Math 115

Fall 2017

Lecture 6

$$\sqrt{xy}$$

Some Review:

① Solve $2(x-1) + 7 = x - 8$

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

$2x + 5 = x - 8$

$2x - x = -8 - 5$

$\boxed{x = -13}$

$\{-13\}$

② Solve $x + 4 \leq 3x - 10$

$x - 3x \leq -10 - 4$

$-2x \boxed{\leq} -14$

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

$x \geq 7$

S.B.N.

$\{x \mid x \geq 7 \quad\}$

I.N. $[7, \infty)$

③ Solve: $\dfrac{2x-3}{3x+5} \gtrless \dfrac{2}{3}$

Cross-Multiply

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

$6x - 9 = 6x + 10$

$6x - 6x = 10 + 9$

$0 = 19$ false

$\boxed{\emptyset}$

④ Solve: $\dfrac{1}{3}x - \dfrac{1}{2} > \dfrac{3}{4}x + \dfrac{2}{3}$

$LCD = 12$

$\overset{4}{\cancel{12}} \cdot \dfrac{1}{3}x - \overset{6}{\cancel{12}} \cdot \dfrac{1}{2} > \overset{3}{\cancel{12}} \cdot \dfrac{3}{4}x + \overset{4}{\cancel{12}} \cdot \dfrac{2}{3}$

$4x - 6 > 9x + 8$

$4x - 9x > 8 + 6$

$\boxed{-5x} > 14$

$\dfrac{-5}{-5}x < \dfrac{14}{-5}$

$\boxed{x < \dfrac{-14}{5}}$
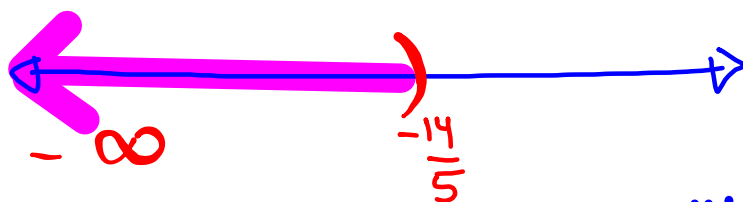
S.B.N. $\left\{ x \mid x < \dfrac{-14}{5} \right\}$

I.N. $\left(-\infty, \dfrac{-14}{5} \right)$
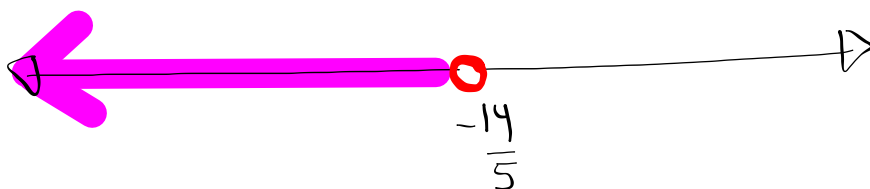
⑤ Use proportion to solve:

2.5% of what number is 750?

$\dfrac{P}{100} = \dfrac{\text{Part}}{\text{whole}}$ $\dfrac{2.5}{100} = \dfrac{750}{x}$ $2.5x = 100(750)$

$x = \dfrac{100(750)}{2.5} = 30,000$
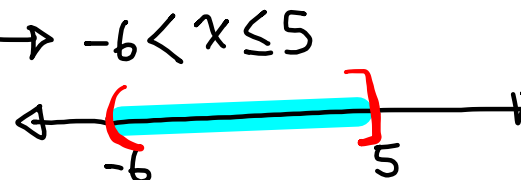
2.5% of 30,000 is 750

⑥ Solve: $-8 < 2x + 4 \leq 14$

$-8 - 4 < 2x + 4 - 4 \leq 14 - 4$ → $-6 < x \leq 5$

$-12 < 2x \leq 10$

$\dfrac{-12}{2} < x \leq \dfrac{10}{2}$

S.B.N. $\{x \mid -6 < x \leq 5\}$

I.N. $(-6, 5]$

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⑦   4% of 1500 is what number?

