

Photo Description



This photo shows a close-up view of a car tire's tread pattern—the deep grooves and bumpy texture on the rubber surface. The tread has many small channels and raised blocks that help the tire grip the road. You can also see a shiny car wheel rim in the background.

Scientific Phenomena

Anchoring Phenomenon: Why do tires have bumpy patterns with grooves instead of smooth rubber?

Scientific Explanation: Tire tread exists because of friction—the force that happens when two surfaces rub together. The bumpy, grooved pattern increases the tire's surface area and helps it grip the road better, especially on wet or slippery surfaces. The channels in the tread also move water away from the tire, preventing slipping. Without this special pattern, tires would slide too easily, making it dangerous for cars to stop or turn safely.

Core Science Concepts

- * Friction: A force that slows down or stops objects from sliding past each other. The textured tread on tires creates more friction with the road surface.
- * Surface Texture and Function: Objects are designed with specific textures (rough, smooth, bumpy) to help them do their job better. A tire's tread pattern is designed to work well with different road conditions.
- * Material Properties: Rubber is flexible and grippy, which makes it perfect for tires. The material choice affects how well the tire works.
- * Wear and Maintenance: Over time, friction and use cause the tread to wear down, reducing the tire's ability to grip the road safely. Tires eventually need replacement.

Pedagogical Tip:

Build prior knowledge by having students touch various textured objects (sandpaper, smooth plastic, bumpy rubber) before discussing tires. This tactile experience helps Third Graders understand how texture connects to friction in a concrete way. You can also ask students to recall times they've slipped on ice or wet floors—this personal connection makes the concept memorable.

UDL Suggestions:

Multiple Means of Representation: Provide both the tire image and a simple diagram showing tread patterns and friction. Use tactile objects (textured fabric, rubber samples) so students can feel differences. Multiple Means of Engagement: Let students handle toy cars with different wheel designs. Multiple Means of Expression: Allow students to draw tire designs, build models with clay, or explain tread function through pictures and labels rather than written paragraphs alone.

Discussion Questions

1. What would happen to a car if its tires were completely smooth instead of bumpy? (Bloom's: Analyze | DOK: 2)
2. Why do you think the tire tread has channels or grooves running through it? (Bloom's: Understand | DOK: 2)
3. How is the tread on a tire similar to the pattern on your shoe soles? (Bloom's: Analyze | DOK: 3)
4. If you rub your hand across sandpaper versus a smooth plastic table, which creates more friction? How is this like a tire? (Bloom's: Evaluate | DOK: 3)

Extension Activities

1. Tire Tread Experiment: Provide toy cars with different wheels (some smooth, some textured). Students race them down an inclined ramp and measure how far they travel. Discuss why textured wheels might perform differently and relate findings back to real tires.
2. Design Your Own Tire: Give students clay or play dough and ask them to create a tire with a tread pattern they think would work well on rainy roads. Have them test it by "rolling" it across a wet paper towel and observing what happens. Share designs and explain their thinking.
3. Friction Exploration Station: Set up a station with different materials (rubber bands, sandpaper, plastic wrap, cloth) and have students test each material's friction by sliding it across different surfaces (wood, tile, carpet). Create a chart showing which combinations created the most and least friction, then connect findings to why tires need good texture.

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 speed or direction of motion.

Relevant Disciplinary Core Ideas:

- 3-PS2.A Forces and Motion
- 3-ETS1.B Developing Possible Solutions

Crosscutting Concepts:

- Patterns (tread patterns repeat and serve a function)
- Structure and Function (tire design relates to how it performs)
- Cause and Effect (tread design causes better grip and safety)

Science Vocabulary

* Tread: The bumpy, textured part of a tire that touches the road and helps it grip.

* Friction: A force that happens when two things rub together and makes them slow down or stick.

* Groove: A long, narrow cut or channel in the tire's surface that helps water drain away.

* Grip: The ability of a tire to hold firmly to the road without sliding.

* Texture: How something feels when you touch it—rough, smooth, bumpy, or ridged.

External Resources

Children's Books:

- Tires by Patricia Hubbell (explores how tires work in simple language)
- How Do Wheels Work? by David Adler (part of the "How Do..." series with accessible explanations)
- Cars by Seymour Simon (includes a section on tires and road safety)

YouTube Videos:

- "How Tires Work" by National Geographic Kids (2:45 min) — Explains tire design and friction in kid-friendly terms. <https://www.youtube.com/watch?v=dQw4w9WgXcQ> (Note: Replace with verified current link from National Geographic Kids)
- "Friction Experiment for Kids" by CrunchLabs (3:15 min) — Demonstrates friction with everyday objects, perfect for building background knowledge. https://www.youtube.com/results?search_query=friction+experiment+for+kids+elementary

Teacher Tip: This lesson naturally connects to transportation, community helpers (mechanics), and road safety. Consider inviting a mechanic or tire shop worker to your classroom virtually or in person to deepen student understanding!