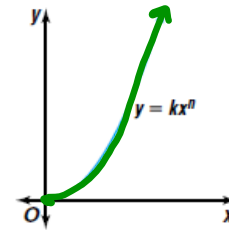


Trig 3.8

Solve problems involving direct*, inverse**, joint** variation

* Alg 1 Ch. 5
** Alg 2 Ch. 9

direct variation $A = k B^2$ $E = 2 \cdot P$
 inverse variation $A = \frac{k}{B}$ $T = \frac{D}{R}$
 constant of variation k
 directly proportional
 inversely proportional
 joint variation (combination) $A = \frac{k \cdot B \cdot C}{D}$
 activity: whiteboards (if time)



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k = constant

(6, 27)

- 1 Suppose y varies directly as x and y = 27 when x = 6.
- Find the constant of variation and write an equation of the form $y = kx^n$.
 - Use the equation to find the value of y when $x = 10$.

$y = kx$
 $27 = k \cdot 6$
 $\frac{27}{6} = k$
 $\frac{9}{2} = k$
 $y = \frac{9}{2}x$
 $y = \frac{9}{2} \cdot 10$
 $= \frac{90}{2} = 45$

Oct 21-5:01 PM

3 If y varies directly as the cube of x and $y = -67.5$ when $x = 3$, find x when $y = -540$.

$$y = kx^3$$

$(3, -67.5)$

$$-67.5 = k(3)^3$$

$$-67.5 = 27k$$

$$\frac{-67.5}{27} = \frac{27k}{27} \quad k = -2.5$$

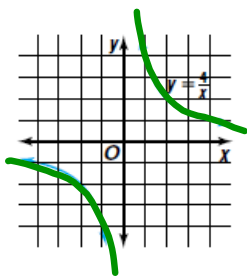
$$y = -2.5x^3$$

$$-540 = -2.5x^3$$

$$(216)^{\frac{1}{3}} = (x^3)^{\frac{1}{3}}$$

$$x = 6$$

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inverse variation
 driving
 leftovers
 homework

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

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4 If y varies inversely as x and $y = 21$ when $x = 15$, find x when $y = 12$.

$x = 26.25$

$y = \frac{k}{x} \quad (15, 21)$

$y = \frac{315}{x}$

15. $21 = \frac{k}{15} \cdot 15$
 $k = 315$

$12 = \frac{315}{x}$
 $12x = \frac{315}{12}$

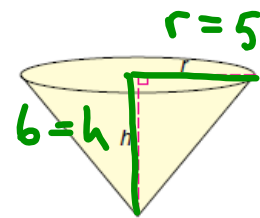
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Joint Variation

y varies jointly as x^n and z^n if there is some nonzero constant k such that $y = kx^n z^n$, where $x \neq 0$, $z \neq 0$, and $n > 0$.

and inversely as...

Example 5 GEOMETRY The volume V of a cone varies jointly as the height h and the square of the radius r of the base. Find the equation for the volume of a cone with height 6 centimeters and base diameter 10 centimeters that has a volume of 50π cubic centimeters.



$V = 50\pi$

$V = k \cdot h \cdot r^2$
 $50\pi = k \cdot 6 \cdot 25 \quad k = \frac{50\pi}{150} = \frac{1}{3}\pi$
 $\frac{50\pi}{150} = \frac{k \cdot 150}{150} \quad V = \frac{1}{3}\pi h r^2$

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whiteboards

Find the constant of variation for each relation and use it to write an equation for each statement. Then solve the equation.

5. If y varies **inversely** as x and $y = 3$ when $x = 4$, find y when $x = 15$. $k = 12$ $y = \frac{4}{5}$
6. If y varies **directly** as the square of x and $y = -54$ when $x = 9$, find y when $x = 6$. -24 $k = -\frac{2}{3}$
7. If y varies **jointly** as x and the cube of z and $y = 16$ when $x = 4$ and $z = 2$, find y when $x = -8$ and $z = -3$. $(4, 16, 2)$

$$y = kxz^3 \quad 0.5$$

$$y = 0.5xz^3, 108$$

$$= 0.5(-8)(-27)$$

$$= 0.5(-8)(-27)$$

Oct 21-5:03 PM

Oct 22-3:02 PM