Algebra 2 8.5

Recognize and solve direct and joint variation problems

Recognize and solve inverse and combined variation problems

direct variation $y = kx$ ↑ ↑

joint variation $y = k \cdot x \cdot z$

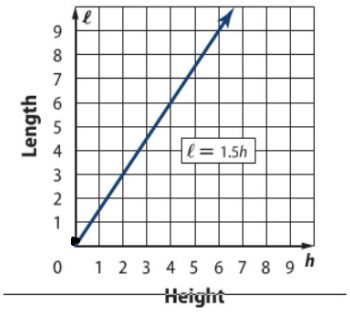
inverse variation $y = \frac{k}{x}$ ↑ ↓ $y = \frac{kx^2}{\sqrt{y}}$

constant of variation

combined $y = k\frac{xa}{b}$

KeyConcept Direct Variation

Words	y varies directly as x if there is some nonzero constant k such that $y = kx$. k is called the *constant of variation.*
Example	If $y = 3x$ and $x = 7$, then $y = 3(7)$ or 21.



KeyConcept Joint Variation

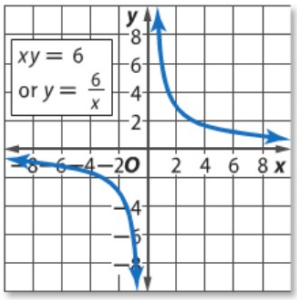
Words y varies jointly as x and z if there is some nonzero constant k such that $y = kxz$.

Example If $y = 5xz$, $x = 6$, and $z = -2$, then $y = 5(6)(-2)$ or -60.

KeyConcept Inverse Variation

Words y varies inversely as x if there is some nonzero constant k such that $xy = k$ or $y = \frac{k}{x}$, where $x \neq 0$ and $y \neq 0$.

Example If $xy = 2$, and $x = 6$, then $y = \frac{2}{6}$ or $\frac{1}{3}$.



GuidedPractice

5. Suppose p varies directly as r, and p varies inversely as t. Find t when $r = 10$ and $p = 5$, if $t = 20$ when $p = 4$ and $r = 2$.

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

$\frac{4}{1} = \frac{k\,2}{20}$

$\frac{80}{2} = \frac{2k}{2}$

$p = \frac{40r}{t}$

$\frac{5}{1} = \frac{40 \cdot 10}{t}$

$\frac{5t}{5} = \frac{400}{5}$

$t = 80$

$y = kx$ $y = k \cdot x \cdot z$ $y = \frac{k}{z}$ $y = \frac{kx}{z}$

State whether each equation represents a *direct*, *joint*, *inverse*, or *combined* variation. Then name the constant of variation.

32. $\frac{x}{y} = \frac{2.75}{1}$

$2.75y = x$

$\frac{2.75y}{2.75} = \frac{x}{2.75}$

$y = \frac{1}{2.75}x$

33. $fg = -2$

$f = -\frac{2}{g}$ $-\frac{2}{f}$

Inv.

$k = -2$

34. $a = 3bc$

joint

$k = 3$

35. $\frac{10}{1} = \frac{xy^2}{z}$

$\frac{10z}{10} = \frac{xy^2}{10}$

$z = \frac{1}{10}xy^2$

Solve for y (or some other variable...whatever is easiest)

Answers can vary depending on your decision

Answer the question

≈ 0.36

36. $y = -11x$

D

$k = -11$

37. $\frac{n}{p} = \frac{4}{1}$

$n = 4p$

$\frac{n}{4} \quad \frac{p}{4}$

$p = \frac{1}{4}n$

38. $9n = pr$

$\frac{9n}{p} = \frac{pr}{p}$

$r = \frac{9n}{p}$

39. $-2y = z$

$z = -2y$

40. $a = 27b$

41. $c = \frac{7}{d}$

$= 7 \cdot \frac{1}{d}$

42. $-10 = gh$

$\frac{-10}{h} \quad \frac{gh}{h}$

$g = \frac{-10}{h}$

43. $m = 20cd$

WB 8.5 prac

odds + 20, 22

(all = 6)