Math 115

Winter 2017

Lecture 3

Solve:

1) $-4x+7=-21$

$-4x=-21-7$

$-4x=-28$

$x=\frac{-28}{-4}$

$x=7$

$\{7\}$

2) $3x-8=x-24$

$3x-x=-24+8$

$2x=-16$

$x=\frac{-16}{2}$

$x=-8$

$\{-8\}$

Solve:

1) $4(2x-1)+7 = -2(x+3)-8$

$8x-4+7 = -2x-6-8$

$8x+3 = -2x-14$

$8x+2x = -14-3$

$10x = -17$

$x = \frac{-17}{10}$ $\quad x = -1.7$

$\{-1.7\}$

2) $\frac{3}{5}(x-1)+4 = \frac{1}{2}(x+2)-3$

LCD = 10

$\cancel{10}^{2} \cdot \frac{3}{\cancel{5}}(x-1) + 10 \cdot 4 = \cancel{10}^{5} \cdot \frac{1}{\cancel{2}}(x+2) - 10 \cdot 3$

$6(x-1)+10 \cdot 4 = 5(x+2)-10 \cdot 3$

$6x-6+40 = 5x+10-30$

$6x+34 = 5x-20$

$6x-5x = -20-34$

$x = -54 \rightarrow \{-54\}$

Solve

$.4(3x-1)+2=-.13x-5$

$1.2x-.4+2=-.13x-5$

$1.2x+1.6=-.13x-5$

$1.2x+.13x=-5-1.6$

$1.33x=-6.6$

$x=\frac{-6.6}{1.33}$

$x=-4.9624\ldots$

$\boxed{x\approx -4.96}$

$\{-4.96\}$

Solve:

$2.25(3x-1)+5.25=-3.75x+3$

$6.75x-2.25+5.25=-3.75x+3$

$6.75x+3=-3.75x+3$

$6.75x+3.75x=3-3$

$10.5x=0$

$x=\frac{0}{10.5}$

$\boxed{x=0}\rightarrow\{0\}$

A rectangular carpet has a perimeter of 42 m.

Its length is 3 m longer than twice its width.

Find its area.

$W = x$

$L = 2x + 3$

$P = 42$

$2L + 2W = 42$

$2(2x+3) + 2x = 42$

$4x + 6 + 2x = 42$

$6x = 42 - 6$

$6x = 36$

$x = 6$

Width → 6 m

Length → 15 m

$A = LW = 90\ m^2$

PTA of a local school paid $184 for a trip to the zoo.

Adults pay $12, and kids pay $5.

The number of kids was 1 fewer than 3 times the number of adults.

How many kids went to the zoo?

Adults → x

Kids → $3x - 1$

Total cost = 184

Adults + Kids = 184

$12 \cdot x + 5 \cdot (3x - 1) = 184$

$12x + 5(3x-1) = 184$

$12x + 15x - 5 = 184$

$27x - 5 = 184$

$27x = 184 + 5$

$27x = 189$

$x = \frac{189}{27}$ $\boxed{x=7}$

Kids → $3x-1$

$= 3(7)-1$

$= 20$

20 kids

A piece of wood is cut into 3 pieces.

Second piece is twice the first piece.

Third piece is 1 ft longer than the sum of first & second pieces.

Find all 3 pieces if it was 49 ft long before cuts.

First	Second	Third
x	$2x$	$x+2x+1$
		$3x$

First + Second + Third = 49

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

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

$6x + 1 = 49$

$6x = 48$

$x = 8$

Final Ans.

first piece	8 ft
Second "	16 ft
Third "	25 ft

Use First Last Name

use rfaradineh@gmail.com

Basic Percent

what or what number	x
what percent or P%	$\frac{P}{100}$
Percent of	$\cdot$
a of b	$\frac{a}{b}$
is, get, become, equal, ...	$=$

What is 12% of 800?

