

5.25

Word Problem on Inverse Variation

• Example 1

According to the universal gas law, the pressure of a gas, under certain constant conditions, varies inversely with its volume. Suppose that a gas under constant conditions in a container with volume 20 in.^3 results in a pressure value of 38 lb/in.^3 . If the same gas under the same constant conditions is put into a container with volume 19 in.^3 , what will the value of the pressure be?

Since pressure varies inversely with volume, $p = \frac{k}{v}$, where p represents pressure, v represents volume, and k is a constant depending on the units used for the measurement of pressure and volume. To find the pressure, we need to find the constant of variation, k , determined by the conditions on the gas in the container with volume 20 in.^3 .

$$38 = \frac{k}{20}$$

Solving for k yields

$$k = 760$$

Using this value for k , and 19 for v we get

$$p = \frac{760}{19} = 40$$

Therefore, the pressure is 40 lb/in.^3 .

• • • CHECK YOURSELF 1

The amount of time required to drive a certain distance is inversely proportional to the speed of driving. (We assume that the speed is constant.) If one driver completes a 150-mi trip in 3 h, find the time required for a second driver to complete a 200-mi trip driving at the same speed.

• • • CHECK YOURSELF ANSWER

1. 4 h.
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5.25 Exercises

Name _____

Section _____

Date _____

A N S W E R S

1. _____

2. _____

3. _____

4. _____

1. The length of a rectangle with a constant area is inversely proportional to its width. A given rectangle has a length of 10 in. and a width of 6 in. Another rectangle has the same area as the first rectangle but its width is 3 in. Find the length of the second rectangle.

2. According to Newton's Second Law of Motion, given a constant force, acceleration of an object varies inversely with its mass. Assume a constant force is acting on an object with mass 8 lb resulting in an acceleration of 10 ft/s^2 . If the same force acts on another object whose mass is 16 lb, what would be the resulting acceleration?

3. The amount of force required to do a certain amount of work in moving an object is inversely proportional to the distance that the object is moved in the direction of the force. Suppose 100 N of force is required to move an object 8 ft under the above conditions. Find the force needed to move another object 20 ft if the same amount of work is done.

4. The simple interest rate is inversely proportional to the amount of money invested when the total amount of interest earned for 1 yr is constant. One person invested \$5000 at a simple interest rate of 4%. A second person invested \$6000 and earned the same amount of interest as the first. What was the simple interest rate for the second person's investment?