Math 115

Spring 2017

Lecture 6

Solve by Cross-Multiplication

$\frac{x}{4} = \frac{3}{5}$

$x \cdot 5 = 4 \cdot 3$

$5x = 12$

$\boxed{x = \frac{12}{5}}$ $\boxed{x = 2.4}$

$\left\{\frac{12}{5}\right\}$

$\frac{x}{16.8} = \frac{5}{2.5}$

$2.5x = 5(16.8)$

$2.5x = 84$

$x = \frac{84}{2.5}$ $\boxed{x = 33.6}$ $\{33.6\}$

Equations are Conditional

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

$3(2x-4) = 2(3x+1)$

$6x - 12 = 6x + 2$

$6x - 6x = 2 + 12$

$0 = 14$

false

$\emptyset$

eqn is Contradiction

$$\frac{2x+5}{1} = \frac{4x+10}{2}$$

$2(2x+5) = 1(4x+10)$

$4x + 10 = 4x + 10$

$4x - 4x = 10 - 10$

$0 = 0$ True

Infinitely Many Solns.

Eqn is identity

You need to make 40 muffins for a Party. For 5 muffins you need .5 cup of sugar. How many cups of sugar for 40 Muffins?

$$\frac{5 \text{ Muffins}}{.5 \text{ cup Sugar}} = \frac{40 \text{ Muffins}}{x \text{ cup of Sugar}}$$

We need 4 cups of Sugar.

$$\frac{5}{.5} = \frac{40}{x}$$

$5x = .5(40)$

$x = \frac{.5(40)}{5}$ $\boxed{x = 4}$

Mike drove 120 miles in 1.8 hrs.

At this speed, how long does it Mike to drive 600 Miles?

$$\frac{120 \text{ Miles}}{1.8 \text{ hrs}} = \frac{600 \text{ Miles}}{x \text{ hrs}}$$

$$\frac{120}{1.8} = \frac{600}{x}$$

$$120x = 600(1.8)$$

$$x = \frac{600(1.8)}{120}$$

$$\boxed{x = 9}$$

It takes him 9 hrs.

4 kg of potatoes was sold for $1.25 at Farmer's Market.

How many kg of potatoes can we buy if we have $10?

$$\frac{4 \text{ kg}}{\$1.25} = \frac{x \text{ kg}}{\$10}$$

$$\frac{4}{1.25} = \frac{x}{10}$$

$$1.25x = 40$$

$$x = \frac{40}{1.25}$$

$$\boxed{x = 32}$$

32 kg

Art goes fishing, he caught 16 fish, tagged them all, and put them back in the water. A week later, he caught 30 fish, but only 4 had tags. Use ratio & proportion to estimate the # of fish in the water.

$$\frac{x \text{ fish}}{16 \text{ tags}} = \frac{30 \text{ fish}}{4 \text{ tags}}$$

$$x = \frac{16 \cdot 30}{4}$$

$$x = 120$$

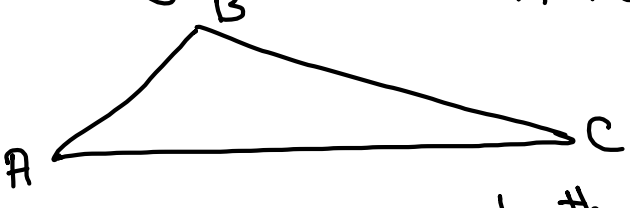
120 fish

$$\frac{x}{16} = \frac{30}{4}$$

$$4x = 16 \cdot 30$$

WP 3 Due tomorrow

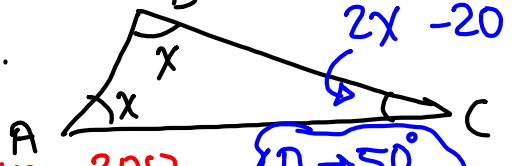
In any Triangle $A + B + C = 180^\circ$



Two angles are equal, the third angle is 20° less than the sum of equal angles.

Find all three angles.

$A + B + C = 180^\circ$



$x + x + 2x - 20 = 180^\circ$

$4x - 20 = 180$

$4x = 200$

$x = 50$

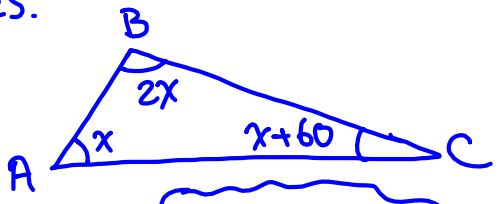
A → 50°
B → 50°
C → 80°

In triangle ABC, Angle B is twice angle A. Angle C is 60° more than Angle A.

