

## 1. Essential Element

**Activity/Lesson Title:** Gravitational Force

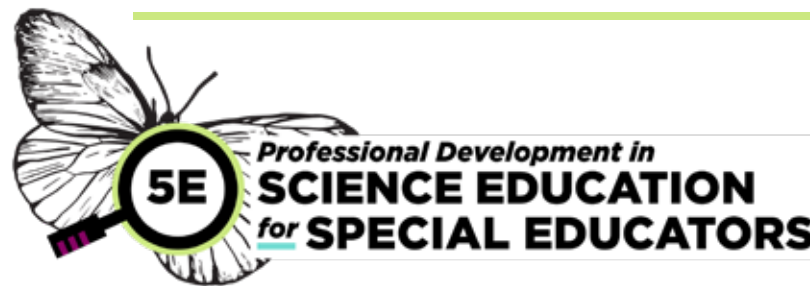
**EE.5.PS2-1:** Support an argument that the gravitational force exerted by Earth on objects is directed down.

**Teacher:** Jordan

**Grade Level:** 6

**Student:** Elizabeth

**Level:** Initial



## 2. Science and Engineering Practice

### *SEP 7: Engaging in Argument from Evidence*

**SEP description:** Supports students as they construct scientific arguments using evidence, data, or models.

## 3. Disciplinary Core Idea

### *Motion and Stability: Forces and Interactions*

**Core Idea description:** The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.

## 4. Crosscutting Concept

### *Cause and Effect*

**Concept Description:** Cause and effect relationships are routinely identified and used to explain change taking place in scientific phenomena.

## 5. Linkage Level Descriptors

**Initial:** Recognize the direction an object will go when dropped.

**Precursor:** Predict the direction an object will go when dropped.

**Target:** Demonstrate that the gravitational force exerted by Earth on objects is directed down.

## 6. Student's Typical Accessibility Supports

- AAC device to respond to prompts
- Checklist of lesson activities
- Graphic organizers
- Picture supports
- Oral directions

## 7. Student Prior Experiences, Prior Knowledge

- The student likes softball.
- The student loves a book about Earth.
- The student loves watching the rain.
- The student has prior knowledge of directional words.

## 8. Phenomenon to Explore

**Question:** What direction do objects go when they are dropped?

## 9. Possible Alternative Conceptions

**Some students may think (incorrectly) that**

- Gravity is related to movement, proximity to Earth, or magnetic fields.
- The Moon has no gravity.
- Planets more distant from the sun have less gravity.
- Astronauts are weightless in space because there is no gravity above Earth.
- Air pressure pushes objects to the Earth.
- Not all mass has gravity.

## 10. UDL Options and Solutions to Potential Barriers

- Use a checklist of lesson activities.
- Use familiar objects in an investigation.
- Use media and technology (e.g., videos, interactive whiteboards) to show various objects falling, including objects that would be unsafe to drop in the classroom.
- Use an appropriate number of investigations (e.g., dropping objects).
- Use appropriately complex phenomena and questions.
- Use a first/then structure to establish goals for the lesson.
- Use tangible examples and interactive opportunities (e.g., different materials for students to experiment with).
- Use enough time for the student to slowly adjust to the new materials or surroundings.
- Use the appropriate academic language and model less complex vocabulary using the students' communication system.

## 11. Engage

### Think

- *How can I make sure to access students' prior learning?*
- *How can I use the CCC to connect everyday language with the scientific language of the phenomenon?*
- *How can I support student participation by scaffolding the SEP?*

### Teacher Will

- Read an informational text about gravity with students.
- Have students (who are able) jump and then drop a pencil to test the direction that objects fall when dropped.
- Pause to ask questions to monitor student comprehension.
- Ask questions that students can answer using the text.

### Students Will

- Read informational text with the teacher.
- Answer questions posed about gravity.
- Ask additional questions that are brought up by the text or that students may have based on their experience.

## 12. Explore

### Think

- *What is difficult or inaccessible about the phenomenon, and how can I make it more accessible in the Explore phase?*
- *How can students collect data in a way that helps answer a scientific question?*
- *How can I stress students' careful observation and asking good questions vs. looking for only the "right answer"?*

### Teacher Will

- Watch a video with students called "Defining Gravity."
- Ask students first to think about "What causes some meteorites to crash to the Earth?" "Why don't all the meteorites float away into space?" "Why don't we humans or other objects on Earth float away into space?"
- Assist students in investigating the direction objects go when dropped (balls, handkerchiefs, etc.) and gathering data using a t-chart and images/objects that are put on the board.

### Students Will

- Answer questions before watching the video.
- Watch a short video; ask questions that they might have about gravity.
- Gather data after dropping differently weighted objects.
- Think about and answer, "Is it true that 'what goes up must come down?'" (question from the video).

## 13. Explain

### Think

- *How can I help students connect science topics, phenomena, data, and everyday experiences? How can I help my students differentiate everyday language from scientific language? What reasoning helps students see or explain the invisible?*

### Teacher Will

- Assist students in reviewing data collected.
- Ask prompting, open-ended questions to help students make connections between the data and the question that they are trying to answer (e.g., "Do objects always fall downwards?" "Why do you fall down and not float up?").
- Introduce and reinforce the definition of gravity.
- Assist students in completing a CER organizer.

### Students Will

- Review data from experiments to use as evidence.
- Complete a CER statement.

**Claim:** Objects on Earth fall down when dropped.

### Evidence:

- » I read in a book and watched a video that said objects fall toward the ground.
- » I tested different objects by dropping them, and they all fell toward the ground.

**Reasoning:** The objects that I tested and those in the video fell downward to the ground.

## 14. Elaborate

### Think

- *How can I enrich or extend student ideas? Are there related science concepts or processes that would support student learning?*

### Teacher Will

- Extend the lesson to help students apply their understanding that dropped objects will fall to the ground.
- Using the same objects, investigate which falls faster or slower; predict which will fall faster/slower.

- Gather new objects and ask the students to predict what will happen before they are dropped (working towards the precursor level).
- Have students predict and then drop a helium balloon. Why does the balloon not fall to Earth right away? Will it ever fall to the Earth?

### Students Will

- Make a prediction about what will happen when an object is dropped.
- Drop different objects to test their predictions.
- Verbally communicate whether their results matched their prediction.

## 15. Evaluate

### Think

- *What do I need to see or hear from my students that assures that they have learned the science content? What information must I gather to inform my teaching as I move through the lesson?*

### Teacher Will

- Provide an exit ticket at the end of the lesson asking about the phenomenon and about what happened during the investigations.
- Use the student responses to inform the evaluation.

### Students Will

- Respond to questions posed by the teacher summarizing the investigation, what they did, and what they learned from it.
- Complete the graphic organizer (t-chart).
- Complete the CER.
- Complete an exit ticket (e.g., select which way objects in our experiments today fell – up or down).