Topic: Inverse variation

Question: If x varies inversely with y and $y = 7$ when $x = 3$, what is the value of the constant of variation, k?

Answer choices:

A $\quad k = \dfrac{3}{7}$

B $\quad k = 21$

C $\quad k = \dfrac{7}{3}$

D $\quad k = \dfrac{1}{21}$

Solution: B

An inverse variation equations is in the form $y = kx$. Plug in the values for x and y.

$$7 = \frac{k}{3}$$

$$k = 21$$

Topic: Inverse variation

Question: If $k/4 = 3$ and $k/x = 4$, find x.

Answer choices:

A $x = 4$

B $x = 3$

C $x = 12$

D $x = 6$

Solution: B

We'll solve the first equation for k.

$$\frac{k}{4} = 3$$

$$\frac{k}{4}(4) = 3(4)$$

$$k = 12$$

Now we'll take the value we found for k and plug it into the second equation to solve for x.

$$\frac{k}{x} = 4$$

$$\frac{12}{x} = 4$$

$$\frac{12}{x}(x) = 4(x)$$

$$12 = 4x$$

$$\frac{12}{4} = \frac{4x}{4}$$

$$x = 3$$

Topic: Inverse variation

Question: Suppose we drive a car to the store and the time it takes us to get there depends on whether or not we speed. If our drive times are recorded in the table below, how long does it take to make the trip at a speed of 30?

Speed	60	40	25	10
Time	10	15	24	60

Answer choices:

A   18

B   20

C   22

D   25

Solution: B

An inverse variation equation takes the form $xy = k$. Let x be speed and y be time. To see that speed and time are inversely related, we'll multiply each speed (each value of x) by the corresponding value of time (y).

$$60 \cdot 10 = 600$$

$$40 \cdot 15 = 600$$

$$25 \cdot 24 = 600$$

$$10 \cdot 60 = 600$$

Since we get the same result each time, we see that speed and time are inversely related, and that $k = 600$. Now plug in $x = 30$ and $k = 600$, and solve for y.

$$xy = k$$

$$(30)y = 600$$

$$y = \frac{600}{30}$$

$$y = 20$$