



# Acceleration

## STEM Sims

### Lesson 3: How Does Speeding Up Affect Fuel Use?

Fuel use is defined as how much gasoline or other fuel a car or truck uses in a given period of time. The mass of the truck, the type of motor, the truck's shape, and the truck's movement all impact the amount of fuel used. Can you find the best way to speed up to reduce the amount of fuel used?

Here are some definitions to help you in your investigation.

Acceleration - speeding up, slowing down, or changing direction

Speed - how fast something is moving

Constant speed - not speeding up or slowing down

Consumption - amount of something used

### Doing the Science

1. Select the Sim tab to open the Acceleration simulation.
2. Select the gray truck on the left side of the screen by clicking on the truck.
3. Select a speed of 10 m/s.
4. Allow a couple of seconds for the vehicle to reach a constant speed. The acceleration dialog box appears when the vehicle reaches a constant speed.
5. Choose an acceleration value of "2 m/s<sup>2</sup>." Allow the simulation to run.
6. Select the "Display Data" option. Click on the "Fuel Consumption" graph tab.
7. Note and record the average fuel use of the truck.
8. Select the "Restart" option.
9. Choose the same truck and speed as you did before.
10. Choose an acceleration value of 4 m/s<sup>2</sup>. Allow the simulation to run.

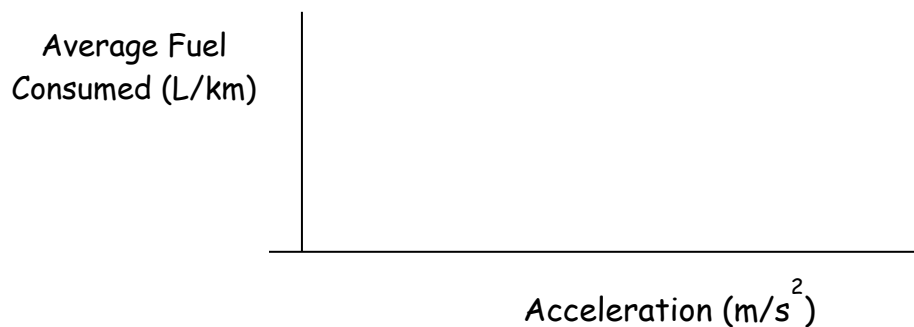
11. Select the "Display Data" option. Click on the "Fuel Consumption" graph tab.
12. Note and record the average fuel consumption of the truck.
13. Select the "Restart" option.
14. Repeat steps 9-12 with an acceleration of  $6 \text{ m/s}^2$ .

Table 1.

Trial	Speed (m/s)	Acceleration ( $\text{m/s}^2$ )	Average Fuel Consumption (L/km)
1	10	2	
2	10	4	
3	10	6	

#### Do You Understand?

1. Make a graph of the vehicle acceleration versus the amount of fuel consumed during each test.



2. How are fuel consumption and acceleration related?
3. Based on your investigation, which is better to save fuel in a truck: start slowly and gradually increase the truck's speed, or quickly increase the speed of the truck? Please explain your response.