

## Car Friction: The Science of Going Fast

Start your toy engines -- this is going to be a fast and friction-filled race! Have you ever wondered what kind of surfaces make race cars go faster or slower? Grab your remote control to find out as your car zips over different surfaces. The key to this experiment is car friction, or resistance created, between the car's wheels and the road.

Problem:

How does friction affect the speed of a toy car?

Materials:

- Radio-controlled toy car
- Sandpaper
- Gravel
- Concrete
- Paper
- Pencil
- Notepad
- Measuring tape
- Stopwatch
- Masking tape
- Helper



Procedure:

1. Use your measuring tape to measure out a "race track" that is at least five feet long and two feet wide. The track can be either indoor or outdoor -- just make sure the area is flat and dry. Preferably this area should be on concrete.
2. Stick pieces of tape at the beginning and end of your track to form a clear start and finish line.
3. Place your toy car at the starting line.
4. Look at the three different surfaces you will test: the concrete, sandpaper and gravel. Rub your finger against each one. Which one is the smoothest? Which one is the roughest? Can you feel any friction between your finger and the different surfaces?
5. Keeping friction in mind, which surface do you think will produce the fastest race time? Write down your hypothesis, or guess, in your notebook.
6. Have your helper prepare the stopwatch and count you down from three. When she reaches one, she should start the stopwatch and you should use the remote control to race your car to the finish line.
7. Have your helper stop the stopwatch as soon as the car speeds across the finish line.
8. Record the time in your notebook.
9. Now lay sandpaper on your track.
10. Place the toy car at the starting line.
11. Drive the car through the track with your helper timing the race again.

12. Record the time in your notebook.

13. Take out the sandpaper and fill the track with gravel.

14. It's time for the last race! Use the remote control to drive the car over the bumpy gravel track while your helper times the race.

15. Record the time in your notebook.

16. Study the different race times. What are your conclusions?

Results:

The car will move the fastest on the smooth tile, and much slower on the sandpaper and gravel surfaces.

Why?

A car's speed is often determined by the friction between its wheels and the road. When you drove your toy car over the smooth tile, the wheels were met with little resistance. Try sweeping your finger against the tile --is it met with any resistance, anything that somehow stops it from moving forward? Now try sweeping your finger against the gravel. See the difference?

As the car's wheels hit the rough gravel and sandpaper surfaces, they're met with this same sort of friction. You could probably have guessed by now that real race car drivers would rather drive on a smooth surface than a gravel or sandpaper one.

What other ways can you experiment with car friction? You can set up a "friction obstacle course" and see which one of your friends can drive the car the fastest over all the tricky surfaces. Try using bumpy surfaces or even dirt from your backyard. Guessing and testing is a big part of being a scientist -- especially for those studying the science of going fast!