

8th Grade

2.5 Solving Proportions

proportion: an equation of 2 equal ratios

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

Solve for a missing value in a proportion by cross multiplying and setting them equal to each other.

$$ad = bc \quad \text{or} \quad bc = ad$$

1. $\frac{11}{6} = \frac{x}{30}$

$$6x = 11 \cdot 30$$

$$\frac{6x}{6} = \frac{330}{6}$$

$$x = 55$$

2. $\frac{8}{p} = \frac{6}{10}$

$$p \cdot 6 = 8 \cdot 10$$

$$\frac{6p}{6} = \frac{80}{6}$$

$$p = \frac{40}{3}$$

3) $\frac{2.6}{13} = \frac{8}{n}$

$$2.6n = 8 \cdot 13$$

$$\frac{2.6n}{2.6} = \frac{104}{2.6}$$

$$n = 40$$

$$\frac{3 \cdot 3 \cdot 5}{21 \cdot 0}$$

4) $\frac{6}{2} = \frac{c}{3.5}$

$$2c = 6 \cdot 3.5$$

$$\frac{2c}{2} = \frac{21}{2}$$

$$c = 10.5$$

$$\begin{array}{r} 2 \\ 26 \\ \hline 104 \end{array}$$

$$\begin{array}{r} 40 \\ 26 \overline{) 1040} \\ \underline{104} \\ 00 \\ \underline{-00} \\ 0 \end{array}$$

Solving Proportions with Distributive Property

$$5) \frac{3}{5} = \frac{x+2}{15}$$

$$5(x+2) = 3 \cdot 15$$

$$5(x+2) = 45$$

$$5x + 10 = 45$$

$$\frac{5x}{5} = \frac{35}{5}$$

$$\boxed{x=7}$$

$$7 \overline{) 133}$$

$$\begin{array}{r} 19 \\ 7 \overline{) 133} \\ \underline{7} \\ 63 \\ \underline{63} \\ 0 \end{array}$$

$$6) \frac{14}{y-3} = \frac{7}{8}$$

$$7(y-3) = 14 \cdot 8$$

$$7(y-3) = 112$$

$$7y - 21 = 112$$

$$\frac{7y}{7} = \frac{133}{7}$$

$$\boxed{y=19}$$

Try this:

$$1. \frac{w}{35} = \frac{4}{7}$$

$$w \cdot 7 = 35 \cdot 4$$

$$\frac{7w}{7} = \frac{140}{7}$$

$$\boxed{w=20}$$

$$2. \frac{1}{3} = \frac{w-5}{9}$$

$$3(w-5) = 1 \cdot 9$$

$$3(w-5) = 9$$

$$3w - 15 = 9$$

$$\frac{3w}{3} = \frac{24}{3}$$

$$\boxed{w=8}$$

Setting up a proportion

1. A backpacker in the Sierras hikes 5.5 miles in 2 hrs. If the hiking rate remains the same, how far will the backpacker hike in 7 hours? Write and solve a proportion to find the answer.

$$\frac{5.5 \text{ mi}}{2 \text{ hr}} = \frac{x \text{ mi}}{7 \text{ hr}}$$

$$5.5 \cdot 7 = x \cdot 2$$

$$\frac{2x = 38.5}{2} = \frac{38.5}{2}$$

$$x = 19.25 \text{ mi}$$

2. Seth earns \$152 in 4 days. At that rate, how many days will it take him to earn \$532?

$$\frac{\$152}{4 \text{ d}} = \frac{\$532}{x \text{ d}}$$

$$152x = 4 \cdot 532$$

$$\frac{152x = 2128}{152} = \frac{2128}{152}$$

$$x = 14 \text{ days}$$

3. Lanette drove 248 miles in 4 hours. At that rate, how long will it take her to drive an additional 93 miles?

$$\frac{248 \text{ mi}}{4 \text{ hr}} = \frac{93 \text{ mi}}{h}$$

$$248h = 372$$

$$h = \frac{372}{248} = \frac{124}{82} = \frac{62}{41} = \frac{31}{20.5}$$

4. A blueprint for a house states that 2.5 inches equals 10 feet. If the length of a wall is 12 feet, how long is the wall in the blueprint?

$$\frac{2.5 \text{ in}}{10 \text{ ft}} = \frac{n \text{ in}}{12 \text{ ft}}$$

$$\frac{10n = 30}{10} = \frac{30}{10}$$

$$n = 3 \text{ in}$$

Try this:

The elevator that takes passengers from the lobby of the John Hancock Center in Chicago to the observation level travels 125 ft in 5 seconds. Find the time it will take for the elevator to travel from the lobby to the observation level which is 1029 ft above the ground.

$$\frac{125}{5} = \frac{1029}{x}$$

$$125x = 5145$$

$$x = 41.16 \text{ seconds}$$

$$\begin{array}{r} 14 \\ 1029 \\ \underline{5} \\ 5145 \end{array}$$

$$\begin{array}{r} 41.16 \\ 125 \overline{) 5145.00} \\ \underline{500} \\ 145 \\ \underline{125} \\ 200 \\ \underline{125} \\ 750 \end{array}$$

Homework:

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