

Visible Elements in Photo



- Vehicle tire with deep, angular tread patterns carved into rubber surface
- Metal alloy wheel rim with ventilation holes (visible in background)
- Multiple tires stacked or arranged side-by-side
- Weathered, dirt-covered rubber showing wear and texture variation
- Shadow details revealing the 3D depth of tread blocks

Reasonable Inferences

- From tread pattern: The angular grooves and blocks are designed to channel water and improve grip on wet or loose surfaces (function visible in form).
- From wear/dirt accumulation: Tires experience repeated friction, temperature changes, and environmental exposure over time, requiring durable material.
- From stacking: Multiple tires suggest replacement cycles and the need for tire durability testing or evaluation.

Engineering Task

K-2 Challenge:

Design and build a spinning wheel (using a paper plate, plastic lid, or foam circle) that can grab and pull a toy car or block across a smooth table. Add bumps, ridges, or textured stickers to the bottom to make it "grippy" like a tire. Test: Does it pull better than a smooth wheel? What sticks best?

3-5 Challenge:

Your challenge: Design a tire tread pattern that maximizes grip on a wet, slippery surface (smooth linoleum or plastic sheet sprayed lightly with water) while minimizing rolling resistance. Using foam circles, clay, or carved rubber erasers, carve or glue different groove patterns. Success criteria: (1) Pattern must cover at least 60% of the wheel surface, (2) Test rolling distance on wet surface—pattern must allow the wheel to stop within 2 feet when rolled from a 3-foot ramp, (3) Document why your pattern works (explain groove angle, depth, and spacing).

EDP Phase Targeted

Ask / Define Problem

Tires exist to solve a real-world problem: grip and safety. The photo shows the solution (tread design) but doesn't show the problem in action (slipping, hydroplaning, or loss of control). Starting with Ask / Define Problem lets students first understand why tread matters before they redesign it. This grounds the challenge in authentic need rather than jumping to prototype-building.

Suggested Materials

- Foam circles, cardboard discs, or paper plates (wheel blanks)
- Clay, playdough, or craft foam (for carving tread)
- Textured tape, sandpaper, or sticky-back foam (for adding grip)
- Water spray bottle or shallow water tray (for wet-surface testing)
- Ramp (wooden board, cardboard tube, or ruler propped at 20–30°)

Estimated Time

K-2: 40–50 minutes (5 min brief, 20 min build, 15 min test & compare, 10 min share results)

3-5: Two 40-minute sessions (Session 1: Ask/design, 15 min build; Session 2: Test, analyze, refine, 30 min)

Why This Works for Teachers

This task directly addresses NGSS ETS1.A (Define the design problem) by having students identify that grip, durability, and control are engineering requirements, then test whether their design choices actually meet those needs in a measurable way.