4.4 PROJECT

LITERS, GALLONS, AND FUEL EFFICIENCY

According to a 2019 report produced by the United Nations, fossil fuel emissions from energy use grew 2.0% in 2018. These emissions reached a record high of 37.5 gigatons of equivalent CO_2 per year. In order to try to alleviate the issue, many countries are working on requiring that cars become more fuel efficient.

In this activity, you will investigate a few different units used to measure fuel efficiency and how to compare such units.

In the US, we define fuel efficiency as the number of miles a car can travel using one gallon of fuel. The unit of choice for this measurement is miles per gallon (mpg). This number is the rate of miles traveled per gallons used. European countries commonly define fuel efficiency as the amount of fuel a car requires to travel a fixed distance. The unit of choice for this measurement is liters per 100 kilometers $\left(\frac{\text{L}}{100\text{ km}}\right)$. This number is the rate of liters of fuel used per 100 kilometers traveled. Notice that mpg is a rate of distance per volume of fuel while $\frac{\text{L}}{100\text{ km}}$ is a rate of volume of fuel per distance.

The 2021 Honda Accord has a reported highway fuel efficiency of 38 mpg. Complete the following steps to find the Accord's equivalent highway fuel efficiency in the European standard of $\frac{\text{L}}{100\text{ km}}$.

Recall that 1 US gallon is equal to 3.785 liters and that 1 mile is approximately equal to 1.61 kilometers.

1. Determine how many 100 kilometers are in 38 miles. Round your answer to the nearest hundredth, if necessary. (**Hint:** Find the number of kilometers in 38 miles and divide your answer by 100.)
2. Organize this information using the table below.

Distance	Miles	38
	100 Kilometers	
Fuel Volume	Gallons	1
	Liters	

3. Now, divide the number of liters per number of 100 kilometers to find the Accord's equivalent European standard fuel efficiency. Round your answer to the nearest hundredth, if necessary.
4. You may have noticed that the two rates reflect the fuel efficiency of a vehicle, but they are not really measuring the same quantity. As more governments require higher mpg from cars, would the corresponding $\frac{\text{L}}{100\text{ km}}$ also increase as the mpg increase? Why or why not?