

# Gravity

## 4<sup>th</sup> Grade

Kelly Krupa

### **Benchmarks:**

SLC 12: A.) Students will apply concepts of Newton's Laws in scientific explorations. B.) Students will explore the relationships among force, mass, direction and speed on moving objects.

### **Objectives:**

To engage students in an experiment to discover the properties of gravity at the Earth's surface.

### **Materials:**

- Chair
- Frisbee
- Beads
- Stuffed animal
- Water bottle
- Highlighter
- Keys
- Beach ball
- Baseball
- Crumpled paper
- Flat paper

### **Initial Demonstration:**

Jump off a chair. Ask the students what they saw. Why did this happen?

### **Target Observations:**

- The teacher jumped off the chair, went up into the air, and came back down
- The teacher came back to the ground because gravity pulled her down

### **Target Model:**

*-Gravity is something that pulls things down to Earth.*

### **Discussion:**

Gravity is a force acting on us. We can think of forces as pushes and pulls. Discuss forces and where we see them.

### **Target Observations:**

- You give the door a force every time you open it
- You feel a force when the car or bus speeds up or slows down quickly
- You give a baseball a force when you strike it with a bat

### **Target Revised Model:**

*-Gravity is a force that pulls things down to Earth.*

*-A force is a push or a pull.*

### **Procedure:**

Discuss the myth of Galileo Galilei's experiments in which he threw items out of the leaning Tower of Pisa (over 400 years ago) to find out how fast they fall (he didn't actually drop them, he rolled them down a plank). Pass out a Galileo sheet to each student and have students make predictions about what they think will happen when the two items listed on the same line are dropped at the same time.

After the students have made their predictions, drop the objects onto a table while standing on a chair. Make note to the students that you are dropping them from the same height, at the same time, in the same room, etc... There is only 1 thing changing – what is it? Have the students circle which object hit first (if there was a tie, put an = sign). Discuss how close their predictions were to what actually happened and why they were off. Why did any of the objects fall to the desk? Does everything get pulled down to the Earth at the same time?

**Target Observations:**

- *Students make predictions and record observations*
- Only the type of object dropped is being changed
- All of the objects are falling because of gravity
- Some of the objects fall at different rates (i.e. they take different amounts of time to fall to the ground)

**Target Model:**

- Gravity is a force that pulls things down to Earth.
- A force is a push or a pull.
- Some objects fall to Earth at different speeds.*

**Procedure:**

Why might the 2 papers fall at different speeds? Why do people use a parachute when they jump out of airplanes? What types of shapes would you think are affected by this the most? If there was no air, what do you think would happen?

**Target Observations:**

- Skydivers use parachutes to use air resistance to slow them down before they hit the Earth.
- The 2 papers fall at different speeds because: they weigh differently or they have different amounts of air resistance.
- The 2 papers weigh about the same
- Flat or baggy shapes probably have more air resistance than small, tight shapes
- If there was no air to slow the paper down, they would probably fall at the same rate.

**Target Revised Model:**

- Gravity is a force that pulls things down to Earth.
- A force is a push or a pull.
- Some objects fall to Earth at different speeds, *because air resistance slows them down.*
- Without air resistance, objects would fall at the same speed.*

**Discussion:**

Why does gravity matter in our everyday lives?

**Target Observations:**

- We would float away without gravity
- Gravity keeps the earth orbiting around the sun
- We use gravity as a constant variable in experiments

Name:

Date:

**Galileo Galilei Test**

***Instructions:** Think about, then circle, which object you think will hit first under the 'your educated guess' section. Then, watch and circle which one really hit first under the 'what actually happened' section.*

**Your educated guess:**

**What actually happened:**

- |                   |              |                   |              |
|-------------------|--------------|-------------------|--------------|
| 1) Frisbee        | Beads        | 1) Frisbee        | Beads        |
| 2) Stuffed animal | Water bottle | 2) Stuffed animal | Water bottle |
| 3) Highlighter    | Keys         | 3) Highlighter    | Keys         |
| 4) Beach ball     | Baseball     | 4) Beach ball     | Baseball     |
| 5) Crumpled paper | Flat paper   | 5) Crumpled paper | Flat paper   |

Did things happen the way you thought they were going to?  
Why or why not?

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