Math 115

Fall 2017

Lecture 4

Solve by using Cross-Multiplication:

① $\frac{x}{2} = \frac{7}{5}$ $\left\{\frac{14}{5}\right\}$

$5x = 2(7)$

$5x = 14$

$\boxed{x = \frac{14}{5}}$

② $\frac{x-2}{x+3} = \frac{2}{3}$

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

$3x - 6 = 2x + 6$

$3x - 2x = 6 + 6$

$\boxed{x = 12}$ $\{12\}$

③ $\frac{3x-1}{2x+3} = \frac{3}{2}$

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

$6x - 2 = 6x + 9$

$6x - 6x = 9 + 2$

$0 = 11$ false $\Rightarrow$ No Solution

$\emptyset$

4 lb. of apples for $12.50.

At this rate, how much for 10 lb. of apple?

$$\frac{4 \text{ lb.}}{\$12.50} = \frac{10 \text{ lb.}}{\$x} \qquad \frac{4}{12.5} = \frac{10}{x}$$

Cross-Multiply

$4x = 10(12.5)$

$4x = 125$

$x = \frac{125}{4}$

$x = 31.25$

$31.25

John lost 7.5 pounds in 15 days.

At this rate, how long does it take him to lose 30 pounds?

$$\frac{7.5 \text{ Pounds}}{15 \text{ Days}} = \frac{30 \text{ Pounds}}{x \text{ Days}} \Rightarrow \frac{7.5}{15} = \frac{30}{x}$$

Cross-Multiply

$7.5x = 15(30)$

$x = \frac{15(30)}{7.5}$

$x = 60$

60 days

A 5 ft tall person has a shadow of 18 ft.
At the same time, a tall tree has a shadow of 60 ft. Find the height of the tree.

$$\frac{5 \text{ ft tall}}{18 \text{ ft. shad.}} = \frac{x \text{ ft tall}}{60 \text{ ft. shad.}}$$

$$\frac{5}{18} = \frac{x}{60}$$

$$18x = 5(60)$$

$$x = \frac{5(60)}{18}$$

$x \approx 16.\overline{6}$

About 17 ft tall

WP 3 is due on Tuesday.

Basic Percent

By Translation

By Proportion

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

"Whole comes after of"

4% of what number is 75?

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

$$\frac{4}{100} = \frac{75}{x}$$

$$4x = 100(75)$$

$$x = \frac{100(75)}{4}$$

$$x = 1875$$

4% of 1875 is 75.

8% of 450 is what?

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

$$\frac{8}{100} = \frac{x}{450}$$

$$100x = 8(450)$$

$$x = \frac{8(450)}{100}$$

$$x = 36$$

8% of 450 is 36.

What Percent of 80 is 120?

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

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

$$80P = 100(120)$$

$$P = \frac{100(120)}{80} \qquad P = 150$$

150% of 80 is 120.

① What is 12.5% of 1200?

$$\frac{P}{100} = \frac{\text{Part}}{\text{whole}} \qquad \frac{12.5}{100} = \frac{x}{1200}$$

$$100x = 1200(12.5)$$

$$x = 150$$

150 is 12.5% of 1200.

② 2.5% of what is 600?

$$\frac{2.5}{100} = \frac{600}{x}$$

$$2.5x = 100(600) \qquad x = 24000$$

2.5% of 24000 is 600.

③ What Percent of 2500 is 125?

$$\frac{P}{100} = \frac{125}{2500}$$

$$2500P = 100(125) \qquad P = 5$$

5% of 2500 is 125.

WP 3 is due on Tuesday.

Basic Percent

By Translation

what, what number → x

what percent → $\frac{p}{100}$

is, get, become, ... → $=$

a of b → $\frac{a}{b}$

% of → $\cdot$

By Proportion

$$\frac{p}{100} = \frac{\text{Part}}{\text{Whole}}$$

"Whole comes after of"

5% of 2500 is what number?

$\frac{5}{100} \cdot 2500 = x$

$5(25) = x$

$x = 125$

5% of 2500 is 125.

2% of what number is 450?

$\frac{2}{100} \cdot x = 450$

$\frac{2}{100} x = 450$

$.02x = 450$

$x = \frac{450}{.02}$

$x = 22500$

2% of 22500 is 450.

What Percent of 750 is 37.5?

$\frac{P}{100} \cdot 750 = 37.5$

$P \cdot 750 = 750P$

$\frac{\cancel{750}^{75}}{\cancel{100}_{10}} P = 37.5$

$7.5P = 37.5$

$P = \frac{37.5}{7.5}$ $P = 5$

5% of 750 is 37.5.

Solve by translation:

1) 7.5% of 1800 is what?

$\frac{7.5}{\cancel{100}} \cdot \cancel{1800} = x$

$7.5(18) = x$ $x = 135$

7.5% of 1800 is 135.