Draw & label all angles.

Find all angles.

$A + B + C = 180°$



$x + 2x + x + 60 = 180$

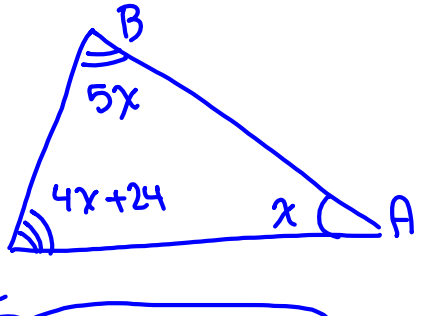
$4x = 120$ $\quad \boxed{x = 30}$

$m\angle A = 30°$

$m\angle B = 60°$

$m\angle C = 90°$

In triangle ABC, Angle B is 5 times angle A. Angle C is 24° more than 4 times angle A. Find all three angles.



$A + B + C = 180$

$x + 5x + 4x + 24 = 180$

$10x = 156$

$\boxed{x = 15.6}$

$m\angle A = 15.6°$,

$m\angle B = 78°$, and $m\angle C = 86.4°$

Solve, express final ans in all 3 ways:

$-2x + 12 < 3x + 42$

$-2x - 3x < 42 - 12$

$-5x < 30$

$\frac{-5}{-5}x > \frac{30}{-5}$

$x > -6$

① S.B.N. $\{x \mid x > -6\}$

② Graph

③ Interval Notation

$(-6, \infty)$

Solve

$3x - 12 \geq 5(x+1) - 7$

$3x - 12 \geq 5x + 5 - 7$

$3x - 12 \geq 5x - 2$

$3x - 5x \geq -2 + 12$

$-2x \geq 10$

$\frac{-2}{-2}x \leq \frac{10}{-2}$

$x \leq -5$

① S.B.N. $\{x \mid x \leq -5\}$

② Graph

③ I.N. $(-\infty, -5]$

Solve

$-7 < 3x + 2 \leq 32$

$-7-2 < 3x+2-2 \leq 32-2$

$-9 < 3x \leq 30$

$\frac{-9}{3} < \frac{3}{3}x \leq \frac{30}{3}$

$-3 < x \leq 10$

S.B.N. $\{x \mid -3 < x \leq 10\}$

Graph

I.N. $(-3, 10]$

Solving Basic percent problems:

① By translation

what, what number → x

p%, what percent → $\frac{p}{100}$

is, get, become, ... → $=$

% of → $\cdot$

a of b → $\frac{a}{b}$

what is 4.5% of 800?

$x = \frac{4.5}{100} \cdot 800$

$x = 4.5(8)$

$x = 36$

36 is 4.5% of 800.

4.5% → $x = .045 \cdot 800$

$x = 36$

8.5% of what number is 3500?

$\frac{8.5}{100} \cdot x = 3500$

$.085x = 3500 \rightarrow x = \frac{3500}{.085}$ $x = 41176.47$

$x \approx 41176$

8.5% of 41,176 is 3500.

1.5% of what number is 3000?

$\frac{1.5}{100} \cdot x = 3000$

$.015x = 3000$

$x = \frac{3000}{.015}$ $x = 200{,}000$

1.5% of 200,000 is 3000

What percent of 80 is 120?

$\frac{P}{100} \cdot 80 = 120$

$\frac{P}{100} \cdot 80 = 120$

$.8P = 120$

$P = \frac{120}{.8}$

$P = 150$

150% of 80 is 120.

what percent of 6000 is 240?

$\frac{P}{100} \cdot 6000 = 240$

$60P = 240$

$P = 4$

4% of 6000 is 240.

① what is .5% of 240?

$x = \frac{.5}{100} \cdot 240$

$x = .005(240)$

$x = 1.2$

1.2 is .5% of 240.

② 3.5% of what number is 21.7?

$\frac{3.5}{100} \cdot x = 21.7$

$.035x = 21.7$

$x = 620$

3.5% of 620 is 21.7.

③ what percent of 40000 is 100?

$\frac{P}{100} \cdot 40000 = 100$

$400P = 100$

$P = \frac{100}{400} = .25$

.25% of 40000 is 100.

