



Try This at Home Science: Friction Racers

Activity Overview:

Observe how different surfaces can change the speed of a Matchbox down a track with the power of friction!

Materials:

- Matchbox car
- Matchbox car racetrack or a cardboard box to make a ramp
- Tinfoil
- Cling wrap
- Sandpaper or play sand
- Scarf or other fabric piece
- Stopwatch (optional)

Try this!

1. Set up the Matchbox racetrack or create one from cardboard boxes to create a ramp to race down.
2. Run your Matchbox car down the ramp to see how well it races.
3. Add a layer of tinfoil on the ramp and repeat Step 2.
4. Compare results or use stopwatch to record if the test in Step 3 was slower or faster than the initial test.
5. Remove the tinfoil, replace with a layer of cling wrap and repeat Step 2.
6. Compare results and record if the test in Step 5 was slower or faster than the initial test.
7. Remove the cling wrap, replace with strips of sandpaper and repeat Step 2.
8. Compare results and record if the test in Step 7 was slower or faster than the initial test.
9. Remove the sandpaper, replace with a scarf or fabric and repeat Step 2.
10. Compare results and record if the test in Step 9 was slower or faster than the initial test.
11. Compare all results and discuss how the surfaces affected how fast the Matchbox car traveled down the ramp.
12. Clean up from the experiment, recycling or reusing items when possible.



What's happening?

The Matchbox car rolls down the ramp due to the pull of gravity. As we release the car from the top of the ramp, gravity pulls it down to the bottom of the ramp. We can repeat this part of the experiment as many times as we want and will get the same results. By using the same Matchbox car and the same ramp we have a **control** for our experiment. A control is where the

scientist has set the base for the experiment where no variables have been changed. After setting a control, scientists can change one variable at a time to compare results back to the control.

As we change the surface that the Matchbox car is traveling over, we may notice a change in how the car moves down the ramp. Each covering added to the ramp will change how well the car moves due to friction on the wheels. More friction, or resistance, on the wheels will slow the car down. Less friction on the wheels will allow the car to roll more easily. This is the same reason why it's harder to walk through a pool instead of on land, there is more friction on our bodies, creating resistance to our movement.

How does this relate to car tires?

Car tires have a specific tread pattern on the edges to help them grip the road better in varying conditions. Special tire treads are designed for racetracks, sand dunes, snow, or even climbing boulders. They each have a unique pattern to perform on different surfaces. Tire manufacturers have changed the patterns over the years to meet the needs of the drivers and the conditions they drive in which is why there are so many different tread patterns. Each tire tread pattern to the right is specifically designed for a certain surface or weather condition, and having the proper tire on your car for whatever weather may happen where you live, or whatever adventure you are taking will keep you safer.



Now try...

- Using slightly crumpled tinfoil (rough surface) and tightly fitted tinfoil (smooth surface) repeat the experiment. What did you notice? Which surface allowed the car to travel faster? Why?
- Find other objects in your house to test your car on (tape sticky side up, rice, banana peel, olive oil). Repeat the experiment. What do you notice? Which surface allowed the car to travel faster? Why do you think that is?
- Grab at least one different Matchbox car and repeat the experiment. Compare the speeds of each car. What did you notice? Which traveled the fastest? Did the fastest car change depending on the surface it drove over? Why?

Additional Information

Watch a how-to video for this experiment here <https://www.pbs.org/parents/crafts-and-experiments/friction-racing>