# DO NOW

Solve: $\frac{3x+3}{3} = \frac{7x-1}{5}$ ★cross multiply (fraction=fraction)

$3(7x-1)=5(3x+3)$

$21x-3=15x+15$

$21x-3-15x=15$

$21x-15x=15+3$

$6x=18$

$x=\frac{18}{6}$

$x=3$

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## 3.2 Direct Variation

direct variation - relationship between two variables so their ratio is a constant (always the same #)

**Say one variable: "varies directly" as the other / "directly proportional"

**constant of variation - symbol: $k$ → is that constant ratio

★To find this → put the pairs of numbers in a ratio and compare

SEE CW 3.2 Direct Variation

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***Examples: Determine which of the following tables of values expresses direct variation. State the constant of variation.***

★put pairs in ratios (fractions) → bottom row on top

1.

| n | 3 | 4 | 5 |
|---|---|---|---|
| c | 6 | 8 | 10 |

$\frac{c}{n}$ $\frac{6}{3}=2$, $\frac{8}{4}=2$, $\frac{10}{5}=2$ — These all match.

direct variation

$k=2$

2.

| x | 1 | 2 | 3 |
|---|---|---|---|
| y | 1 | 4 | 9 |

$\frac{y}{x}$ $\frac{1}{1}=1$, $\frac{4}{2}=2$, $\frac{9}{3}=3$ — These don't match.

not direct variation

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Direct Variation Equation - form: $y=kx$

$k$ → constant of variation (coefficient of x)

* is a linear equation (line)

* Always contains the point (0,0) → will graph through the origin

* To determine if an equation is direct variation:
  - Solve for y
  ? Does it look like $y=kx$?

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***Examples: Determine which of the following equations expresses direct variation. State the constant of variation.*** form: $y=kx$

3. $y=5x$

direct variation

$k=5$

4. $y=2x-7$

not direct variation

5. $-3y=21$

$y=\frac{21}{-3}$

$y=-7$

not direct variation

6. $\frac{2y}{x}=6$

$2y=6x$

$y=\frac{6x}{2}$

$y=3x$

direct variation

$k=3$

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7. If $d$ varies directly as $t$ and $d = 520$ when $t = 13$, find the value of $d$ when $t = 9$.

$\frac{d}{t}$ ★★★★

$\frac{520}{13}=\frac{d}{9}$

$13d=9(520)$

$13d=4680$

$d=\frac{4680}{13}$

$d=360$

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8. The bending of a beam varies directly as its mass. A beam is bent 20 mm by a mass of 40 kg. How much will the beam bend with a mass of 100 kg?

let $x$ = beam bend (mm)

$\frac{\text{mass (kg)}}{\text{bend (mm)}}$

$$\frac{40}{20} = \frac{100}{x}$$

$$40x = 20(100)$$

$$40x = 2000$$

$$x = \frac{2000}{40}$$

$$x = 50$$

The beam will bend 50 mm.



# HOMEWORK

Worksheet - HW 3.2 Direct Variation