

Photo Description



This image shows the bumpy, grooved pattern on a tire called tread. The deep ridges and raised bumps on the tire surface are designed to help cars grip the road safely. You can see how the tread pattern creates a textured surface that looks very different from a smooth wheel.

Scientific Phenomena

Anchoring Phenomenon: Why do tires have bumpy patterns instead of smooth surfaces?

Scientific Explanation: Tire tread exists to create friction—a force that happens when two surfaces rub together. The bumpy grooves and ridges increase the contact area between the tire and the road, helping the tire grip better and preventing slipping. Smooth tires would slide more easily on wet or icy roads because there's less surface area for friction to work. The deeper the tread, the better the tire can push water and debris away, maintaining grip even in bad weather.

Core Science Concepts

1. **Texture & Surface Properties:** Objects have different textures (bumpy, smooth, rough). The texture of tread affects how a tire interacts with the road.
2. **Friction:** Friction is a force that slows things down or stops them from sliding. Bumpy surfaces create more friction than smooth surfaces.
3. **Cause & Effect:** The design of the tire tread (cause) affects how well a car can stop and turn (effect).
4. **Materials & Wear:** Tires are made from rubber that wears down over time. The deeper the tread grooves, the safer the tire; shallow tread means the tire needs replacing.

Pedagogical Tip:

Engagement Tip: Start the lesson by asking students to rub their fingertips on a smooth desk, then on a bumpy textured surface (like tree bark or sandpaper). Have them compare how each feels and predict which would help a car stop better. This tactile experience builds understanding of friction before introducing tire tread concepts.

UDL Suggestions:

Multiple Means of Representation: Provide both visual inspection of tires AND tactile exploration of textured materials. Show photographs and real tire samples. Use simple diagrams with labels showing how bumps help grip the road.

Multiple Means of Action & Expression: Allow students to demonstrate learning through drawing tires with and without tread, physically moving toy cars across smooth vs. textured surfaces, or creating rubbings of tire tread patterns.

Multiple Means of Engagement: Connect to student experience: "Have you ever slipped on ice?" or "Why do rain boots have bumpy bottoms?" This makes the phenomenon personally relevant.

Zoom In / Zoom Out

Zoom In: The Microscopic View

If we could shrink down really, really small and look at tire rubber under a super-powerful microscope, we would see tiny bumps and valleys all over the rubber surface—even tinier than what we can see with our eyes! These microscopic bumps help the tire grip the road because the bumps on the tire catch on tiny bumps on the road surface, kind of like two puzzle pieces fitting together. When a tire gets old and worn down, those tiny bumps wear away, making it harder for the tire to grip.

Zoom Out: The Transportation System

Tires are just one small part of a much bigger system that keeps cars safe and moving. Cars need tires with good tread so they can stop quickly on roads. Roads need to be smooth and level so tires can grip them properly. Traffic lights, road signs, and painted lines all work together with tires to keep people safe. Even the weather matters—rain, ice, and snow all affect how well a tire's tread can grip the road. All these pieces work together as a transportation system to help people travel safely.

Discussion Questions

1. What would happen if a tire had NO bumps and was completely smooth? Why?
(Bloom's: Predict | DOK: 2)
2. Where else do you see bumpy patterns that help things NOT slip? Can you find an example in our classroom?
(Bloom's: Analyze | DOK: 3)
3. Why might a tire get "bald" (lose its bumps) after a car drives for many miles?
(Bloom's: Explain | DOK: 2)
4. How is the bumpy tread on a tire similar to the bumpy bottom of your shoes or sneakers?
(Bloom's: Compare | DOK: 3)

Potential Student Misconceptions

Misconception 1: "Bumps are just for looks."

Some students might think the tire tread is just a design or pattern that looks cool but doesn't really do anything important. Clarification: The bumps aren't decorations—they have an important job! They help the tire hold onto the road so the car doesn't slip. It's the same reason your shoes have bumpy bottoms: so YOU don't slip!

Misconception 2: "A smooth tire would be faster."

First graders might think a smooth, slippery tire would make a car go faster, like how ice feels slippery. Clarification: While a smooth tire might feel faster for a moment, it's actually more dangerous because it can't grip the road well. A car with bumpy tire tread is safer and stops better, even if it doesn't go faster.

Misconception 3: "Tires wear out because they get dirty."

Students might believe tires become bald (lose their bumps) simply because they get dusty or muddy. Clarification: Tires wear down because the rubber rubs against the road millions and millions of times. The friction that helps the car grip the road also slowly wears away the bumpy tread, kind of like how a pencil gets shorter the more you use it.

Extension Activities

1. Tire Tread Rubbings & Comparisons:

Set out paper and crayons near a tire (or a photo). Have students make rubbings of the tread pattern, then compare it to rubbings of other textured items (tree bark, leaf veins, bumpy toys). Display these side-by-side and discuss which have the deepest patterns.

