Activities

The Magic School Bus Gains Weight

Grades: 3–5

Overview
The Magic School Bus series explores gravity, and as a hands-on activity they organize a dropping station to see how gravity affects objects large and small or heavy and light.

Field Trip Notes
Guess who's selected to give an exhibition of a slam dunk during half-time of the big basketball game—Phoebe! The problem is, Phoebe can't jump high enough. 'If only gravity didn't pull on me!' she moans. Never one to be tied down, Ms. Frizzle sends them into space and turns the bus into a planet—with adjustable gravity! Basketball's a snap with low gravity, and a riot with no gravity at all. But when they end up with way too much gravity, things get really heavy!
What a Downer

Time: 20 minutes
Group Size: 4

Phoebe and her classmates find out that gravity pulls everything down. Your kids test whether gravity makes heavier things fall faster than lighter ones.

What You Need

For the class:
- Pencil tied to a string
- Scissors
- Copies of WHAT A DOWNER page

For each group:
- 1 empty film canister filled with sand, pennies, or clay
- 2 pairs safety glasses for “Eyes” and “Ears”
- Stepladder (optional)

Talk About It

Hold up the string with the pencil suspended. Ask a volunteer to cut the string. Ask: What happened? Why did the pencil fall?

What To Do

- Set up a dropping station for each group - stepladder, table edge, chair on table - the higher the better. Check that stations are sturdy.
- Ask: Do heavy objects fall faster than lighter ones? How can we tell if one object falls faster than another? How will we know if the objects hit the ground at the same time? What senses can we use? (vision, hearing)
• Give groups light and heavy film canisters to test. Ask: Does gravity pull equally on heavy and light objects?

**Next Stop**
If one kid throws a ball straight out, horizontal to the ground, and another drops a ball at the same time from the same height, will the balls hit the ground at the same time? (Yes. One may travel farther, but gravity pulls down on each equally, and they both fall at the same speed.) Ask: Is this difficult to judge with our senses? What could we use to improve our judgment?

**Subjects:** Science, Gravity, Force and Motion, Observation, Measurement
WHAT A DOWNER

Do heavy objects fall faster than lighter ones? You be the judge...

What Do You Think?

If you drop a heavy canister and an empty canister at the same time, will the heavy one fall faster? __Yes__ __No

Now, Find Out

1. Assign jobs.
   DROPPER places a heavy and light canister on the edge of a surface. When Starter says, "GO!" the Dropper knocks both off at exactly the same time.
   STARTER says, "GO!" and makes sure canisters fall at the same time.
   EYES and EARS wear safety glasses. They lie on the floor to see when objects hit. They listen as objects hit. Are the hit sounds together or apart?

2. Test your canisters.
3. Run four trials. Rotate jobs so everyone fills all jobs.

YOU BE THE JUDGE:

Which canister hit the ground first—
The heavier (H), the lighter (L), or both at the same Time (S)? Record H, L, or S on this chart.

<table>
<thead>
<tr>
<th></th>
<th>Trial #1</th>
<th>Trial #2</th>
<th>Trial #3</th>
<th>Trial #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DROPPER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STARTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EYES &amp; EARS #1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EYES &amp; EARS #2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wrap-Up

Do heavy objects fall faster than lighter ones? ____________
Were the trials easy to judge? ____________
Explain why or why not on the back.

Take-Home Challenge:

Can you push with as much force as gravity pulls?

1. Weigh yourself on a bathroom scale. Your weight is the pull of gravity on you.
2. Now, ask a family member to hold the scale against a wall. Push on it with both hands. Push HARD! Can you push your own weight?