$x = \frac{12}{100} \cdot 800^{8}$

$x = .12 \cdot 800$

$x = 96$

96 is 12% of 800

8.5% of what number is 340?

$\frac{8.5}{100} \cdot x = 340$

$.085 \cdot x = 340$

$x = \frac{340}{.085}$

$x = 4000$

8.5% of 4000 is 340.

what percent of 400 is 120?

$$\frac{P}{100} \cdot 400 = 120$$

$$\frac{P}{\cancel{100}} \cdot \cancel{400}^{4} = 120$$

$$4P = 120$$

$$P = 30$$

30% of 400 is 120.

what is 4.5% of 2000?

$$x = \frac{4.5}{\cancel{100}} \cdot 20\cancel{00}$$

$$x = 4.5(20)$$

$$x = 90$$

90 is 4.5% of 2000.

12% of what number is 600?

.12 · x = 600

Solve $.12x = 600$

$x = \frac{600}{.12}$ $x = 5000$

12% of 5000 is 600.

what percent is 3 of 8?

$\frac{P}{100} = \frac{3}{8}$

Cross-Multiply

$8P = 100(3)$

$8P = 300$

$P = \frac{300}{8}$

$P = 37.5$

37.5% is 3 of 8.

Proportion

Rate or ratio → Ratio of a to b is $\frac{a}{b}$

When two ratios are equal to each other → Proportion

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

To solve a proportion equation → we simply Cross-Multiply.

Solve $\frac{x}{5} = \frac{3}{2}$

Cross-Multiply

$2x = 5 \cdot 3$

$2x = 15$

$x = \frac{15}{2}$ $\boxed{x = 7.5}$ $\{7.5\}$

Solve

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

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

$3x + 12 = 2x - 2$

$3x - 2x = -2 - 12$

$\boxed{x = -14}$ $\rightarrow \{-14\}$

Solve

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

$$\frac{2x-3}{x+4} = \frac{\frac{3}{2}}{\frac{13}{4}}$$

$$\frac{13}{4}(2x-3) = \frac{3}{2}(x+4)$$

LCD = 4

Hint:

1) Convert mixed numbers to improper fractions ✓

✓ 2) Cross-Multiply

3) Use LCD to clear fractions

$$\frac{13}{4}(2x-3) = \frac{3}{2}(x+4)$$

LCD = 4

$$\cancel{4}\cdot\frac{13}{\cancel{4}}(2x-3) = \overset{2}{\cancel{4}}\cdot\frac{3}{\cancel{2}}(x+4)$$

$$13(2x-3) = 6(x+4)$$

$$26x - 39 = 6x + 24$$

$$26x - 6x = 24 + 39$$

$$20x = 63$$

$$x = \frac{63}{20}$$

$$\boxed{x = 3.15}$$

$$\{3.15\}$$

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3 cups of sugar for 10 muffins.

How many cups of sugar for 45 muffins?

$$\frac{3 \text{ cups}}{10 \text{ muffins}} = \frac{x \text{ cups}}{45 \text{ muffins}}$$

Solve $\frac{3}{10} = \frac{x}{45}$ $\Rightarrow 10x = 3(45)$

$10x = 135$

$\boxed{x = 13.5}$

13.5 cups of sugar

2.5 inches on a map is for 100 miles in actual distance.

Two cities are 8 inches apart on the map. Find the actual distance between them.

$$\frac{2.5 \text{ inches}}{100 \text{ Miles}} = \frac{8 \text{ inches}}{x \text{ Miles}}$$

Solve

$$\frac{2.5}{100} = \frac{8}{x}$$

$$2.5x = 8(100)$$

$$x = \frac{800}{2.5}$$

$$x = 320 \rightarrow \boxed{320 \text{ Miles}}$$

$7.50 for 12 bananas.

How much for 20 bananas?

$$\frac{\$7.50}{12 \text{ Ban.}} = \frac{\$x}{20 \text{ Ban.}} \Rightarrow x = 12.5$$

$12.50

At a local lake, Mark caught 20 fish, tagged them all, and threw them back into the lake.

