Review Exercise Set 18

Exercise 1: Translate the following statement of variation into an equation using "k" as the constant of variation.

y varies inversely as the cube of x

Exercise 2: Translate the following statement of variation into an equation using "k" as the constant of variation.

s varies jointly as r and the square of t

Exercise 3: Find the value of constant of variation (k) for the stated condition.

y varies directly as the cube of x, and y = -1 when x = 3

Exercise 4: Find the value of constant of variation (k) for the stated condition.

y is directly proportional to x and inversely proportional to the cube root of z, and $y = -6$ when $x = 2$ and $z = -1$

Exercise 5: The time required to drive a certain distance varies inversely as the rate at which you are driving. If it takes you 4.5 hours at 40 miles per hour to travel the distance, how long will it take if you drive 60 miles per hour?

Review Exercise Set 18 Answer Key

Exercise 1: Translate the following statement of variation into an equation using "k" as the constant of variation.

y varies inversely as the cube of x

Interpret the variation

varies inversely -- indicates that a fraction will be used
cube of x = x^3

Setup the equation

$$y = \frac{k}{x^3}$$

Exercise 2: Translate the following statement of variation into an equation using "k" as the constant of variation.

s varies jointly as r and the square of t

Interpret the variation

varies jointly -- indicates that multiple variables will be multiplied times the constant k
square of t = t^2

Setup the equation

$y = k(r)(t^2)$
$y = krt^2$

Exercise 3: Find the value of constant of variation (k) for the stated condition.

y varies directly as the cube of x, and y = -1 when x = 3

Interpret the variation

varies directly -- indicates the product of a variable and the constant k
cube of x = x^3

Setup the equation

$y = kx^3$

Exercise 3 (Continued):

Substitute in the known values for y and x

$y = kx^3$
$-1 = k(3)^3$
$-1 = k(27)$
$-\frac{1}{27} = k$

Exercise 4: Find the value of constant of variation (k) for the stated condition.

y is directly proportional to x and inversely proportional to the cube root of z, and y = -6 when x = 2 and z = -1

Interpret the variation

directly proportional -- indicates the product of a variable and the constant k

$y = kx$

inversely proportional -- indicates the quotient of the constant k and a variable

cube root of $z = \sqrt[3]{z}$

$$y = \frac{k}{\sqrt[3]{z}}$$

Setup the equation

The equation would be a combination of the two variations

$$y = \frac{kx}{\sqrt[3]{z}}$$

Substitute in the known values for y and x

$$-6 = \frac{k(2)}{\sqrt[3]{-1}}$$
$$-6 = \frac{2k}{-1}$$
$$-6 = -2k$$
$$3 = k$$

Exercise 5: The time required to drive a certain distance varies inversely as the rate at which you are driving. If it takes you 4.5 hours at 40 miles per hour to travel the distance, how long will it take if you drive 60 miles per hour?

Assign variables and interpret the variation

time = t
rate = r

varies inversely = indicates the quotient of the constant k and a variable

Setup the equation

$$t = \frac{k}{r}$$

Determine the constant of variation (k) with the initial values, t = 4.5 and r = 40

$$\begin{aligned} 4.5 &= \frac{k}{40} \\ 4.5(40) &= k \\ 180 &= k \end{aligned}$$

Now, calculate the value of t using the constant and the new rate

$$\begin{aligned} t &= \frac{k}{r} \\ &= \frac{180}{60} \\ &= 3 \end{aligned}$$

It would take 3 hours traveling at 60 miles per hour.