

Math 115

Fall 2018

Lecture 6

$$? a^2 + b^2 = c^2 ?$$

$$y = mx + b$$

$$d = rt$$

Feb 19-8:47 AM

Linear inequalities:

$$3x - 2 \leq 10 \quad , \quad -2x + 7 \geq -17, \quad 2(x-3) + 7 < x - 7$$

$$-4(2x+3) - 8 > 3(x+4) + 2, \quad \dots$$

we do approach these like solving
linear equations except whenever we
multiply or divide by a negative number,
we must reverse the inequality.

Solve $3x - 2 \leq 10$

$$3x \leq 10 + 2 \quad \rightarrow \quad 3x \leq 12$$

$$3x \leq 12 \quad \rightarrow \quad \frac{3}{3}x \leq \frac{12}{3}$$

$$x \leq 4$$

There are 3-ways to write thrs.

Oct 30-6:03 AM

Solve

$$-2x + 7 \geq -17$$

$$-2x \geq -17 - 7$$

$$-2x \geq -24$$

Divide by -2

$$\frac{-2}{-2}x < \frac{-24}{-2}$$

$$x < 12$$

• Set-builder notation

• Graph

• Interval notation

Oct 30-6:08 AM

Solve

$$2(x-3) + 10 < 4x + 12$$

Distribute & like terms

$$2x - 6 + 10 < 4x + 12$$

$$2x + 4 < 4x + 12$$

Variable on the left,
Numbers on the right

$$2x - 4x < 12 - 4$$

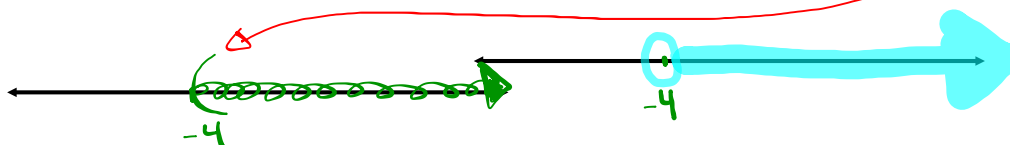
$$-2x < 8$$

Divide by -2

$$\frac{-2}{-2}x > \frac{8}{-2}$$

$$x > -4$$

Graph



Oct 30-6:12 AM

Solve & graph

$$7(x+2) + 6 \leq 3x + 40$$

$$7x + 14 + 6 \leq 3x + 40$$

$$7x + 20 \leq 3x + 40$$

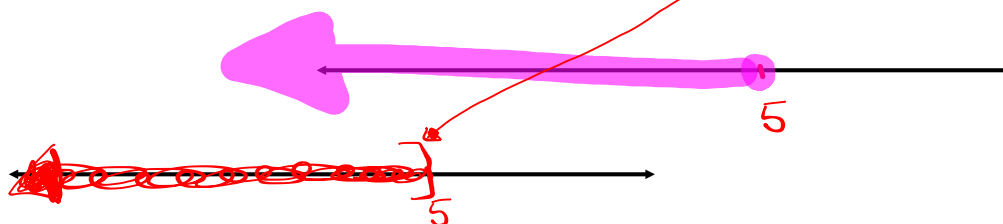
$$7x - 3x \leq 40 - 20$$

$$4x \leq 20$$

Divide by 4

$$\frac{4}{4}x \leq \frac{20}{4}$$

$$x \leq 5$$



Oct 30-6:17 AM

12 more than -3 times some number
is at least \geq

28 less than twice the number.

Find all such numbers, graph the solution.

Let x be such number,

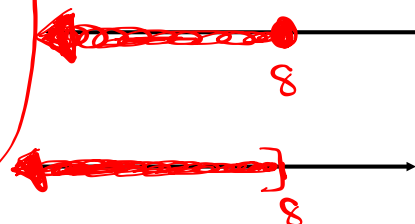
$$-3x + 12 \geq 2x - 28$$

$$-3x - 2x \geq -28 - 12$$

$$-5x \geq -40$$

$$\frac{-5}{-5}x \leq \frac{-40}{-5}$$

$$x \leq 8$$



Oct 30-6:22 AM

3 times the difference of 5 and 7 and twice some number is at most 19. less than 4 times the number. Find all such numbers. Graph the solution.

