

## Activity Sheet: Friction

Name:

### Instructions

Your goal is to investigate friction by attaching different surfaces on your car's tracks. You will observe and calculate the effect on the speed of the car. As an additional challenge, work with your teams to create the fastest and slowest moving cars. Follow the steps below to brainstorm and test your hypothesis.

### Step 1: Background knowledge

Define friction and come up with your own example.

### Step 2: Form a hypothesis

The purpose here is to predict and investigate which surface (*satin, burlap, elastic knit, etc.*) would slow or speed up the car the most, as evidence of the friction acting upon it.

### Step 3: Set Up Experiment

1. Using a few books, elevate the starting height of your track.
2. Grab 3 different rolls of fabric, or try constructing your own surface, to place along the top of the track.
3. Use tape to secure the fabric to the track (it may only be necessary to tape the top of the fabric to the top of the track).
4. When you have finished laying out your surface on top of the track, roll the car through the track to flatten out any folds.
5. Finally, hold your car at the starting point and lay out the tape measure so the 0" begins at the front of the car and runs all the way down the length of the track.

### Step 4: Test

1. Start your races! Start the stopwatch/camera and let go of the car to watch it go! (Do not apply any force to the car, let it move naturally)
2. Stop the timer when your car stops and use the tape measure to write down where the front of the car stopped (distance traveled). You can use this data to calculate the speed of the car. Remember to write down your data!

### Step 5: Observations

Use the formula for speed,  $s = d / t$  which means **speed equals distance traveled divided by time**. To calculate the average speed, add the speeds from all three trials and divide by 3.

	Trial 1	Trial 2	Trial 3	Average Speed
<b>Material 1</b>	distance=			
	time=			
	speed=			
<b>Material 2</b>	d=			
	t=			
	s=			
<b>Material 3</b>	d=			
	t=			
	s=			

### Step 6: Conclusion

Review your hypothesis. Which surface made the car move the slowest? Fastest? What, if any, effect does a surface have on the friction and speed experienced by a moving object? Use evidence to support your reasoning.

### Extension

Using your data, create a distance-time graph to represent the average speed data. The distance should be on the x-axis, time on the y-axis, and create a legend to represent the different surfaces.

