Force And Motion

Physical Science | Lesson Guide

1st Grade

Photo Description

A child wearing a red shirt and khaki pants is jumping high in the air over an orange cone during an outdoor activity. Other children watch from the background. The child's feet are off the ground, showing how their body moved upward through the air.

Scientific Phenomena

Anchoring Phenomenon: A child jumping and temporarily leaving the ground.

Why This Happens: When the child's muscles push down hard against the ground, the ground pushes back up with equal force. This upward push is stronger than the pull of gravity for a moment, so the child's body moves upward into the air. Once the child stops pushing and is in the air, gravity pulls them back down to the ground. This demonstrates the fundamental principle that forces cause objects to move, and that balanced and unbalanced forces determine motion.

Core Science Concepts

* Force is a push or pull. The child's leg muscles push against the ground to make the jump happen.

* Motion is when something changes position or location. The child moves upward into the air, showing motion caused by force.

* Gravity always pulls objects downward. Even though the child jumps up, gravity will eventually bring them back to the ground.

* Objects need a force to start moving, stop moving, or change direction. The child's muscles provide the force needed to jump; gravity provides the force that brings them down.

Pedagogical Tip:

First graders learn best through direct experience. Rather than only discussing the concept, allow students to jump themselves and observe their classmates. Ask them to notice what their legs do before jumping and what happens when they land. This kinesthetic connection helps cement understanding of force and motion in developmentally appropriate ways.

UDL Suggestions:

Provide multiple means of engagement: Some students may prefer jumping, while others might roll a ball, push a toy car, or throw a beanbag to explore forces. Offer choice in how students demonstrate their understanding of jumping—through movement, drawing, dictation, or simple writing. For students with mobility differences, jumping can be replaced with other movements like arm reaches, spinning in a chair, or pushing objects across a table.

Zoom In / Zoom Out

Zoom In: Inside the Muscles
When the child's leg muscles contract (tighten up), special fibers inside the muscles slide past each other, getting shorter and stronger. This happens so fast we can't see it! Millions of tiny muscle fibers all work together at the same time to create the big push that lifts the child off the ground. Even though we only see the jump happen in a second, inside the body, incredible things are happening in the muscles to make that force.

Zoom Out: Jumping in the Community
Jumping is something children do in many places—at playgrounds, during sports, in dance class, and at recess. Communities build playgrounds and fields where children can safely jump and play. Other people like coaches, gym teachers, and playground supervisors help children learn safe ways to move and exercise. When we zoom out, we see that jumping is part of how communities help children stay healthy and active.

Discussion Questions

1. What did the child's legs do to make their body jump up? (Bloom's: Understand | DOK: 1)
2. Why does the child come back down to the ground instead of floating in the air? (Bloom's: Understand | DOK: 2)
3. If the child pushed their legs even harder, what do you think would happen to their jump? (Bloom's: Analyze | DOK: 2)
4. How is jumping different from running? What forces are the same or different? (Bloom's: Analyze | DOK: 3)

Potential Student Misconceptions

Misconception 1: "Gravity only works when you jump down; it doesn't work when you jump up."
Clarification: Gravity is always pulling on us, even when we jump up! When we jump, our leg muscles are strong enough to push us up against gravity for a moment. But gravity never stops working—it's always there pulling us back down. That's why we always come back to the ground.

Misconception 2: "Bigger children can jump higher because they are heavier."
Clarification: Size doesn't always mean a bigger jump! A child's jumping ability depends on how strong their leg muscles are and how hard they can push, not just how heavy they are. Some smaller children with strong muscles can jump very high!

Misconception 3: "You need to move your arms to jump; the jump comes only from your legs."
Clarification: While legs do the main work of jumping, arms help too! When we swing our arms up as we jump, it helps our whole body move upward. Arms and legs work together to create the jumping motion.

