Kinetic Energy

Physical Science | Lesson Guide

Kindergarten

Photo Description

A skateboarder in a white helmet is jumping high into the air at a skate park while their skateboard flies below them. The person is moving very fast and their body is in the air, showing how things can move and change direction when we push them hard.

Scientific Phenomena

Anchoring Phenomenon: What makes things move fast and fly through the air?

This image shows kinetic energy—the energy of motion. When the skateboarder pushes off and moves across the smooth concrete surface, they gain speed (momentum builds). Their leg muscles do work to overcome friction and propel their body forward. At the lip of the ramp, their forward motion and speed cause them to leave the ground and become airborne. Gravity then pulls them back down. For young learners, the key observable is: moving things have energy, and faster-moving things have MORE energy.

Core Science Concepts

* Movement and Speed: Objects move at different speeds. This skateboarder is moving very fast, which we can see by how high they jump.

* Forces in Action: A push (from legs) makes the skateboard and person move. The ground pushes back on the skateboard (friction), which helps the rider go fast.

* Gravity: After jumping high, the skateboarder comes back down because Earth pulls everything toward it.

* Energy Transfer: The skateboarder's muscles create energy that makes the skateboard move. That moving energy helps them jump high.

Pedagogical Tip:

For Kindergarteners, avoid the term "kinetic energy" directly—instead, use observable language: "When things move really fast, they have a LOT of power!" Connect to students' own bodies: "When YOU run fast, YOU have power too!" Use actions and movement to make the concept concrete rather than abstract.

UDL Suggestions:

Multiple Means of Representation: Provide photographs, slow-motion videos, and hand motions to show fast vs. slow movement. Some students may not relate to skateboarding, so show other examples of fast movement (running, sliding, rolling).

Multiple Means of Action & Expression: Allow students to demonstrate fast/slow movement with their bodies instead of only answering verbally. Use visual supports (fast/slow cards with pictures) alongside verbal instructions.

Multiple Means of Engagement: Connect to students' interests—do they ride bikes, scooters, or play on playgrounds? Use those familiar contexts to introduce the concept.

Discussion Questions

1. What do you see the skateboarder doing? (Bloom's: Remember | DOK: 1)

2. Why do you think the skateboarder is flying up in the air? What made them jump so high? (Bloom's: Infer | DOK: 2)

3. How is the skateboarder moving differently than someone walking slowly? What is different about their speed? (Bloom's: Compare | DOK: 2)

4. If the skateboarder went slower, do you think they would jump as high? Why or why not? (Bloom's: Predict | DOK: 3)

Extension Activities

1. Fast and Slow Movement Game: Have students walk slowly across the room, then run fast. Ask them: "Which made you move more? Which used more power?" Repeat with rolling toy cars down a ramp—compare rolling slowly vs. rolling very fast and which goes farther.

2. Jump Height Experiment: Mark a wall at different heights with tape. Have students jump with a small push-off vs. a big push-off, and see whose jump goes highest. Discuss: "Did a bigger push make a bigger jump?"

3. Skateboard/Scooter Exploration (If Available): Let students safely ride a scooter on a flat, supervised space. Ask: "How do you make it go fast? What happens when you stop pushing? Does it slow down?" This connects the image directly to their own experience.

NGSS Connections

Performance Expectation:
K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Disciplinary Core Ideas:
- K-PS2.A - Forces and Motion

Crosscutting Concepts:
- Cause and Effect
- Energy and Matter

Science Vocabulary

* Move/Motion: When something changes place or position from one spot to another.

* Fast/Speed: How quickly something is going from one place to another.

* Push: A force that makes something go away from you or go faster.

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

* Gravity: The invisible force that pulls things down toward the ground.

* Energy: The power to make things move and change.

External Resources

Children's Books:
- Go, Dog. Go! by P.D. Eastman (simple story about fast and slow movement)
- The Wheels on the Bus (traditional song with movement; emphasizes speed and motion)
- Fast and Slow by Ken Robbins (concept book about speed)

YouTube Videos:
- "Speed and Motion for Kids" by Crash Course Kids (3:53) — Explains fast/slow in kid-friendly language with real-world examples. https://www.youtube.com/watch?v=JzCX3FqDIOc

- "What is Energy?" by National Geographic Kids (2:38) — Introduces energy through visible actions and movement. https://www.youtube.com/watch?v=W6MWJX8KwbI