



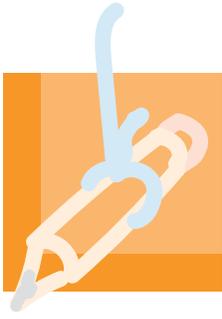
Down With Gravity

Use this guide to assist you with gathering materials and following along with the activities in the *Down With Gravity* video. The video has three activities you can do along with the instructor using simple materials. There is a materials list below that you can use to gather everything you need for the experiments. During the video, the instructor will let you know when you will use the materials you need. Pause the video when you need time to prep your materials or conduct your experiment. If you don't have the materials, you can still watch the video and observe the experiments. There are vocabulary words in this guide to assist you if the instructor mentions a new word you may not yet know. At the end of the video, answer the reflection questions to test your knowledge.

Objective: Explore that gravity is an attraction between objects with mass.

Grade: 5

MATERIALS		
Activity 1: Gravity Pencil Demo	Activity 2: Water Bottle and Paper Experiment	Activity 3: Gravity in a Cup
<ul style="list-style-type: none"><input type="checkbox"/> Pencil<input type="checkbox"/> String<input type="checkbox"/> Paper Clips<input type="checkbox"/> Scissors	<ul style="list-style-type: none"><input type="checkbox"/> 1 Water Bottle — Full<input type="checkbox"/> 1 Water Bottle — Half Empty<input type="checkbox"/> Food Coloring (Optional)<input type="checkbox"/> Paper<input type="checkbox"/> Paper Crumpled Into a Ball	<ul style="list-style-type: none"><input type="checkbox"/> Pencil<input type="checkbox"/> Disposable Cup<input type="checkbox"/> Sink or a Bathtub



MATERIALS

- Pencil
- String
- Paper Clips
- Scissors

Activity 1: Gravity Pencil Demo

WHAT TO DO

1. Tie one end of the string to the pencil, and the other to the paperclip so that the paperclip is dangling freely. You can add as many separate strings and paper clips as you have room for on your pencil.
2. Move the pencil all around, noting how the movement of the pencil affects the way the paper clips dangle.



MATERIALS

- 1 Water Bottle – Full
- 1 Water Bottle – Half Empty
- Food Coloring (Optional)
- Paper
- Paper Crumpled Into a Ball

Activity 2: Water Bottle and Paper Experiments

WHAT TO DO

Gravity: Water Bottle Experiment

1. Hold the full water bottle and the half-empty water bottle at the same height.
2. Drop the water bottles at the same time.
3. Watch how the water bottles fall and land.

Air Resistance and Gravity on Earth

1. What happens when we drop an object that has a different shape like a flat sheet of paper and a paper that has been crumpled up into a ball?
2. Let's see what happens when we drop the flat paper at the same height as the ball of paper. Hold the ball of paper and the flat paper at the same height.
3. Release both papers at the same time.
4. The paper ball lands first and the flat paper lands afterwards. The flat paper is slowed down because of air resistance.



Activity 3: Gravity in a Cup

Note: This activity involves water, so make sure you're working in a place where it's OK to get wet, such as over a sink or a bathtub

MATERIALS

- Pencil
- Disposable Cup
- Sink or Tub

WHAT TO DO

1. Take your cup and carefully poke a hole in the bottom. (You may need to ask an adult to do this step for you.)
2. Hold your cup over the sink or bathtub and cover the hole in the cup with your finger. Fill the cup with water, taking care to keep the hole covered.
3. Once it's filled, release your finger from over the hole.
What happens?
4. Refill the cup with your finger covering the hole.
5. Now hold it out over the sink again. What do you think will happen if you release the water and the cup at the same time?
6. Once you have your hypothesis, or educated guess, go ahead and let go! What happens?

VOCABULARY

Gravity: the force that attracts all objects

Force: a push or pull

Mass: the amount of matter in an object

Air Resistance: the frictional force air exerts against a moving object

STUDENT REFLECTION QUESTIONS

How does gravity pull different masses (heavy and light)?

How does air resistance affect the rate that objects fall?

What would happen if the hole was bigger? If it was smaller? Would that change what happens when you drop it?

WHAT'S HAPPENING?

Gravity is a force. A force is a push or a pull. But when we're talking about gravity, you should know that gravity always pulls, never pushes. Gravity is a force which tries to pull objects together. Gravity's pull is dependent on an object's mass. Mass is a measurement of how much matter or stuff is in an object. So a bigger planet with a bigger mass would have a stronger gravitational pull than a smaller planet with a smaller mass. Since the Earth's mass is so much bigger than your own, it overpowers your own gravitational pull. If you want to be able to experience your own gravity to the fullest, you would have to journey to the deepest part of space, somewhere where there are no other planets or stars to compete with. There are lots of other forces besides gravity that come into play, such as air resistance, or the frictional force air exerts against a moving object.

Check out more activities at www.nysci.org.