at least \geq
at most \leq

Let x be such number

$$3(7 - 2x) \leq 4x - 19$$

Divide by -10

$$\frac{-10}{-10} x \boxed{\geq} \frac{-40}{-10}$$

$$x \geq 4$$

Solid Bracket

Oct 30-6:28 AM

Solve

$$-2 \leq x + 4 < 12$$

Compounded Inequality

Isolate variable in the middle

$$-2 - 4 \leq x + 4 - 4 < 12 - 4$$

$$-6 \leq x < 8$$

Graph

Oct 30-6:37 AM

Solve & Graph

$$3 < 4x - 1 \leq 15$$

$$3 + 1 < 4x - 1 + 1 \leq 15 + 1$$

$$4 < 4x \leq 16$$

$$\frac{4}{4} < \frac{4}{4}x \leq \frac{16}{4}$$

$$1 < x \leq 4$$



Oct 30-6:42 AM

Solve & graph

$$-3 < -2x - 3 < 17$$

$$-3 + 3 < -2x - 3 + 3 < 17 + 3$$

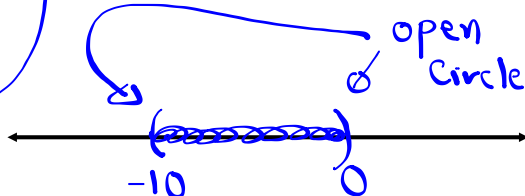
$$0 < -2x < 20$$

Divide by -2

$$\frac{0}{-2} > \frac{-2}{-2}x > \frac{20}{-2}$$

$$0 > x > -10$$

$$-10 < x < 0$$



Oct 30-6:48 AM

Solve and graph

$$-8 \leq 4(1-x) + 2x < 12$$

$$-8 \leq 4 - 4x + 2x < 12$$

$$-8 \leq 4 - 2x < 12$$

$$-8 \leq -2x + 4 < 12$$

$$-8 - 4 \leq -2x + 4 - 4 < 12 - 4$$

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

Divide by -2

$$\frac{-12}{-2} \geq \frac{-2}{-2}x > \frac{8}{-2}$$

$$6 \geq x > -4$$



$$-4 < x \leq 6$$

Oct 30-6:54 AM

You have \$100.

You rent a car for \$25/day, and 8¢ per mile.

How far can you drive this rental car

for 2 days?

Total cost \leq Your budget

$$8¢ = \$0.08$$

$$2(25) + .08M \leq 100$$

$$50 + .08M \leq 100$$

$$.08M \leq 100 - 50$$

$$.08M \leq 50$$

$$M \leq \frac{50}{.08}$$

$$M \leq 625$$

(at most 625 miles)

Oct 30-7:00 AM

BoSA checking: \$10/month plus 2¢ per check

Wells Fargo checking: \$5/month plus 4¢ per check

Find the number of checks per month that makes BoSA a better option.

$$\begin{array}{ccc} \text{\# of checks} & \text{BoSA} < \text{Wells Fargo} & \text{\# check} \\ 10 + .02C < 5 + .04C \end{array}$$

$$.02C - .04C < 5 - 10$$

$$-.02C < -5$$

$$C > \frac{-5}{-.02}$$

$$C > 250$$

more than 250
check/month.

Oct 30-7:06 AM

The perimeter of a triangle exceeds 45 ft.

> 45

Two sides are equal.

The third side is 7 ft shorter than the sum of equal sides. Find all possible values

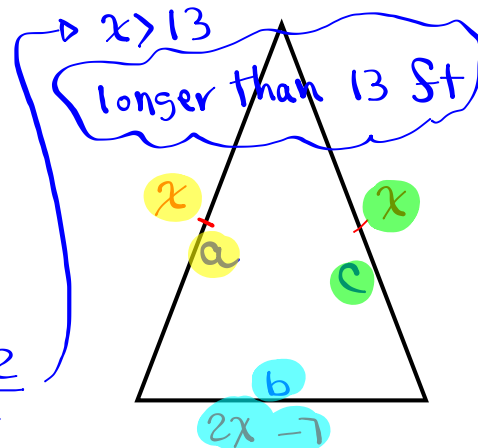
for equal sides.

$$P = a + b + c$$

$$P > 45$$

$$x + 2x - 7 + x > 45$$

$$4x > 52 \quad x > \frac{52}{4}$$



Oct 30-7:12 AM

① Find the ratio of .42 to 3.5 in reduced fraction.

$$\frac{.42}{3.5} = \frac{.42(100)}{3.5(100)} = \frac{42}{350} = \frac{\cancel{7} \cdot 6}{\cancel{7} \cdot 50} = \frac{\cancel{2} \cdot 3}{\cancel{2} \cdot 25} = \boxed{\frac{3}{25}}$$

② True Proportion or not: $\frac{3.6}{5} \stackrel{?}{=} \frac{18}{25}$

$$3.6(25) \stackrel{?}{=} 5(18)$$

$$90 \stackrel{?}{=} 90$$

True proportion

③ Solve: $\frac{2.25}{8} = \frac{-9}{x}$

\downarrow
 $\{-32\}$

$$2.25x = 8(-9)$$

$$x = \frac{-72}{2.25} \quad \boxed{x = -32}$$

Oct 30-7:34 AM

A 5.5 feet tall person has a shadow that is 7.5 feet long.