2) 180% of what number is 9000?

$\frac{\cancel{180}}{\cancel{100}} \cdot x = 9000$

$1.8x = 9000$

$x = \frac{9000}{1.8}$

$x = 5000$

180% of 5000 is 9000.

What percent of 240 is 7000?

Use translation to Solve.

$\frac{P}{100} \cdot 240 = 7000$

$\frac{240}{100} P = 7000$

$2.4P = 7000$

$P = \frac{7000}{2.4}$ $P = 2916.\overline{6}$

About 2917% of 240 is 7000.

Solve

$\frac{3}{5}(x-1) + \frac{1}{4} = \frac{1}{10}(x+3)$

Hint: Use LCD to Clear all Fractions

LCD=20

$20 \cdot \frac{3}{5}(x-1) + 20 \cdot \frac{1}{4} = 20 \cdot \frac{1}{10}(x+3)$

$12(x-1) + 5 = 2(x+3)$

$12x - 12 + 5 = 2x + 6$

$12x - 7 = 2x + 6$

$12x - 2x = 6 + 7$

$10x = 13$

$x = 1.3$

or

$\{\frac{13}{10}\}$

$x = \frac{13}{10}$

or $x = 1\frac{3}{10}$

NO School Monday

Due Tuesday

WP 3 , WP 2

The sum of two numbers is 30.

one of them is 4 more than another one.

find both numbers.

First → x

Second → $x+4$

13 & 17

First + Second = 30

$x + x+4 = 30$

$2x+4=30$

$2x=30-4$

$2x=26$

$x=13$

The sum of two numbers is 31.

one of them is 5 less than twice the other one.

find both numbers.

First → x

Second → $2x-5$

12 & 19

$x + 2x-5 = 31$

$3x-5=31$

$3x=36$

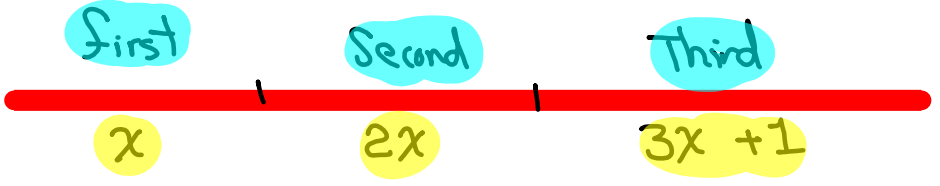
$x=12$

A piece of wood is 49 inches long.

It was cut into 3 pieces.

Second piece was twice as long the first piece.

Third piece was 1 inch more than 3 times the first piece. Find the length of the third piece.



First + Second + Third = 49 in.

$x + 2x + 3x+1 = 49$

$6x + 1 = 49$

$6x = 48$

$x = 8$

$3(8)+1$

25 in.

NO School Monday

Due Tuesday: wp2, wp3, wp4

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working with linear inequality

Follow steps as solving linear equations but reverse the inequality symbol after dividing or multiplying by a negative #.

Solve

less than

$3x - 7 < x + 5$

$3x - x < 5 + 7$

$2x < 12$

$\frac{2}{2}x < \frac{12}{2}$

$\boxed{x < 6}$

$-2x + 8 \leq 3x - 12$

$-2x - 3x \leq -12 - 8$

$-5x \leq -20$

Divide by -5

$\frac{-5}{-5}x \geq \frac{-20}{-5}$

$\boxed{x \geq 4}$

$2(x-1)+5 > 4x + 13$

Distribute & Simplify

$2x - 2 + 5 > 4x + 13$

$2x + 3 > 4x + 13$

Variable on LHS
Numbers on RHS

$2x - 4x > 13 - 3$

$-2x > 10$

Make $1x$ on LHS

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

$\boxed{x < -5}$

$-5 < 2x - 3 \leq 13$

① Add 3 to all 3 sides, and Simplify

$-5 + 3 < 2x - 3 + 3 \leq 13 + 3$

$-2 < 2x \leq 16$

② Divide all three sides by 2.

$\frac{-2}{2} < \frac{2}{2}x \leq \frac{16}{2}$

$\boxed{-1 < x \leq 8}$

Solve

$-5 \leq 3x + 4 < 22$

$-5-4 \leq 3x + 4 - 4 < 22 - 4$

$-9 \leq 3x < 18$

$\frac{-9}{3} \leq \frac{3}{3}x < \frac{18}{3}$

$\boxed{-3 \leq x < 6}$

$7 < -2x - 3 \leq 13$

Add 3, and Simplify

$10 < -2x \leq 16$

Divide by -2, and Simplify

Warning: You are dividing by a $-$ number

$-5 > x \geq -8 \Rightarrow \boxed{-8 \leq x < -5}$

Due Tuesday WP 2, WP 3, WP 4, SG 3