair, and the hand dryer in a public restroom both heats and pushes air against your hands.

We are making small paper helicopters to see how they fly. Try them at home. All you need is paper and paper clips.

Whenever children investigate on their own, they develop questions. Some of those questions you may want to explore at home. But it is always terrific when children bring their questions to school. If a good question comes up, send it along.

Thanks for being great STEM partners. And have fun.

Be an Engineer!

Can you make an airplane out of paper? Here's a plan from NASA. Start with a square piece of paper. Fold it where the line is dotted, like this:

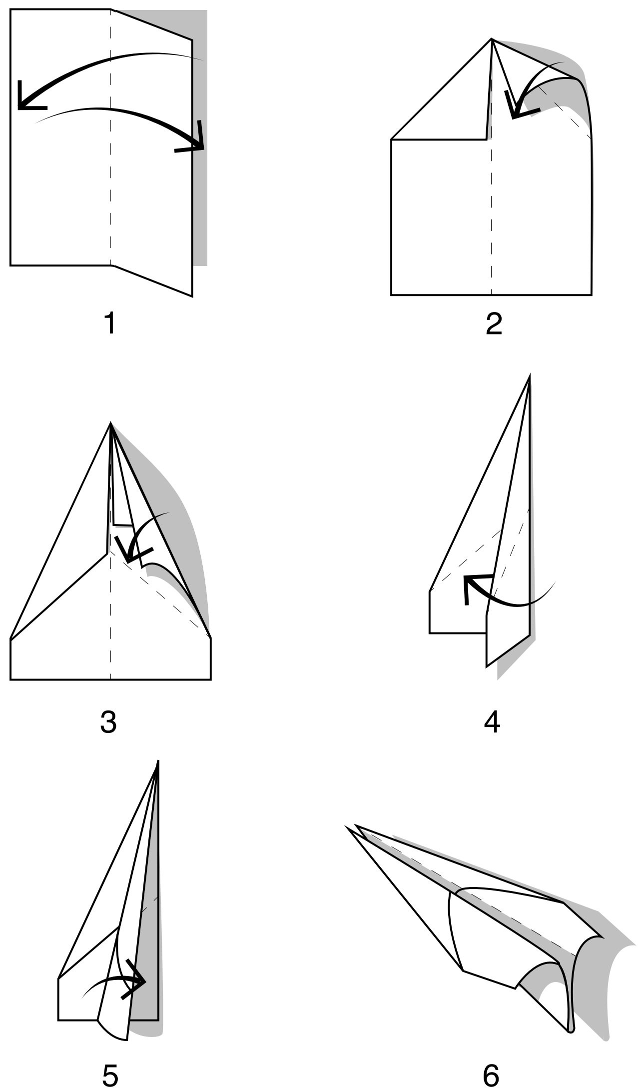
How far can your plane fly?

Now change the plane. Take a paper clip or dot sticker and make one part heavier.

Did it fly farther?

(Remember, a test must be fair!)

How to make a Dart Airplane

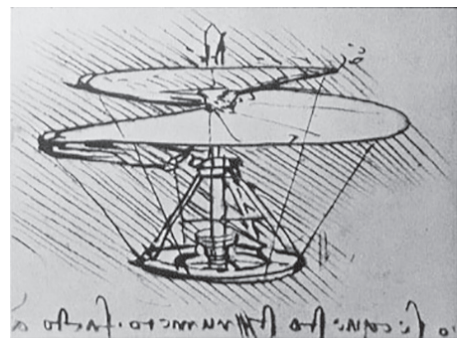


Leonardo da Vinci: STEM Star

Leonardo da Vinci loved to do many things.

He was an artist. He loved to draw.

Leonardo was a painter, too.



He invented new kinds of paints, made of things like egg and oil. Some of his paints were beautiful. Some didn't last very long.

Leonardo invented weapons for kings. He once made a metal statue, then melted it to make a cannon.

He drew inventions that were like helicopters, bicycles, and even an airplane that flew like a bat.

But most of his ideas were never built.

What do you like to do? ______________________________

____

Do you have more than one talent? ______________________________

____

Do you have a good idea? ______________________________

____

What could you invent? ______________________________

____

____

Try It!

Draw your shadow!

Morning	Noon	Afternoon

Explain to your friend why your shadow changed: ______________________________

____

____

____

____

____

____

____

Be an Engineer!

Be a chemical engineer. Look at how sunscreen works. Use your sun beads. Put some sunscreen on some beads and not on others. Put both groups of beads in the sun. How do you know that the sun has hit the beads?

No Sunscreen	Weak Sunscreen	Strong Sunscreen

Then walk around outdoors on a sunny day. Put beads in places that are very sunny and places that are shady. Use a map to mark the sunny spots.

Build a sundial. Because the sun's shadows change each hour of the day, we can use them to tell the time of day. Look at the picture of a sundial here. Think about what you might use to make the same thing.