A week later, he caught 25 fish, but only 8 had tags. use proportion to estimate the # of fish in that lake.

$$\frac{x \text{ fish}}{20 \text{ tags}} = \frac{25 \text{ fish}}{8 \text{ tags}}$$

Solve $\frac{x}{20} = \frac{25}{8}$

$$8x = 20(25)$$

$$x = \frac{500}{8}$$

$$x = 62.5$$

About 63 fish

Using Proportion to Solve Basic Percent:

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

"whole comes after of"

What is 2% of 750?

$$\frac{2}{100} = \frac{x}{750} \rightarrow 100x = 1500$$

$$\boxed{x = 15}$$

15 is 2% of 750.

6.25% of what number is 52.5?

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

"whole comes after of"

$$\frac{6.25}{100} = \frac{52.5}{x}$$

$$6.25x = 100(52.5) \rightarrow x = \frac{5250}{6.25}$$

$$\boxed{x = 840}$$

6.25% of 840 is 52.5

What percent of 1200 is 80?

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

"whole comes after of"

$$\frac{P}{100} = \frac{80}{1200}$$

$$1200P = 80(100)$$

$$P = \frac{8000}{1200}$$

$$P = 6.\overline{6}$$

$6.\overline{6}\%$ of 1200 is 80

Simplify and name properties used.

$$\frac{4}{3}\left(\frac{3}{4}x + 2\right) - \frac{8}{3}$$

Distributive

$$= \frac{4}{3}\cdot\left(\frac{3}{4}x\right) + \frac{4}{3}\cdot 2 - \frac{8}{3}$$

Associative

$$= \left(\frac{4}{3}\cdot\frac{3}{4}\right)x + \frac{8}{3} - \frac{8}{3}$$

Inverse

$$= 1\cdot x + 0$$

Identity

$$= \boxed{x}$$

PTA Sold 67 tickets for a School Play. Some tickets for kids, Some for adults.
The number of kid's tkt was 1 fewer than 3 times the number of adult's tkt. How much did they raise if adult tkt was $8 and kid tkt was $3?

Total # of TKts = 67

Adults + Kids = 67

Kids → 3x-1 → 50

Adults → x → 17

$x + 3x - 1 = 67$

$4x - 1 = 67$

$4x = 68$

$x = 17$

$17(\$8) + 50(\$3) = \$$ raised

$136 + 150 =$ $286 → Raised.

Office hours : M - Th 11:00 AM – 11:30 AM

Location : G5 - 111 Q

Due Monday:

WP 2, WP 3, WP 4

SG 2, SG 3

Plan ahead & work on SG 4 & SG 5.

When an equation contains more than one variable, we have a formula.

Rectangle → $P = 2L + 2W$, $A = LW$

Square → $P = 4S$, $A = S^2$

Triangle → $P = a + b + c$, $A = \frac{bh}{2}$

Circle → $C = 2\pi r$, $A = \pi r^2$

$C = \pi d$

Solve for a: $P = a + b + c$

Isolate a

$P - b - c = a$

$a = P - b - c$

Solve for L: $P = 2L + 2W$

Isolate L

$P - 2W = 2L$

$\frac{P - 2W}{2} = L$

Solve for h: $A = \frac{b \cdot h}{2}$

Multiply both sides by 2.