$\dfrac{P}{100} = \dfrac{\text{Part}}{\text{whole}}$ $\dfrac{4}{100} = \dfrac{x}{1500}$ $100x = 4(1500)$

Cross-Multiply $x = 60$

4% of 1500 is 60

⑧ Solve $-6 < -2x - 4 \leq 14$

$-6 + 4 < -2x - 4 + 4 \leq 14 + 4$

$-2 < -2x \leq 18$

Divide by -2

$\dfrac{-2}{-2} > \dfrac{-2}{-2}x \geq \dfrac{18}{-2}$

$1 > x \geq -9$ ⟹ $-9 \leq x < 1$

3

S.B.N. $\{x \mid -9 \le x < 1\}$

I.N. $[-9, 1)$

$\boxed{\frac{2}{3} \text{ of some number}}$ $\boxed{\text{increased by 3}}$ $\underline{\text{is equal}}$

$\underline{\text{to}}$ $\boxed{\frac{3}{4} \text{ of the number}}$ $\boxed{\text{decreased by 4.}}$

find the number.

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

$LCD = 12$

$\overset{4}{\cancel{12}} \cdot \frac{2}{3}x + 12 \cdot 3 = \overset{3}{\cancel{12}} \cdot \frac{3}{4}x - 12 \cdot 4$

$8x + 36 = 9x - 48$

$8x - 9x = -48 - 36$

$-x = -84 \qquad x = 84$

$\frac{-1}{-1}x = \frac{-84}{-1}$

$x = 84$

The number is 84.

⑩ Solve: $3(2x-5)-x+5=2(2x+1)-12+x$

$6x-15-x+5=4x+2-12+x$

$5x-10=5x-10$ $\longrightarrow$ $0=0$ True

$5x-5x=-10+10$ All Reals

           Identity

⑪ Solve $-3(4x-1)+8x-4=4(2-x)+18$

$-12x+3+8x-4=8-4x+18$

$-4x-1=-4x+26$

$-4x+4x=26+1$

$0=27$ false $\longrightarrow$ $\emptyset$

⑫ Evaluate $-2x^2+5x-3$ for $x=-2$

$=-2(-2)^2+5(-2)-3$

$=-2\cdot4+5(-2)=-8-10-3=\boxed{-21}$

⑬ Simplify $2(3x^2-5x+4)-6(x^2-3x+2)$

$=6x^2-10x+8-6x^2+18x-12$

$=\boxed{8x-4}$

(14) Name the properties used

$$2(3x+1)-2 = 2(3x) + 2(1) -2 \quad \text{Dist.}$$

$$= (2 \cdot 3)x + 2 \cdot 1 - 2 \quad \text{Assoc.}$$

$$= 6x + 2 - 2 \quad \text{Identity}$$

$$= 6x + 0 \quad \text{Inverse}$$

$$= \boxed{6x} \quad \text{Identity}$$

Evaluate $\dfrac{x+6}{x-3}$ for $x=0, -6,$ and 3.

for $x=0$

$$= \frac{0+6}{0-3} = \frac{6}{-3}$$

$$= \boxed{-2}$$

for $x=-6$

$$= \frac{-6+6}{-6-3} = \frac{0}{-9}$$

$$= \boxed{0}$$

for $x=3$

$$= \frac{3+6}{3-3} = \frac{9}{0}$$

$$\Rightarrow \text{undefined}$$

Jose is 1 year older than Maria.

Sum of their ages is 35.

How old is Jose?

Jose + Maria = 35

Jose $\rightarrow x + 1$

$x + 1 + x = 35$

$2x = 34$

Maria $\rightarrow x$

$x = 17$

Jose is 18 years old.

Lisa's age is 1 year less than twice of John's age. Sum of their ages is 53 Years. How old is Lisa?

Lisa: $2x - 1$

$x + 2x - 1 = 53$

$3x - 1 = 53$ $3x = 54$

John: x

$x = 18$

Lisa is 35 Years old. $2(18) - 1 = 35$

An equation with more than one variable is called a formula.

$$A = LW \quad , \quad P = 2L + 2W \qquad \text{Rectangle}$$

$$A = S^2 \quad , \quad P = 4S \qquad \text{Square}$$

$$A = \pi r^2 \quad , \quad C = \pi d \quad , \quad d = 2r \qquad \text{Circle}$$

Solve $A = LW$ for L.

Isolate L, we need to remove W.

