

## 1.4 Direct Variation & Proportion

- Obj: 1. Write & apply direct variation eqs.  
 2. Write & solve proportions.

$$y = kx \quad \text{direct variation eq.}$$

$k$ : constant of variation

Find the constant of variation if  $y$  varies directly as  $x$  and

$$y = -24 \text{ when } x = 4.$$

$$y = kx$$

$$\frac{-24}{4} = \frac{k(4)}{4} \quad k = -6$$

Direct Variation Eq:  $y = -6x$

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Find the constant of variation & the direct variation eq. if  $y$  varies directly as  $x$  and  $y = 15$  when  $x = 3$ .

$$\frac{15}{3} = \frac{k(3)}{3}$$

$$k = 5$$

$$y = 5x$$

$$\frac{30}{5} = \frac{5x}{5} \quad x = 6$$

Find  $x$  when  $y = 30$

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If  $y$  varies directly as  $x$  and  
 $y = -72$  when  $x = -18$ , find  $x$   
 when  $y = 12$ .

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

$$x = 3$$

$$\frac{-72}{-18} = \frac{k(-18)}{-18}$$

$$k = 4$$

$$y = 4x$$

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Proportions:

a statement that 2 ratios are =

$$\frac{a}{b} = \frac{c}{d}$$

$$\frac{2}{3} = \frac{4}{6} \quad \checkmark$$

$$\frac{3}{4} \neq \frac{7}{8} \quad \text{Not a proportion}$$

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### Cross Product Property

If  $\frac{a}{b} = \frac{c}{d}$   $b, d \neq 0$

then  $ad = bc$

Solve:  $\frac{3x-1}{5} = \frac{x}{2}$

$$5x = 2(3x-1)$$

$$5x = 6x - 2$$

$$\begin{matrix} -6x & -6x \end{matrix}$$

$$\frac{-x}{-1} = \frac{-2}{-1} \quad x = 2$$

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Solve:  $\frac{3x+2}{7} = \frac{x}{2}$

$$7x = 2(3x+2)$$

$$7x = 6x + 4$$

$$\begin{matrix} -6x & -6x \end{matrix}$$

$$\frac{1x}{1} = \frac{4}{1} \quad x = 4$$

check:  $\frac{3(4)+2}{7} = \frac{4}{2}$

$$\frac{14}{7} = \frac{4}{2}$$

$$2 = 2 \checkmark$$

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$$\text{Solve: } \frac{2x}{x+1} - 6 = \frac{x}{2}$$

Cannot cross multiply  
(yet)

$$\frac{2}{2} \cdot \frac{1}{2} + \frac{2x}{4} = \frac{3}{8}$$

$$\frac{2+2x}{4} = \frac{3}{8}$$

$$8(2+2x) = 12$$

$$16 + 16x = 12$$

$$\begin{array}{r} -16 \\ 16 + 16x = 12 \\ \hline \end{array}$$

$$\begin{array}{r} -16 \\ 16x = -4 \\ \hline \end{array}$$

$$x = -\frac{1}{4}$$

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