2. Slipping Experiment with Toy Cars:

Create two ramps—one smooth (plastic wrap or aluminum foil) and one textured (sandpaper or bumpy shelf liner). Let students roll toy cars down each ramp and observe which one stops more easily. Connect this to how tire tread helps real cars stop. Safety note: Use low ramps and ensure toy cars don't fly off.

3. Explore Objects with Helpful Bumps:

Take a classroom "bump hunt" where students find and discuss objects with purposeful textured surfaces: pencil grips, stair treads, shoe bottoms, dish sponges, and climbing gym handholds. Create a display with sketches or photos labeled "Things with Bumps That Help Us."

Cross-Curricular Ideas

Math Connection: Measuring & Comparing Tread Depth

Students can use simple rulers or measuring blocks to compare the height of tire tread bumps from different tires (new vs. old). Create a bar graph showing "Deep Tread," "Medium Tread," and "Shallow Tread" using blocks or drawn columns.

Discuss: "Which tire is safest?" and "How much tread is missing from the old tire?"

ELA Connection: Descriptive Writing & Vocabulary Building

Have students write or dictate sentences describing what a tire tread feels and looks like using rich adjectives: bumpy, grooved, rough, chunky, deep, raised. Create a class "Texture Word Wall" with illustrations. Students can write pattern sentences: "The tire tread is _____ because _____." Read aloud books about wheels and transportation, and discuss how authors describe movement and safety.

Art Connection: Tread Rubbings & Texture Collages

Students create tire tread rubbings using paper and crayons, then cut and arrange these alongside rubbings of other textured items (tree bark, sandpaper, leaves) to make a mixed-media collage titled "Bumps That Help." Discuss how artists and engineers both think about texture and purpose. Display student work and have a gallery walk where children share which textures surprise them.

Social Studies Connection: Community Safety & Jobs

Connect tire tread to community safety by discussing who checks tires to keep people safe: mechanics, car inspectors, and parents. Take a virtual or real-world "walk" through a neighborhood and observe where friction and grip matter (playground equipment, stairs, sidewalks). Discuss: "Who keeps our community safe?" and "What jobs help make sure cars and roads are safe for everyone?"

STEM Career Connection

Mechanical Engineer - Tire Designer

Tire designers are engineers who invent and test new tire tread patterns to keep cars safe. They draw pictures and designs on computers and test them on special machines to see which patterns grip the road best in rain, snow, and dry weather. They think about how to make tires that last a long time, grip well, and don't wear out too fast. This job helps keep people safe when they drive!

Average Annual Salary: \$90,000 - \$110,000 USD

Materials Scientist

Materials scientists choose which kinds of rubber and other materials are best for making tires. They test different rubber mixtures to find which ones are strong, flexible, and grip the road best. They work in laboratories mixing and testing materials, kind of like a chef experimenting with recipes, but for tires and other products. Their work helps make sure tires work well in hot summers, cold winters, and everything in between.

Average Annual Salary: \$95,000 - \$120,000 USD

Quality Control Inspector (Automotive)

Quality control inspectors check tires at the factory to make sure the tread pattern is the right depth and shape before the tires are sent to car shops and garages. They measure the bumps, look for problems, and test that each tire works safely. They're like detectives making sure every single tire is perfect before it helps keep people safe on the road!

Average Annual Salary: \$40,000 - \$60,000 USD

NGSS Connections

Performance Expectation: 1-PS3-1 Plan and conduct investigations to provide evidence that vibrating objects can make sound and that various materials can be used to solve the problem of unwanted sound.

(Note: While this PE focuses on sound, tire friction investigations support the foundational understanding of how objects interact with surfaces.)

Disciplinary Core Ideas:

- 1-PS2.A Forces and Motion - Objects can move in different ways, and the amount and type of motion can be changed by pushing or pulling.

Crosscutting Concepts:

- Cause and Effect - Simple cause-and-effect relationships exist in everyday life (bumpy tread causes better grip).
- Patterns - Patterns in the natural and human-designed world can be observed and used to solve problems (tire tread patterns solve grip problems).

Science Vocabulary

- * Tread: The bumpy, grooved pattern on a tire that helps it grip the road.
- * Friction: A force that happens when two surfaces rub together and makes it harder for things to slide.
- * Grip: When something holds on tightly without slipping (like a tire gripping the road).
- * Texture: How something feels when you touch it—bumpy, smooth, rough, or sticky.
- * Rubber: The stretchy material that tires are made from.

External Resources

Children's Books:

- Cars by DK (Simple Machines) - Introduces vehicle parts including tires in accessible language.
- The Wheels on the Bus by Pam Schiller (Illustrated Edition) - A classic that can be extended to discuss why wheels have tread.
- How Do Wheels Work? by Isaac Asimov (Easy Astrophysics Series) - Age-appropriate exploration of wheels and tire function.

Implementation Note: This lesson builds foundational physics understanding through observation and hands-on exploration, preparing first graders for more complex motion and forces concepts in later grades.