Extension Activities

1. Jump Challenge Obstacle Course: Set up cones, lines on the ground, and low barriers. Have students jump over and around obstacles while you observe how they adjust their force and motion. Ask: "How did you change your jump to go over the tall cone?"

2. Compare Different Movements: Have students explore different ways to move (walking, running, hopping on one foot, crawling, rolling). Discuss which movements require the most force and why. Create a class chart showing "Pushes We Use" for each movement.

3. Force Exploration Station: Provide various objects (balls, blocks, toy cars, bean bags) and let students push, pull, and throw them. Have them observe which objects need more or less force to move and record observations through drawings or simple dictation.

Cross-Curricular Ideas

Math Connection: Measuring Jumps
Have students jump and measure how far or high they jumped using non-standard units (handspans, footprints, blocks stacked together). Create a class graph showing "How Far We Jumped" with each student's name and their distance. Students practice measuring, comparing, and organizing data while exploring force and motion.

ELA Connection: Jump Action Words
Read and discuss action verbs related to jumping: hop, leap, bounce, spring, vault, and soar. Have students act out each word to feel the different movements. Create a word wall with pictures and ask students to dictate or write sentences like "I can hop like a rabbit" or "The frog can leap high." This builds vocabulary while reinforcing the science concept.

Art Connection: Motion in Movement
Have students create drawings or paintings showing a person in different positions during a jump (preparing, jumping, landing). Use arrows and lines to show the direction of motion. Students can also create a flip-book animation showing the jump sequence, combining art with an understanding of how motion happens over time.

Social Studies Connection: Games and Play Around the World
Explore how children in different cultures and countries jump and play. Research jump rope games, hopscotch variations, or traditional jumping games from different places. Discuss how jumping is a way people all over the world exercise, have fun, and spend time together as communities.

STEM Career Connection

Physical Therapist
A physical therapist helps people who are hurt or having trouble moving. They teach people exercises and movements to help them get stronger and move better. If a child hurt their leg and couldn't jump, a physical therapist would show them gentle exercises to help them jump again. They use their knowledge of how muscles and bones work together.
Average Annual Salary: $91,010 USD

Fitness Coach or Personal Trainer
A fitness coach helps people stay healthy and strong by teaching them exercises and movements. They might work at a gym, a school, or a sports team. Coaches understand how the body moves and what exercises make muscles stronger. They help people learn to jump higher, run faster, and be healthier.
Average Annual Salary: $40,390 USD

Biomechanics Engineer
A biomechanics engineer studies how our bodies move and uses science to help people move better. They might design special shoes for athletes, wheelchairs for people who need them, or equipment to help someone jump higher in sports. They combine science and engineering to understand forces and motion in the human body.
Average Annual Salary: $68,620 USD

NGSS Connections

Performance Expectation:
K-PS2-1: Plan and conduct an investigation to provide evidence that vibrations make sound and that vibrations can make other objects move.
(Note: While this PE focuses on sound, the broader K-PS2 standard addresses forces and motion fundamentals.)

Disciplinary Core Idea:
K-PS2.A | Objects can be moved in a variety of ways, such as pushing, pulling, and by releasing or throwing them.

Crosscutting Concepts:
* Cause and Effect | The child's leg muscles cause a force that results in the motion of jumping.
* Patterns | Students can observe patterns in jumping motion across multiple trials.

Science Vocabulary

* Force: A push or pull that makes something move, stop, or change direction.

* Push: A force that moves something away from you.

* Jump: To push off the ground with your legs and move upward into the air.

* Gravity: An invisible force that pulls everything toward Earth and brings things back down.

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

* Obstacle: Something in the way that you have to go over, under, or around (like the cone in the photo).

External Resources

Children's Books:
Push and Pull* by Lola M. Schaefer (explores forces in everyday activities)
Jumping* by Leslie Pate Mackeen (celebrates movement and jumping)
Move!* by Steve Jenkins (interactive book about different types of motion)