$2A = 2 \cdot \frac{bh}{2}$

$2A = bh$

$\frac{2A}{b} = \frac{bh}{b} \Rightarrow \frac{2A}{b} = h$

Solve for y: $2x + 3y = 6$

$3y = -2x + 6$

$\frac{3}{3}y = \frac{-2}{3}x + \frac{6}{3}$

$y = \frac{-2}{3}x + 2$

$y = mx + b$

Slope-Int. form

Solve for y: $4x - 5y = 10$

$-5y = -4x + 10$

Divide by -5

$\frac{-5}{-5}y = \frac{-4}{-5}x + \frac{10}{-5}$

$y = \frac{4}{5}x - 2$

Solve for y: Hint: Use LCD to clear fractions

$$\frac{x}{4} + \frac{y}{3} = 1$$

$$\cancel{12}^{3} \cdot \frac{x}{\cancel{4}} + \cancel{12}^{4} \cdot \frac{y}{\cancel{3}} = 12 \cdot 1$$

$$3x + 4y = 12$$

$$4y = -3x + 12$$

$$y = \frac{-3x + 12}{4} \checkmark$$

$$y = \frac{-3x}{4} + \frac{12}{4}$$

$$\boxed{y = \frac{-3}{4}x + 3}$$

Linear inequalities:

$$<\ ,\ \leq\ ,\ >\ ,\ \geq$$

we do everything like solving linear equations, but if we divide or multiply by a negative number, we must reverse the inequality.

Solve

$3x - 1 \geq 14$

$3x \geq 14 + 1$

$3x \geq 15$

$\frac{3}{3}x \geq \frac{15}{3}$

$x \geq 5$

Incomplete work

Solve

$-2x + 7 > -9$

$-2x > -9 - 7$

$-2x > -16$

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

$x < 8$

Incomplete Work

Solve

$2(x-3) \leq 4x + 8$

Hint: Isolate x on the left-hand side.

$2x - 6 \leq 4x + 8$

$2x - 4x \leq 8 + 6$

$-2x \leq 14$

$\frac{-2}{-2}x \geq \frac{14}{-2}$

$x \geq -7$

Incomplete Work

Solve

$\frac{1}{3}x + \frac{2}{5} < \frac{3}{5}x - \frac{1}{3}$

Hint: Use LCD to Clear all Fractions

LCD = 15

$\cancel{15}^{5} \cdot \frac{1}{\cancel{3}}x + \cancel{15}^{3} \cdot \frac{2}{\cancel{5}} < \cancel{15}^{3} \cdot \frac{3}{\cancel{5}}x - \cancel{15}^{5} \cdot \frac{1}{\cancel{3}}$

$5x + 6 < 9x - 5$

$5x - 9x < -5 - 6$

$-4x < -11$

$x > \frac{11}{4}$

Incomplete work!

5 more than | Some number times −3 | is at least | 8. Find all such numbers.

$-3x + 5 \geq 8$

at least $\geq$

$-3x \geq 8 - 5$

$-3x \geq 3$

$\frac{-3}{-3}x \leq \frac{3}{-3}$

$x \leq -1$

At most $\leq$

at most −1.

I plan to move. I have $100 to rent a truck for 1 day. Cost of rental is $20/Day and 25¢ Per mile. How many miles am I allowed to drive this truck in one day?

Total Cost ≤ 100

$20 + .25M \leq 100$

$.25M \leq 100 - 20$

$.25M \leq 80$

$M \leq \frac{80}{.25}$

$M \leq 320$

at most 320 Miles

Maria is planning to open a checking account.

B of A → \$5/Month + 10¢/check

Wells Fargo → \$10/Month + 2¢/check.

Find the # of checks that makes Wells Fargo a better option.

Cost(Wells Fargo) < Cost(B of A)

$10 + .02C < 5 + .10C$

C is # of checks

$.02C - .1C < 5 - 10$

$-.08C < -5$

$C > \frac{-5}{-.08}$ $\quad C > 62.5$

More than 62 checks

$-3 < 2x - 1 \leq 9$

Add 1 to undo -1

$-3 + 1 < 2x - 1 + 1 \leq 9 + 1$

$-2 < 2x \leq 10$

Divide by 2

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

$-1 < x \leq 5$

Incomplete work

Solve

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

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

$$-9 \leq -3x < 0$$

$$\frac{-9}{-3} \geq \frac{-3}{-3}x > \frac{0}{-3}$$

incomplete work!

$$3 \geq x > 0$$