$\frac{P}{100} = \frac{\text{Part}}{\text{whole}}$ "whole comes after of" "Part comes after is"

4% of what number is 50?

x

$\frac{4}{100} = \frac{50}{x}$

$4x = 100(50)$

$x = \frac{100(50)}{4}$

$x = 375$

4% of 375 is 50.

12.75% of 4000 is what number?

$$\frac{P}{100} = \frac{\text{Part}}{\text{whole}}$$

$$\frac{12.75}{100} = \frac{x}{4000}$$

$$100x = 4000(12.75)$$

$$\boxed{x = 510}$$

12.75% of 4000 is 510.

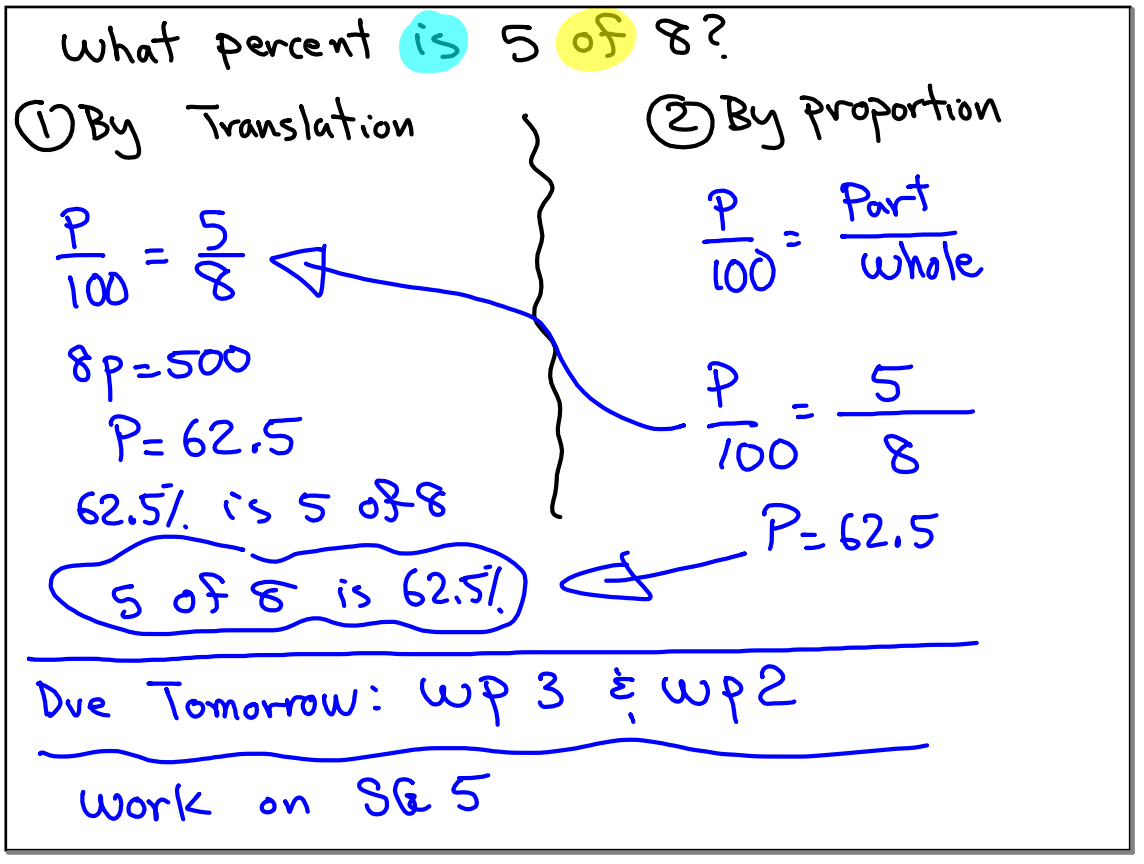
What percent of 6250 is 500?

$$\frac{P}{100} = \frac{\text{Part}}{\text{whole}}$$

$$\frac{P}{100} = \frac{500}{6250}$$ Cross-Multiply,

$$P = 8$$

8% of 6250 is 500


What percent is 5 of 8?
① By Translation
② By Proportion
P/100 = 5/8
8p = 500
P = 62.5
62.5% is 5 of 8
5 of 8 is 62.5%
P/100 = Part/whole
P/100 = 5/8
P = 62.5
Due Tomorrow: wp 3 & wp 2
Work on SG 5