



## Curiosity Guide #206

### Liquid Forces

Accompanies Curious Crew, Season 2, Episode 6 (#206)

#### Making Terrific Tire Treads

STEM Challenge



#### Description

Use your knowledge of how liquid forces work to design a tire-tread pattern that will make driving a car safer in wet conditions.

#### Materials

Block of clay, 5 inches by 10 inches by 2 inches

2-cup measuring cup

Water

Popsicle sticks

Clay-carving tools

Basin partitioned into three sections

Ruler

Funnel

Drawing paper

Pencil

Wooden support or ramp for clay, to hold at an angle over the basin

Procedure #1: Designing a tread pattern and creating a clay model

- 1) Engineering problem: Because of the attractive force of water, it is possible for a driver to lose control of his or her car in heavy rain conditions. As a result, engineers have to design tire treads that will push the water out from the sides of the tire.
- 2) Your objective is to plan the tread pattern that you believe will move the most water from the center to the outside of the tire.
- 3) Draw your idea on paper.
- 4) Use Popsicle sticks and clay-carving tools to carve your chosen tread design into the block of clay.

Procedure #2: Testing the model

- 1) Set up the clay block on the wooden ramp. Position it over a 3-section basin.
- 2) Pour 2 cups of water directly or through a funnel onto the center of the top of the tread.
- 3) Measure how much water went to the side compartments of the basin, compared to the water staying in the center of the basin.
- 4) Did you meet the goal, or do you need to modify your design? A tread that moves a lot of the water out to the sides would be effective in heavy rains.

My Results

## Explanation

When water collects on the roadway from heavy rains, it pools together because of its cohesive forces. At the same time, if the water gets deep enough, the water can push a car out of control. This is called hydroplaning and is the cause of many accidents. Engineers design different tire treads to move the water out of the way, so that the tire continues to grip the road in heavy rains. There are many tread patterns and even different patterns for driving in snow!

**Something else to think about:** Engineers put a lot of thought into designing tire treads that move water out of the way. However, tires will always wear out, eventually. It's a good idea to periodically check how deep the grooves are in your tire tread. Manufacturers even add a little piece of rubber in the deep groove. Once that little piece of rubber seems to have moved to the top of the tire, it is time to get new tires. Drive safely!

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