Week 8: Shoot for the Stars August 12-18

Look up at the night sky and into outer space and meet people who risked everything to follow their dreams.

Use the sheet below to mark off this week's activities as you complete them. See if you can get a BINGO!

Scan the QR code or visit www.michiganlearning.org/stars to see the playlist of videos for this week.

Build an air cannon with DIY Science Time	 60 mins. of activity	 Read for 20 minutes	Draw a cartoon of your hero story	Watch Extra Credit
 Read for 20 minutes	 Watch Story Pirates	Draw an alien planet	 Stargaze	 60 mins. of activity
 60 mins. of activity	 Watch Math Park	 HAVE FUN! (Free Space)	Build a moon rover with NASA	 Read 20 minutes
Watch Extra Credit	Observe clouds with the Detroit Zoo	 Watch Math Park	 Watch Story Pirates	Watch InPACT at home
 Stargaze	 Read for 20 minutes	Watch DIY Science Time	 60 mins. of activity	 Watch Math Park

A NASA/DESIGN SQUAD CHALLENGE

ROVING ON THE MOON

Can you imagine driving an all-terrain vehicle (ATV) on the moon? NASA can. It's building a fleet of ATVs (called rovers). Some can be driven by astronauts. Others are remote-controlled. All of them can handle the moon's dusty, rugged terrain. Talk about off-road adventure!

WE CHALLENGE YOU TO...

…design and build a rubber band-powered rover that can scramble across the floor.

BUILD

1. **First, you have to make the body.** Fold the cardboard into thirds. Each part will be about 2 inches (5 cm) across. Fold along (not across) the corrugation (the tubes inside a piece of cardboard).
2. **Then, make the front wheels.** On the two 5-inch (13-cm) cardboard squares, draw diagonal lines from corner to corner. Poke a small hole in the center (that's where the lines cross). On the body, poke one hole close to the end of each side for the axle. Make sure the holes are directly across from each other and are big enough for the pencil to spin freely.
3. **Now attach the front wheels.** Slide the pencil through the body's axle holes. Push a wheel onto each end. Secure with tape.
4. **Next, make the rear wheels.** Tape the straw under the back end of the rover. Slip a candy onto each end. Bend and tape the axle to stop the candies from coming off.
5. **Finally, attach the rubber band.** Loop one end around the pencil. Cut small slits into the back end of the body. Slide the free end of the rubber bands into the slits.

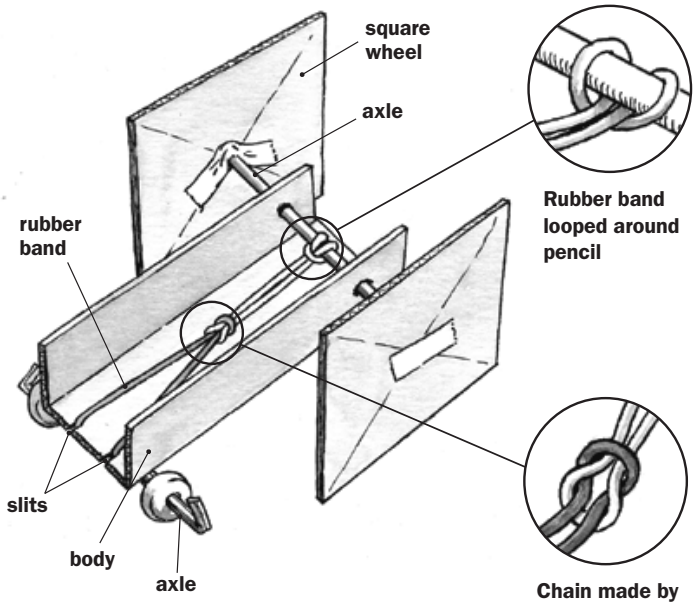
MATERIALS (per rover)

- corrugated cardboard body (6-inch/15-cm square)
- 2 corrugated cardboard wheels (5-inch/13-cm square)
- 1 sharpened round pencil
- 2 rubber bands
- ruler
- tape
- 2 round candies (the hard, white, mint ones with a hole in the middle)
- 1 plastic drinking straw
- scissors

TEST, EVALUATE, AND REDESIGN

Test your rover. Wind up the wheels, set the rover down, and let it go. Did everything work? Can you make your rover go farther? Engineers improve their designs by testing them. This is called the design process. Try redesigning the wheel setup or rubber band system. For example, if:

- **the wheels don't turn freely**— *Check that the pencil turns freely in the holes. Also, make sure the wheels are firmly attached and are parallel to the sides.*



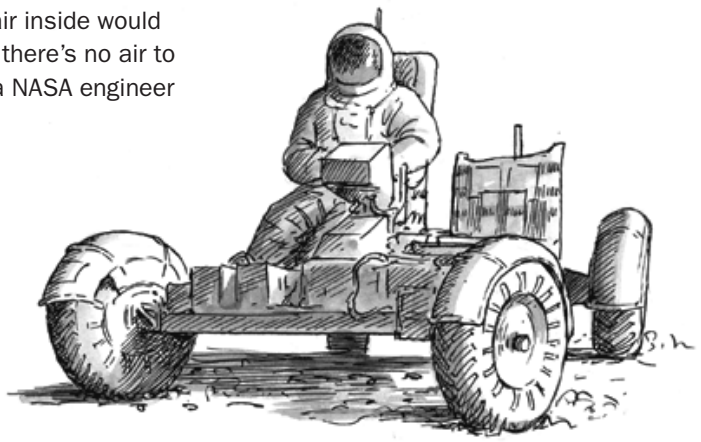
- **the rover doesn't go far**—*Wind up the wheels more. Try wheels of different sizes or shapes. Or, add another rubber band or use a rubber-band chain.*
- **the wheels spin out**—*Add weight above the square wheels; put more wheels on the pencil; use bigger wheels; or cut open a rubber band and use only a single strand of elastic.*
- **the rover won't travel in a straight line**—*Check that the pencil is straight and the front wheels are the same size.*

Check out NASA's moon missions at moon.msfc.nasa.gov.

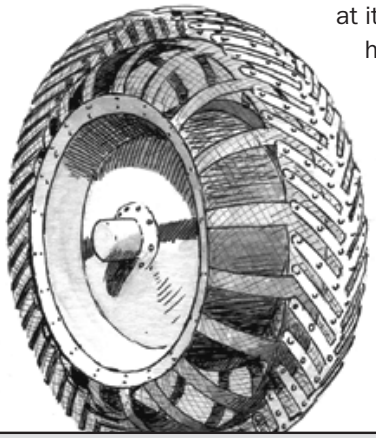
CUSTOM WHEELS

The moon doesn't have an atmosphere—there's no air there! So air-filled tires like the ones on a bike or car would explode—the air inside would push through the tire to escape into outer space (where there's no air to push back against the walls of the tire). Imagine you're a NASA engineer who has to design a tire that:

- works in space, where there's no atmosphere
- withstands extreme hot and cold temperatures—on the moon, they range from roughly 250° to –250° Fahrenheit (121° to –157° Celsius)
- weighs 12 pounds (5.5 kg), which is half the weight of an average car tire
- won't get clogged with the fine dust that covers the moon



Despite these challenges, engineers designed a tire that worked perfectly when it was used on the moon. It's made of thin bands of springy metal. That helps it be lightweight, have good traction, and work at any temperature the moon can throw at it. Plus, it flexes when it hits a rock, and it doesn't need to be pumped up. Dependability is important. There's no roadside service when you're on the moon, 250,000 miles (400,000 km) from home.



RIDE IN "STYLE"?

A rover may not be the hottest-looking vehicle around, but with a price tag of over ten million dollars, it's one of the most expensive. And it sure is convenient to bring along. Rovers can be folded and stored in a landing module the size of a small room. Look at the picture of the rover. Which features are also found on cars designed for use on Earth?

Answers: Chassis, wheels, fenders, motor, seats, seat belts, antenna, battery, camera (some cars), and steering controls.

The farthest trip anyone has ever taken on the moon with a rover is 2.8 miles (4.5 km).

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GLOBE Observer Clouds - Citizen Science

EDUCATION ACTIVITY

MATERIALS:

- Smartphone or tablet
- GLOBE Observer app

Directions:

- Download and familiarize yourself with the GLOBE Observer app (Clouds).
- Step outside, take a walk around your home, in your neighborhood or to a local park to find a good view of the sky.
- Click through the app to enter your observations on what the sky looks like, percentage of cloud cover, sky color, visibility, type of clouds present, opacity, surface conditions, and photos.

Guiding Questions:

1. What do you notice about the clouds today?
2. What predictions can you make about the weather from looking at the clouds?
3. Describe what features, shapes, and heights of the clouds you see.
4. Use the Interactive Cloud Key to answer questions that guide you to identify what clouds you may be looking at.