Divide both sides by W. $\qquad \dfrac{A}{W} = \dfrac{L\cancel{W}}{\cancel{W}}$

$$L = \dfrac{A}{W}$$

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

$$P - 2L = 2W$$

Divide by 2

$$\dfrac{P - 2L}{2} = \dfrac{2W}{2} \qquad \boxed{W = \dfrac{P - 2L}{2}}$$

Solve for y: $2x + 3y = 6$ $\qquad$ Slope-Int Form

$$3y = -2x + 6$$

$$y = \dfrac{-2}{3}x + \dfrac{6}{3} \Rightarrow \boxed{y = \dfrac{-2}{3}x + 2}$$

Solve $A = P + 2d$ for d.

$A - P = 2d$

$$\dfrac{A - P}{2} = d$$

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

$-5y = -4x + 10$

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

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

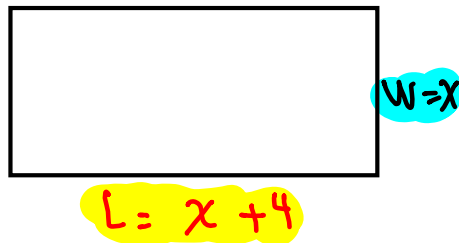
The length of a rectangle is 4 ft longer than its width.

1) Draw & label such rectangle

2) find its dimensions if the Perimeter is 48 ft.
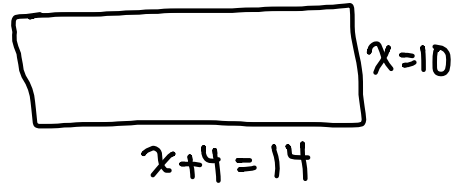
$P = 48$

$2L + 2W = 48$

$2(x+4) + 2(x) = 48$

W = x

L = x + 4

$2(x+4) + 2(x) = 48$

$2x + 8 + 2x = 48$
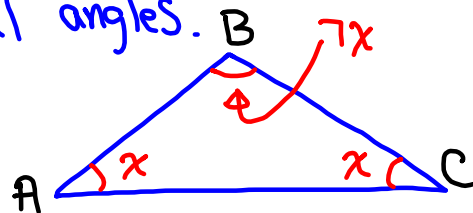
$4x + 8 = 48$

$4x = 40$

$x = 10$

$x = 10$

$x + 4 = 14$

10 ft by 14 ft.

Two angles of a triangle are equal. The third angle is 7 times the measure of the equal angles. find all three angles.

$7x$

B

x x C

A

FACT: The sum of all three angles in any triangle is $180°$.
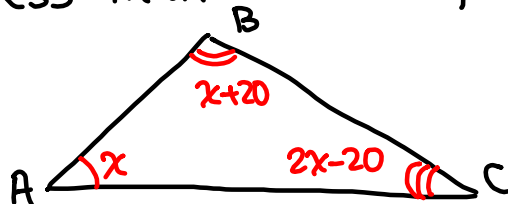
$x = 20$

$A + B + C = 180°$

$x + 7x + x = 180$

$9x = 180$

$20°, 20°, $ and $140°$

In triangle ABC, angle B is 20° more than angle A.

angle C is 20° less than twice angle A.

Draw & label such triangle.

find all three angles.

$45°, 65°, and 70°$

(diagram of triangle A, B, C with angles x at A, $x+20$ at B, $2x-20$ at C)

$A + B + C = 180°$

$x + x+20 + 2x-20 = 180°$

$4x = 180$

$x = 45$

$y = x^2 - x - 6$

find y when $x = 0$, $x = 3$, and $x = -2$.

$y = 0^2 - 0 - 6$

$y = 0 - 6$

$y = -6$

$y = 3^2 - 3 - 6$

$y = 9 - 3 - 6$

$y = 6 - 6$

$y = 0$

$y = (-2)^2 - (-2) - 6$

$y = 4 - (-2) - 6$

$y = 4 + 2 - 6$

$y = 0$

Solve

$$1.25x - 5(.5x - 2) = 10$$

$$1.25x - 2.5x + 10 = 10$$

$$-1.25x = 10 - 10$$

$$-1.25x = 0$$

$$x = \frac{0}{-1.25} \qquad \boxed{x = 0} \qquad \{0\}$$

Solve

$$.1x + .05(2x + 1) = 3.45$$

$$.1x + .05(2x) + .05(1) = 3.45$$

$$.1x + .1x + .05 = 3.45$$

$$.2x = 3.45 - .05$$

$$.2x = 3.4$$

$$x = \frac{3.4}{.2} \qquad \boxed{x = 17} \Rightarrow \{17\}$$

SG 4   Due Tomorrow.