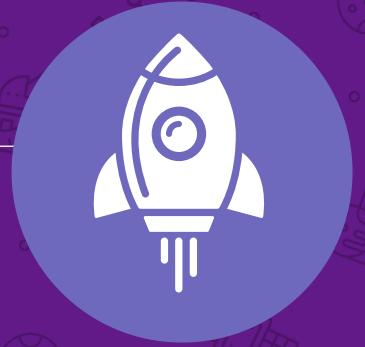


Start with a Book: Space Rangers

Exploring Gravity



Introduction

Gravity is an invisible force that pulls objects toward each other. On Earth, gravity continuously pulls us and everything on Earth (and in Earth's orbit) down towards the ground. The closer an object is to Earth, the more its gravity pulls on it. To explore space, spacecrafts have to overcome Earth's gravity, have kids build a model rocket to explore the force and thrust needed to launch a real rocket into space.

Supplies

- Straight, jumbo size (smoothie) straws
- Flexible drinking straws, standard size (standard straws need to slide inside the jumbo straws easily without too much extra space)
- 2 adhesive labels, 1" x 2.5" (for each rocket)
- Modeling clay (small ball to fill the end of the smoothie straw)
- Scissors
- Small stuffed animal (optional)
- Masking tape
- Tape measure

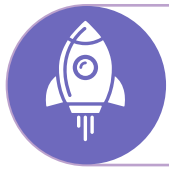
You'll need some space for launching the rockets!

Get kids thinking

Check kids understanding of gravity. Do they think things just naturally fall? They should understand that objects and people "fall" towards Earth because of gravity.

WATCH this Crash Course Kids video: Defining Gravity (youtu.be/ljRIB6TuMOU) or try a demonstration:





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Hold up a small stuffed animal. Drop it on the floor and **ASK KIDS**: What happened? Talk about how the force of gravity continuously pulls things down towards the ground. Next, toss the stuffed animal up into the air and then let it fall to the ground and **ASK KIDS** how the toy fell to the ground this time. Talk about the force you used to toss the stuffed animal up and the force of gravity that pulled it down to the ground.

Let's get started!

Have kids jump straight up as high as they can. **ASK KIDS**: how do you feel? How much energy did you use to jump? Were you able to jump very high? How does a rocket get so high? Why can't you jump as high?

Talk about the incredible amount of energy it takes to launch a rocket to overcome Earth's gravity. In a rocket engine, when ignited rocket fuel heats up, rapidly expanding gases are forced out of the tail of the rocket. This generates the upward thrust which pushes the rocket into the air.

IN THIS ACTIVITY, KIDS USE MOVING AIR BLOWN THROUGH A STRAW TO PROVIDE THE THRUST.

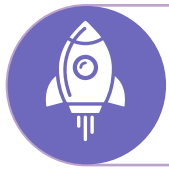
Provide kids with a jumbo straw, small clay ball, and labels. Have kids use the clay to stop up one end of the straw. This is the nose of the rocket. Have them fashion a nose cone by cutting one of the labels in half and wrapping it around the top of the straw, covering the clay.

Kids should cut the remaining label in half. They should use those halves along with the half label left over from the nose cone to make fins. Fins are at the opposite end of the rocket's nose. Kids should attach one end of the label to the straw, fold and crease the piece in half, and attach the remaining bit of label to the straw. They should position 3 fins around the base of the straw. (See photo at right).



Photo © Breece Walker





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Now kids are ready to launch! Have them bend the neck of the flexible drinking straw to a right angle. Next, they should slide the long end of the straw into the base of the rocket. Before anyone blows into the short end of the drinking straw to launch, make sure everyone has plenty of room and that no one is in the way of an incoming rocket.

COUNT DOWN 10-9-8-7-6-5-4-3-2-1, BLAST OFF!

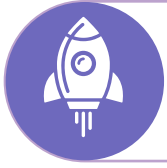


Photo © Breece Walker

After this initial test flight, measure out a flight zone with masking tape so kids can see how far their rockets travel in future flights. Have them launch again. Encourage kids to make observations about their rocket launch. **ASK KIDS:** Where did it go? How high? How far down the flight zone? What could you change about your rocket or your launch to make it go higher or travel farther? Talk about how the clay prevents the air from escaping from the rocket and is pressurized, producing a force — thrust.

Give kids a chance to modify their rockets, try different launch angles, blow harder, or redesign something different to test. Let them keep launching and revising and then discuss how their ideas and changes worked or didn't work.





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Launch	Launch Angle	Air Output	Distance	Observations
1				
2				
3				
4				
5				

More rocket activities

SIMPLE ROCKET SCIENCE

jpl.nasa.gov/edu/teach/activity/simple-rocket-science

UP, UP, UP! BUILD AND LAUNCH YOUR OWN ROCKETS

esa.int/Education/Teachers_Corner/Up_up_up!_Build_and_launch_your_own_rockets_Teach_with_space_PR23