How it Works:

Weather is the conditions we see day to day within the atmosphere, while climate refers to conditions seen over a time. Clouds impact both local weather and climates across the planet. Clouds can provide information about temperatures, humidity, and wind throughout the atmosphere. Using this information helps to predict weather conditions.

Continue Exploring

- How do cloud conditions compare across different seasons? Different areas of the world? Make predictions, research, and make observations at different times and places.

DRAW YOUR STORY!

THE STORY PIRATES CREATOR CLUB

DRAW YOUR STORY!

DIY Air Cannon

FUN FACT

Dolphins can create vortex rings to play with in the ocean by blowing air through their blowholes. The quick burst of air combined with the round shape of the blowhole creates a vortex ring of bubbles.

MATERIALS

- Plastic or styrofoam cups
- Scissors
- Balloon
- Various items to knock over

DIFFICULTY

AIR PRESSURE

Air pressure, also known as atmospheric pressure, is the force exerted on a surface by the weight of air. Even though it is invisible to our eyes, the air surrounding us puts about 14.7 pounds per square inch of pressure on everything on the surface of Earth. That's a lot of pressure!

Why do scientists love renewable energy so much?

*Answer on the next page

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FOR MORE SCIENCE FUN!

ALABAMA PUBLIC TELEVISION

DIY SCIENCE TIME

"Science is wherever YOU are!"

DIY Air Cannon

*Joke Answer -
Because renewable energy really BLOWS them away!

EXPERIMENT

Step 1: Gather your materials.

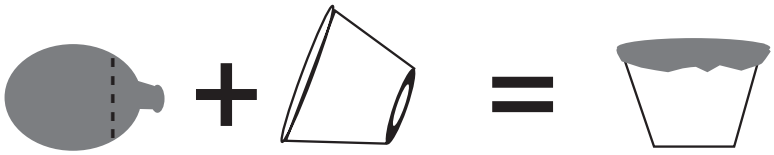
Step 2: Cut the neck off of the balloon and keep the large part.

Step 3: Carefully cut a hole in the bottom of the cup about the size of a dime with your scissors.

Step 4: Attach the cut balloon to the mouth of the cup. Be sure to stretch it tightly and reinforce by wrapping a rubber band around the lip of the cup.

Step 5: Tap or gently pull back the balloon and let it go to force the air out of your cannon.

Step 6: Set up a target, such as hanging toilet paper, to test to see how far your air rings can reach.



WHY IT WORKS

Although you can't see it, your cup is filled with air. When you apply a force to the air molecules by pulling back the balloon and letting it snapback, the air molecules are pushed towards the opening. This movement sets off a quick chain reaction of collisions with other air molecules and the sides of the cup. The only way for the air molecules to escape is through the opening at the bottom of the cup. The quick escape of these air molecules forms a stream of air that flows straight out of the cannon.

EXTEND YOUR LEARNING

- What might happen if you used a different sized cup? Could you cut a 2 liter bottle to make a larger cannon?
- Could you try another stretchy material to take the place of the balloon?
- Does it change the experiment if you make the hole a different shape? What if you place it in a different spot?
- Experiment with your air cannon to see what changes allow you to shoot air the furthest.
- Have a target competition with a friend.

WORKFORCE CONNECTION

A meteorologist studies interactions between temperature, humidity, air pressure, precipitation and vortices in the atmosphere. They develop an understanding of how vortices such as tornadoes, waterspouts and hurricanes form so they can predict the weather to keep people informed and safe. They also study and learn about the polar vortex and how it affects the weather during winter.

it's Storytime

CHALLENGE

Balloon Bagpipe

Scan here for instructions from Live From the Opera House Episode 308: Shoot for the Stars

- Large Balloon
- Plastic Bottle Top
- Tape
- Plastic Tube
- Scissors

My Design Ideas:

How could I improve on my design for next time?

DID YOU KNOW?

All musical instruments create sound through vibrations! Those vibrations create sound waves. Slower sound waves make a lower pitch, faster waves make a higher pitch!

