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.

Zoom In / Zoom Out

Zoom In: Muscle Cells at Work
When the skateboarder pushes their legs to make the skateboard move fast, tiny muscle cells inside their legs are contracting (squeezing). These muscle cells use energy from food to create the push force. We can't see these cells with our eyes—they're super tiny—but they're what make the skateboarder's legs strong enough to jump high!

Zoom Out: Motion in the Community & World
The skate park is part of a larger community where many things are moving—cars on streets, bikes on paths, airplanes in the sky, and people running. All of these moving things use energy and are affected by gravity and forces. Scientists and engineers study how things move everywhere on Earth (and even in space!) to make transportation safer and faster.

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)

Potential Student Misconceptions

Misconception 1: "The skateboard is pushing the person up into the air."
- Clarification: The person's leg muscles push against the ground/ramp to make their body go fast and jump up. The skateboard doesn't have its own power—the person controls it. Gravity is what brings them back down, not the skateboard.

Misconception 2: "Heavier people jump higher than lighter people."
- Clarification: How HIGH someone jumps depends more on how hard they push with their legs (force) than on how heavy they are. A lighter person with strong leg muscles can jump very high. A heavier person with very strong muscles can also jump high. It's about the power of the push, not just the weight.

Misconception 3: "Things stay in the air because they're moving fast."
- Clarification: Even though the skateboarder is moving very fast, gravity always pulls things back down to Earth. Nothing can stay floating in the air—gravity is always working! Fast movement helps you jump higher, but it doesn't keep you in the air forever.

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.

Cross-Curricular Ideas

Math Connection: Measuring Jumps & Comparing Heights
Have students use non-standard measurement (blocks, hand-spans, or footprints) to measure how high they can jump with a small push vs. a big push. Create a simple bar graph showing "Small Push Jumps" vs. "Big Push Jumps." Discuss: "Which jump was taller? How many blocks higher?"

ELA Connection: Action Words & Movement Stories
Read books with action verbs like Go, Dog. Go! and have students act out the words: zoom, dash, leap, glide, soar. Then have students create a simple picture story about "My Fast Adventure" using movement words. They can draw themselves doing something fast (running, sliding, jumping) and dictate or label the picture with action words.

Social Studies Connection: Community Helpers & Safety
Discuss why the skateboarder is wearing a helmet—it keeps them safe! Connect to other community helpers (firefighters, police officers, construction workers) who wear safety gear. Have students draw or discuss: "What safety gear do people wear when they move fast? Why is it important?"

Art Connection: Movement in Art & Freezing Motion
Show students action photographs and ask them to recreate the pose with their bodies (like a human statue). Have them draw or paint themselves "frozen" in a fast-moving position with exaggerated arms and legs to show motion. Discuss: "How do artists show that something is moving when a picture can't actually move?"

STEM Career Connection

Skateboard Designer/Engineer
A skateboard designer makes skateboards that are fun, safe, and work really well. They think about how to make skateboards that are light enough to jump high with, but strong enough not to break. They test different shapes and materials to see which ones help people do cool tricks. Average Salary: $55,000–$75,000 per year

Physical Therapist or Sports Medicine Doctor
These doctors help people who do sports stay healthy and strong. If a skateboarder gets hurt, a physical therapist helps them feel better and teaches them exercises to make their muscles stronger. They understand how the body moves and how to keep athletes safe. Average Salary: $88,000–$120,000 per year

Physicist or Motion Scientist
Physicists study how things move, how fast they go, and what forces make them move. They use math and experiments to understand jumping, flying, and falling. Some physicists help design safer skate parks by studying how people move and where accidents happen. Average Salary: $75,000–$130,000 per year

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)