Unit 1.5   Solving Proportions

Solve each proportion.

1) $\frac{3}{5} = \frac{x}{10}$

$\frac{3}{5} = \frac{x}{10}$ Write the original problem

$10 \cdot \frac{3}{5} = \frac{x}{10} \cdot 10$ Multiply both sides by 10

$6 = x$ Simplify

3) $\frac{1}{3} = \frac{x}{5}$

$\frac{1}{3} = \frac{x}{5}$ Write the original problem

$5 \cdot \frac{1}{3} = \frac{x}{5} \cdot 5$ Multiply both sides by 5

$\frac{5}{3} = x$ Simplify

5) $\frac{7}{5} = \frac{x}{4}$

$\frac{7}{5} = \frac{x}{4}$ Write the original problem

$4 \cdot \frac{7}{5} = \frac{x}{4} \cdot 4$ Multiply both sides by 4

$\frac{28}{5} = x$ Simplify

7) $\frac{22}{x} = \frac{-5}{3}$

$\frac{22}{x} = \frac{-5}{3}$ Write the original problem

$x \cdot \frac{22}{x} = \frac{-5}{3} \cdot x$ Multiply both sides by x

$22 = \frac{-5}{3} x$ Simplify

$\frac{-3}{5} \cdot 22 = \frac{-5}{3} x \cdot \frac{-3}{5}$ Multiply both sides by $\frac{-3}{5}$

$\frac{-66}{5} = x$ Simplify

7) $\dfrac{22}{x} = \dfrac{-5}{3}$ Alternative way to solve:

$\dfrac{22}{x} = \dfrac{-5}{3}$ Write the original problem

$\dfrac{x}{22} = \dfrac{-3}{5}$ Proportions can be flipped upside down, keep the negative on top of the fraction

$22 \cdot \dfrac{x}{22} = \dfrac{-3}{5} \cdot 22$ Multiply both sides by 22

$x = \dfrac{-66}{5}$ Simplify

9) $\dfrac{25}{p} = \dfrac{5}{-4}$

$\dfrac{25}{p} = \dfrac{5}{-4}$ Write the original problem

$\dfrac{p}{25} = \dfrac{-4}{5}$ Proportions can be flipped upside down, keep the negative on top of the fraction

$25 \cdot \dfrac{p}{25} = \dfrac{-4}{5} \cdot 25$ Multiply both sides by 25

$x = -20$ Simplify

Solve each proportion using the Cross Products Property.

11) $\dfrac{11}{8} = \dfrac{13}{m}$

$\dfrac{11}{8} = \dfrac{13}{m}$ Write the original problem

$m \cdot 11 = 13 \cdot 8$ Use cross products property

$\dfrac{11m}{11} = \dfrac{104}{11}$ Divide both sides by 11

$x = \dfrac{104}{11}$ Simplify

13) $\frac{14}{f} = \frac{9}{21}$

$\frac{14}{f} = \frac{9}{21}$ Write the original problem

$21 \cdot 14 = 9 \cdot f$ Use cross products property

$\frac{294}{9} = \frac{9f}{9}$ Divide both sides by 9

$\frac{98}{3} = f$ Simplify

15) $\frac{16}{-5} = \frac{-13}{c}$

$\frac{16}{-5} = \frac{-13}{c}$ Write the original problem

$c \cdot 16 = -13 \cdot (-5)$ Use cross products property

$\frac{16c}{16} = \frac{65}{16}$ Divide both sides by 16

$c = \frac{65}{16}$ Simplify

17) The doors on a building are proportional to the size of the building. The height of each door is 72 in., and the width is 32 in. If the height of the building is 102 ft, what is the width of the building?

$\frac{HEIGHT}{WIDTH} = \frac{72\ in}{32\ in} = \frac{102\ ft}{x\ ft}$ need to change to same units to work out problem.

$\frac{HEIGHT}{WIDTH} = \frac{6\ ft}{2\frac{2}{3}\ ft} = \frac{102\ ft}{x\ ft}$ divide 72 by 12 to get 6 ft and divide 32 by 12 to get $2\frac{2}{3}$ ft .

$x \cdot 6 = 102 \cdot 2\frac{2}{3}$ Use cross products property

$\frac{6x}{6} = \frac{272}{6}$ Divide both sides by 6

$x = \frac{136}{3}$ Simplify

$X = 45\frac{1}{3}$ ft Change to mixed fraction and add units

Or

$\frac{HEIGHT}{WIDTH} = \frac{72\ in}{32\ in} = \frac{1224\ in}{x\ in}$ multiple 102 by 12 to get 1224 in.

$X = 544\ in$, then divide by 12 to get $X = 45\frac{1}{3}$ ft

19) Sixty students, out of 100 surveyed, chose chicken nuggets as their favorite lunch item. If the school has 1360 students, how many students would likely say that chicken nuggets is their favorite if the survey is a fair representation of the student body?

$$\frac{LIKE\ CHICKEN\ NUGGETS}{TOTAL\ PEOPLE} = \frac{60\ LIKE\ CHICKEN\ NUGGETS}{100\ TOTAL\ SURVEYED} = \frac{x\ LIKE\ CHICKEN\ NUGGETS}{1360\ TOTAL\ STUDENTS}$$

$\frac{60}{100} = \frac{x}{1360}$ Write the original problem

$1360 \cdot \frac{60}{100} = \frac{x}{1360} \cdot 1360$ Multiply both sides by 1360

$816 = x$ Simplify

$X = 816\ students\ is\ a\ fair\ representation\ of\ how\ many\ students\ would\ like\ chicken\ nuggets.$

Solve the following. Round to two decimal places.

21) $\frac{10}{k-5} = \frac{5}{k}$

$\frac{10}{k-5} = \frac{5}{k}$ Write the original problem

$k \cdot 10 = 5 \cdot (k-5)$ Use cross products property

$10k = 5 \cdot (k) + 5(-5)$ Distribute

$10k = 5k - 25$ Simplify

$10k - (5k) = 5k - (5k) - 25$ Subtract 5k from both sides

$5k = -25$ Simplify and Combine like terms

$\frac{5k}{5} = \frac{-25}{5}$ Divide both sides by 5

$k = -5$ Simplify

$k = -5.00$ Round to two decimal places

23) $\frac{x-4}{x} = \frac{9}{8}$

$\frac{x-4}{x} = \frac{9}{8}$	Write the original problem
$8 \cdot (x - 4) = x \cdot (9)$	Use cross products property
$8 \cdot (x) + 8 \cdot (-4) = 9x$	Distribute
$8x - 32 = 9x$	Simplify
$8x - (8x) - 32 = 9x - (8x)$	Subtract 8x from both sides
$-32 = x$	Simplify and Combine like terms
$-32.00 = x$	Round to two decimal places

25) $\frac{23}{15} = \frac{p+10}{p-17}$

$\frac{23}{15} = \frac{p+10}{p-17}$	Write the original problem
$(p - 17) \cdot 23 = (p + 10) \cdot 15$	Use cross products property
$(p) \cdot 23 + (-17) \cdot 23 = (p) \cdot 15 + (10) \cdot 15$	Distribute
$23p - 391 = 15p + 150$	Simplify
$23p - (15p) - 391 = 15p - (15p) + 150$	Subtract 15p from both sides
$8p - 391 = 150$	Simplify and Combine like terms
$8p - 391 + (391) = 150 + (391)$	Add 391 to both sides
$8p = 541$	Simplify
$\frac{8p}{8} = \frac{541}{8}$	Divide both sides by 8
$p = \frac{541}{8}$	Simplify
$p = 67.625$	change to decimal
$p = 67.63$	Round to two decimal places