Force And Motion

Physical Science | Lesson Guide

3rd Grade

Photo Description

A student wearing a red shirt and gray pants is jumping over an orange cone during an outdoor activity. The child's body is in mid-air, showing their legs bent and arms out to the sides for balance. Other students can be seen in the background watching the activity take place on a grassy area near a school building.

Scientific Phenomena

Anchoring Phenomenon: A person jumping into the air and landing back on the ground.

Why It's Happening: When the student pushes down hard with their legs against the ground, that force pushes them upward into the air. Gravity is a force that pulls everything toward Earth, so once the student leaves the ground, gravity pulls them back down. The student must use muscular force to overcome gravity to jump, and then gravity brings them safely back to the ground. This is a perfect example of how forces cause changes in motion.

Core Science Concepts

* Force: A push or pull that can make something move, stop, or change direction. In this image, the student's legs push down (force) to make their body go up.

* Motion: A change in position or location. The student is moving upward through the air, then downward back to the ground.

* Gravity: A force that pulls objects toward Earth. It is always working, even when we can't see it, pulling the student back down to the ground after jumping.

* Balance and Control: The student's arms are spread out to help them balance in the air and land safely. This shows how our bodies use forces to control movement.

Pedagogical Tip:

Help students understand that forces are all around them by using their own bodies as examples. Have them feel the push of the ground under their feet when jumping, or the pull of gravity when they fall. Concrete, experiential learning is crucial for third graders to grasp abstract concepts like force and gravity.

UDL Suggestions:

To support diverse learners, provide multiple means of engagement and representation: (1) Allow kinesthetic learners to physically jump and describe what they feel; (2) Use visual aids like arrows drawn on photos to show direction of forces; (3) Offer vocabulary cards with pictures for students who benefit from visual scaffolding; (4) Partner students who need support with peer models during hands-on activities.

Discussion Questions

1. What force did the student use to jump into the air? (Bloom's: Understand | DOK: 1)

2. Why does the student come back down to the ground after jumping? What force makes that happen? (Bloom's: Explain | DOK: 2)

3. How did the student use their arms to help with their jump? What would happen if they kept their arms at their sides? (Bloom's: Analyze | DOK: 2)

4. If you jumped on the Moon instead of Earth, where gravity is much weaker, how do you think your jump would be different? (Bloom's: Evaluate | DOK: 3)

Extension Activities

1. Jump Challenge: Set up a safe obstacle course with cones of different heights. Have students practice jumping over cones and record how high they can jump. Discuss what forces helped them jump higher (more leg push) and what made it harder (obstacles in the way).

2. Force Detective Walk: Take students on a "force hunt" around the playground or classroom. Have them identify and record examples of pushes and pulls they see (pushing a swing, pulling a door, jumping off a step). Create a class chart showing "Push Forces" and "Pull Forces."

3. Gravity Experiment: Drop different objects from the same height (ball, feather, paper, apple) and observe which falls fastest. Discuss whether gravity pulls all objects equally. Then crumple the paper and drop it again to show how air resistance affects falling objects.

NGSS Connections

Performance Expectation: 3-PS2-1: Plan and conduct an investigation to provide evidence that balanced and unbalanced forces on an object change its motion.

Disciplinary Core Ideas:
- 3-PS2.A (Forces and Motion)
- 3-PS2.B (Types of Interactions)

Crosscutting Concepts:
- Cause and Effect
- Patterns

Science Vocabulary

* Force: A push or pull that makes something move or changes how it is moving.

* Gravity: An invisible force that pulls everything toward Earth.

* Motion: When something changes position and moves from one place to another.

* Jump: To push off the ground with your legs to go into the air.

* Balance: Keeping your body steady and not falling over.

External Resources

Children's Books:

Push and Pull* by David Adler (Illustrator: Edward Miller)

Forces Make Things Move* by Kimberly Brubaker Bradley (Illustrator: Paul Meisel)

What Makes Things Move?* by Kathleen Weidner Zoehfeld (Illustrator: Nadine Bernard Westcott)

YouTube Videos:

* Title: "Force and Motion for Kids" | Description: An engaging animated video explaining how forces cause motion using everyday examples. | URL: https://www.youtube.com/watch?v=LBIuX7ibqxE

* Title: "Gravity Explained for Kids" | Description: A simple explanation of gravity with real-world examples that help children understand why things fall down. | URL: https://www.youtube.com/watch?v=ptaZVZr1zuA