

Physics: Friction Fun



MAIN IDEA

Discover the force of friction by creating ramps made of different materials and then seeing which one allows your racecar to go the fastest.

SCIENCE BACKGROUND

Friction is the resistance that one object encounters when moving over another. A simple way to feel friction in action is to rub your hands together quickly. The heat you feel between your hands is because of the resistance between the two surfaces of your hands, or friction. There are two main types of friction, kinetic friction and static friction. Kinetic friction occurs when an object is moved along a surface, like moving a book across a table. Kinetic friction is an opposite force to the direction of movement, eventually slowing the object down. Static friction occurs between a motionless object and the surface that it is on. An example of static friction would be a couch on a rug. Since the couch isn't moving it is static friction, once you start pushing the couch and it starts moving it becomes kinetic friction.

The texture of the object and surface will play a role in how the object moves. Let's use the example of running around your house in a pair of socks. If you run and try to slide across the various floor surfaces, you will notice some differences. Gliding across wood and tile will be much easier than carpet. This is all due to friction. Carpet causes more friction than a wood or tile surface against a pair of socks.



MATERIALS

- Blocks or books
- Cardboard pieces
- Different surface textures
(*aluminum foil, wrapping paper, t-shirt, felt, etc.*)
- Racecar or ball
- Scissors
- Stopwatch or Stopwatch App
- Smartphone App
- Tape or clips

ACTIVITY PROCEDURE

Step 1: With adult supervision, use a cardboard box and cut it into two or more equal size pieces (suggested size: 1 ½ feet x 4 in.)

Step 2: Once you have your ramps, cover each one with different materials of your choosing.

- ✓ We used cardboard, foil, wrapping paper and a t-shirt, but you can use other kinds of materials that are readily available around your house: tissue paper, felt, or even an old towel!
- ✓ Use tape or clips to secure your material to your cardboard ramp.

Step 3: Time to set up your ramp! You can use stacked books, large blocks, stools, or even a chair if you made your ramp longer than the suggested size.

Step 4: Do you have your racecars? Then you are ready to explore friction! Start with the plain cardboard ramp first.

- ✓ Pull out your stopwatch or phone and watch the car closely, it should be released down a ramp at the same time as you begin timing its descent.
- ✓ As soon as the car reaches the bottom of the ramp, you can stop the timer and write down the time it took for the car to slide down the ramp.
- ✓ You're going to repeat this step for the other ramps as well.

Step 5: Repeat the timing of your racecar down the different ramps at least two times, recording the results each time. Then you are ready to compare your results.

- ✓ What did you find?
 - ✓ Which material slowed down the car the most?
 - ✓ Did any of the materials have similar times? Why do you think that is the case?
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EDUCATIONAL STANDARDS

Kindergarten – Big Idea 12 – Motion of Objects

SC.K.P.12.1 Investigate that things move in different ways, such as fast, slow, etc.

Grade 3 – Big Idea 10 – Forms of Energy

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.

Grade 4 – Big Idea 12 – Motion of Objects

SC.4.P.12.2 Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.

ADDITIONAL RESOURCES

Slipping, Sliding Science

<https://www.youtube.com/watch?v=Ps90zArJEJY>

PBS Curious Crew: Friction

<https://www.pbs.org/video/curious-crew-friction-ep-209/>