At the same time, A tall tree has a shadow of 84 ft long.

How tall is the tree, Rounded to a whole #?

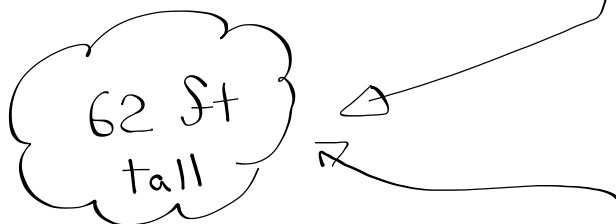
$$\frac{5.5 \text{ tall}}{7.5 \text{ shadow}} = \frac{x \text{ tall}}{84 \text{ shadow}}$$

$$\frac{5.5}{7.5} = \frac{x}{84}$$

$$7.5x = 84(5.5)$$

$$x = \frac{84(5.5)}{7.5}$$

$$x = 61.6 \text{ ft tall}$$



Oct 30-7:43 AM

30% of 148 is what?

$$\frac{30}{100} \cdot 148 = x$$

$$\frac{3}{10} \cdot 148 = x$$

$$.3(148) = x$$

$$x = 44.4$$

30% of 148 is 44.4

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

$$\frac{30}{100} = \frac{x}{148}$$

$$100x = 30(148)$$

$$x = \frac{30(148)}{100}$$

$$x = 44.4$$

Oct 30-7:47 AM

45% of what number is 95.4?

$$.45 \cdot x = 95.4$$

$$x = \frac{95.4}{.45}$$

$$x = 212$$

45% of 212 is 95.4

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

$$\frac{45}{100} = \frac{95.4}{x}$$

$$45x = 100(95.4)$$

$$x = \frac{100(95.4)}{45}$$

$$x = 212$$

Oct 30-7:51 AM

what percent of 400 is 50?

$$\frac{P}{100} \cdot 400 = 50$$

$$4P = 50$$

$$P = 12.5$$

12.5% of 400 is 50.

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

$$\frac{P}{100} = \frac{50}{400}$$

$$P = 12.5$$

Oct 30-7:57 AM

what percent is 19 out of 40?

$$\frac{P}{100} = \frac{19}{40}$$

$$\begin{aligned} A \text{ of } B \\ A \text{ out of } B \Rightarrow \frac{A}{B} \end{aligned}$$

$$40P = 100(19)$$

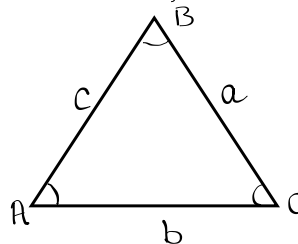
$$P = \frac{1900}{40} \quad \boxed{P = 47.5}$$

19 out of 40 is 47.5%

Oct 30-8:01 AM

FACT: The sum of all three angles in any triangle is 180° .

$$A + B + C = 180$$



In triangle ABC,

angles A and B are equal, Angle C is 20° less than the sum of angles A and B.

Find all three angles.

$$A \rightarrow x$$

$$B \rightarrow x$$

$$C \rightarrow 2x - 20$$

FACT:

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

$$\boxed{x} + \boxed{x} + \boxed{2x - 20} = 180$$

$50^\circ, 50^\circ, \text{ and } 80^\circ$

$$4x = 200 \quad x = 50$$

Oct 30-8:05 AM

In triangle ABC,

angle B is twice angle A, and

angle C is 60° more than angle A.

Find all three angles.

$$A \rightarrow x$$

$$B \rightarrow 2x$$

$$C \rightarrow x + 60$$

$$\text{Fact } A + B + C = 180$$

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

$$4x = 120$$

$$x = 30$$

$30^\circ, 60^\circ, \text{ and } 90^\circ$

Oct 30-8:12 AM

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

$$P - 2L = 2w$$

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

Solve for π : $C = \pi d$

$$\frac{C}{d} = \pi$$

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

$$-5y = -4x + 10$$

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

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

Slope-Int Form

$$y = mx + b$$

Oct 30-8:17 AM

Solve & graph

$$-5 \leq -2x + 7 < 17$$

$$-5 - 7 \leq -2x + 7 - 7 < 17 - 7$$

$$-12 \leq -2x < 10$$

$$\frac{-12}{-2} \geq \frac{-2}{-2}x > \frac{10}{-2}$$

$$6 \geq x > -5$$



Work on SG 5 & WP 4.

Oct 30-8:23 AM