

TOPIC: DIRECT & INVERSE VARIATION

Direct Variation

◆ **Direct Variation:** When 2 quantities are related to that as 1 quantity increases/decreases, the other does the _____.

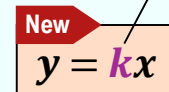
► This *linear* relationship between variables is often stated as: *y varies directly as x* OR *y is directly proportional to x*.

EXAMPLE

If y varies directly as x and if $y = 10$ when $x = 2$, find the following.

(A) Find the equation that relates x and y .

Constant of Variation



New

$$y = kx$$

Plug in given values:

Solve for k :

Rewrite:

(B) What is y when $x = 6$?

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PRACTICE

If y varies directly as x , and $y = 18$ when $x = 6$, find y when $x = 10$.

PRACTICE

The distance d a car travels varies directly as the time t . If the car travels 180 km in 3 hours, find how far it will travel in 5 hours.

EXAMPLE

A bakery sells eggs at \$3 per dozen. The price varies directly with the quantity purchased.

(A) Write a variation model using k as the constant of variation.

(B) How much would 5 dozen eggs cost?

(C) If a local restaurant spent \$39 on eggs at this bakery, how many dozen did they purchase?

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Inverse Variation

◆ Recall: Direct variation is when 2 quantities are related so that as 1 quantity inc/dec, the other does the *same*.

► **Inverse Variation:** As 1 quantity increases/decreases, the other does the _____.

► This relationship between variables is often stated as: y *varies inversely* as x OR y is *inversely proportional* to x .

Recall	Direct Variation	New	Inverse Variation
	If y varies directly as x and $y = 10$ when $x = 2$, find the equation that relates x and y. $y = kx$ Plug in given values: $10 = k(2)$ Solve for k: $k = 5$ Rewrite: $y = 5x$		If y varies inversely as x and $y = 8$ when $x = 4$, find the equation that relates x and y. $y = \frac{k}{x}$ Note: $x \neq 0$ Plug in given values: Solve for k: Rewrite:

EXAMPLE

Using the inverse variation equation from above, find y when $x = 2$.

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PRACTICE

p varies inversely as q , and $p = 18$ when $q = 9$. If $q = 12$, what is the value of p ?

PRACTICE

The time t (in hours) required to travel a fixed distance varies inversely as the speed s (in mi/hr). If it takes 6 hours to travel a certain distance at 50 mi/hr, how long will it take to travel the same distance at 75 mi/hr?

EXAMPLE

The volume of a gas in a container varies inversely as pressure on the gas. A container of helium has a volume of 370 cubic inches under a pressure of 15 psi.

(**A**) Write the equation that relates the volume to the pressure.

(**B**) What would be the volume of this gas if the pressure was increased to 20 psi?