Mark the first shadow early in the day. Ask a friend to predict where the shadow will be the next hour. Was the prediction correct?____

Watch the shadows each hour for a day, and mark where they fall. (You can use flags, tape, or sidewalk chalk.) Do it again the next day. Did the shadows change? ________________________________

Dear Families:

This week we are studying sun and shadows. We will be making shadow puppets and following how our shadows change from morning to afternoon. This is an easy activity to replicate on a sunny day.

The word “**energy**” continues to be an important one. We’ve talked about the energy needed for pushes and pulls, and the energy that changes solids to liquids. Now we will look at light energy (which can, of course, change to heat energy). Humans have energy, too—starting with the sun energy that is stored in our foods, keeping us warm and active. There are lots of opportunities to reinforce both the concept and the key vocabulary.

In our activities, we’ll remind children to protect their eyes from the sun. They should never look at the sun or very bright lights. You can help us by repeating these warnings at home.

We’ll also be reminding children to use sunscreen, to reinforce the idea that the sun’s rays can be dangerous if we don’t protect ourselves. When your children go outside, remind them to use appropriate protection, including hats, shirts, and sunscreen.

Thanks for being great STEM partners. And have fun.

Franz Greiter: STEM Star

Franz Greiter loved to climb mountains. At the top of a mountain, the sun is very bright.

Franz often got sunburned. Sunburn can make you very ill. It is important to prevent sunburn.

Franz went to school.

He became a chemical engineer.

He mixed chemicals and tested them. Some of the mixtures helped keep the sun from burning skin.

Some people climb mountains.

Some people play ball.

What do you do outside? ____

____

____

When do you need sunscreen? ____

____

____

What could you tell a friend who is going to the beach? ____________________________

____

Be an Engineer!

Building Your House

Let's build a house! We want to make it cool in the summer.

Choose a material for the roof. Explain to a friend why you like that material.

What color should you make your roof? Explain to a friend why you like that color.

Predict which house will stay cool:

Testing Your House

Put a thermometer in your house.

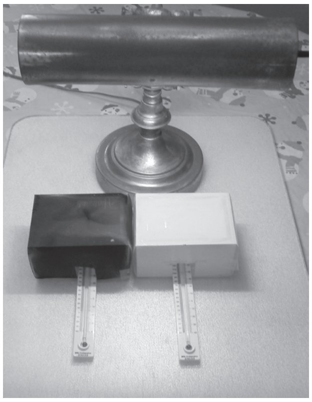
Put your house in the sun.

Did your design keep your house cool? ____________________

____

____

____



How do you know? ______________________________

____

____

____

Improving Your House

How would you make your house better? ____

____

Dear Families:

We are looking forward to another *energetic* week of STEM explorations. Light and heat are forms of **energy**. We are looking at how light energy can change to heat energy. When sunlight hits dark objects on the surface of the earth, much of it changes to heat energy. Light bounces off lighter colors more easily.

This week we are testing materials that might be on the roofs of houses to keep people warm in the winter and cool in the summer. Can you take a walk or drive with your child and compare roofs? Are some light and some dark? Can students see shingles, tiles, or tar? Of course not all roofs are visible from the ground, but many are.

We'll be exploring more insulation activities. In previous units, we tested gloves to see if they could keep our hands warm, and we tested an insulation material for a soda can. We could use some scrap materials for our experiments. If you have small squares of carpet or grass mats, an old rubber car mat, bubble wrap or thick cloth, we could use these items as roofing materials for our experimental houses. We'll change the roofs of our model houses, put them in a warm, lighted area, and see which roof works best.

We will read about architect Frank Lloyd Wright, who not only made beautiful homes but also made them safer. Ask your child for ideas to make your home safer.

Thanks for being great STEM partners. And have fun!

Frank Lloyd Wright: STEM Star

Young Frank Lloyd Wright loved to be outside. His mother was a teacher. His father was a musician.

He drew trees, hills, and outside places.

In school he became an architect.

He had to study drawing, science, math, and engineering.

When an architect builds something, all of these are important!

Most architects design big buildings. Frank wanted to build houses for people. He wanted the houses to be as beautiful as nature.

What parts of nature could you use to make your house nicer? ______________________________

____

____

Frank also built safer homes and hotels in places where there are earthquakes.

What could make your home safer? ____

____

____

____

Be an Engineer!

Some people live at the bottom of a hill. It is always muddy there.

Design a better hill.

Use a model of sand and soil. Put materials in it that will stop the mud.

Then use a cup with water to test what happens in the rain.

Record an ad to help people understand how to save their soil.

Try It!

This is a picture of Alaska. It was taken from an airplane.

What could have made these tracks?

Go to a place that has sand or soil.

Use a straw. Push the sand or soil with “wind” from your straw. Can you make the same pattern?

Get a cup with small holes in the bottom.

Can you make the pattern by letting water fall on the sand or soil?