POWER UP WORDS

- Vibration
- Pitch
- Waves

CAREER LIFTOFF

- Musician
- Sound Engineer
- Music Director
- Teacher
- DJ

CITY OPERA HOUSE

TCAPS Traverse City Area Public Schools Great Community, Great Schools

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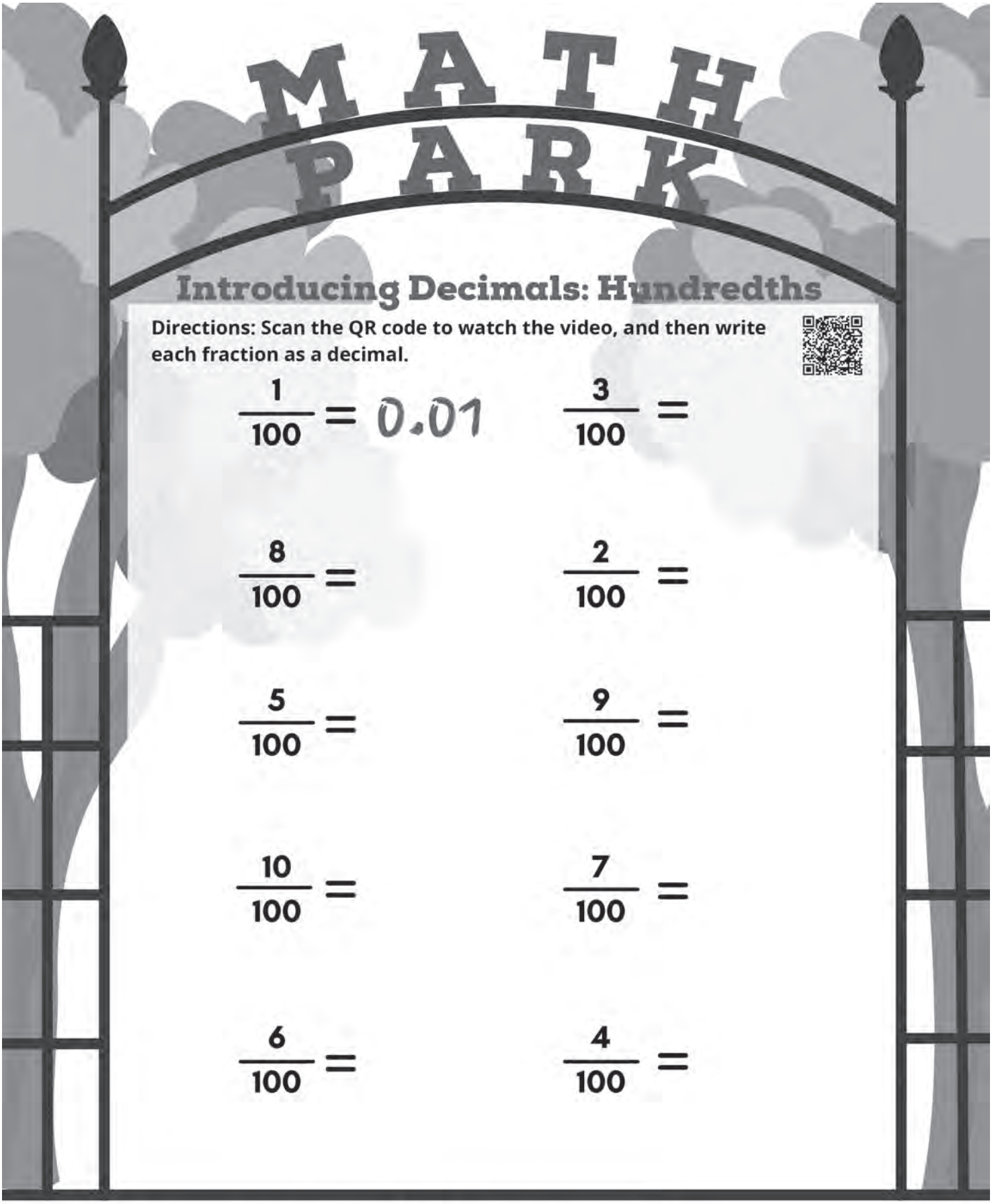
LIVE from the OPERA HOUSE it's Storytime

Learning Standards: 1st Grade

1-PS4-1 Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.



Introducing Decimals: Hundredths

Directions: Scan the QR code to watch the video, and then write each fraction as a decimal.

$\frac{1}{100} = 0.01$

$\frac{3}{100} =$

$\frac{8}{100} =$

$\frac{2}{100} =$

$\frac{5}{100} =$

$\frac{9}{100} =$

$\frac{10}{100} =$

$\frac{7}{100} =$

$\frac{6}{100} =$

$\frac{4}{100} =$

Michigan Learning Channel | Math Park Episode 308