Dear Families:

This week our class is learning how forces in nature—like **wind** and **water**—can change the shape of the land. Illustrations of this are all around us.

Take a walk or a ride. Ask children to observe hills, ditches, valleys, or even carefully planted lawns. Ask them to describe the land. Words like “flat,” “muddy,” “sandy,” or “rocky” are all appropriate. And the words we used in other STEM adventures, like “push,” “pull,” “warm,” “cool,” “heavy,” and “light,” are also appropriate. Any observations are good ones.

Then go on a scavenger hunt. Find a place where wind or water changed the area. This might be a little ditch, a pile of sand near a building, a puddle, or a pond. If you have access to a camera, grab a photo for our class discussion. If not, paper and crayons might provide the picture.

Like all of our lessons in science, we try to make connections. We’ve talked a lot about pushes, pulls, **wind** and **water**, warm and cold, and energy. All of these ideas apply to the way that land is shaped in nature.

When children observe nature, they often come up with questions of their own. If you have an answer, great! But that’s not necessary. You can investigate together with your child, or write a note together to bring to class. We’ll collect children’s questions for future investigations.

Every yard and every neighborhood offers science lessons.

Thanks for sharing yours with us. You are great STEM partners. Have fun.

Joseph Lazaro: STEM Star

Beaches are special places. Waves and wind change beaches every day.

Each time you visit, the beach is different.

Sand can move. It could be erosion. Erosion is when the water washes away the sand.

Plants can hold the sand. But plants can grow or die.

Protecting beaches is important for the plants, the animals, and the people who live near the beaches.

Joseph Lazaro lives near the ocean in Louisiana.
He was worried about beach erosion.

Do you know how big a football field is? In Louisiana that much sand disappears every day!

Joseph invented a way to slow down erosion.

His invention used a strip of plastic in the water just beyond the beach. The plastic strip slowed the waves. The sand stayed on the beach.

Try It!

We will plan our garden by finding out how much sun, water, and space the plants will need.

Plant	Sun	Water	Space
Tomato	Lots of sun	Medium water	One-foot circle *(As big as a large pan lid)*
Pepper	High sun	Medium water	One-foot circle *(As big as a large pan lid)*
Radish	Medium sun	Medium water	Small circle *(As big as a saucepan lid)*
Lettuce	Low sun	High water	Many small plants will need a large area. One package of seeds might take up two square yards.
Carrots	Medium sun	Medium water	Small circle *(Each plant might take up one small saucepan lid.)*

Dear Families:

We are designing a garden! This activity will bring together all the ideas we have explored for many weeks in our STEM curriculum. We'll use science, technology, engineering, and mathematics to create a space where we can grow vegetables, flowers, and other sorts of plants.

Our garden will use the **energy** of the sun and the properties of water and soil. We will design the garden to make the most of our resources.

First, help your child observe gardens around your home and neighborhood. These don't have to be large or exotic. Pot gardens, roof gardens, and window plots are all examples of gardens within the reach of a young child.

Perhaps you can plant a few seeds at home. Pepper seeds (from the grocery store) grow well. Sprouts and herbs can be grown in almost any container to provide food for thought and for lunch!

Then follow our group gardening project with us. We will need a lot of help as we progress, and we would be very grateful for any supplies, time, or advice you can offer. (Grandparents and other helpers are welcome, too!)

Thanks for sharing your "flowers" with us. You are great STEM partners. Have fun.

Be an Engineer!

Some engineers design gardens, forests, and farms. Agriculture is the science of farming.

Be an agricultural engineer. On a map of the yard, find a good place to put your group garden. Think about these things:

- sunlight
- rain
- wind
- people

Use the map you made with your ice cubes or sunlight beads to decide where to plant.

Some plants like lots of sun.

Some plants like a little shade.

Find some plants for the sunny spots near your school.

Find some plants for the shady spots near your school.

How will you get water to your plants?

(continued on next page)

(continued from previous page)

What animals might eat your plants? ____

____

____

____

____

How could you keep them out? ____

____

____

____

____

Now think about these questions:

- What do you want to grow?
- Who will take care of the plants?
- What will you do with them when they grow?

Make a map of your garden here. Then ask a friend to help you improve it.

Carol Johnson: STEM Star

Carol Johnson is an architectural engineer. She uses earth materials and living things to create places people can enjoy.

Parks are fun for people of all ages. But some people have trouble moving around on grass, hills, or stony places.

Carol Johnson builds places for people who need extra help. Her parks and gardens have easy ways to pass through.

Think of the garden you planned. Could everyone enjoy it? ______________________________

____

____

____

____

How could you make it better? ____

____

____

____

____

(your name)

STEM Star

You ask good questions!

You observe interesting things!

You solve problems.

When you don't succeed, you try again.

You never give up.

So you are a STEM star!

Make a list of all the things you can do:

Then do them.

Have fun!