# Math 115

# Fall 2017

# Lecture 3


## Class Quiz

1) Find prime factorization for 40.

$40 = 4 \cdot 10 = \boxed{2 \cdot 2 \cdot 2 \cdot 5} = \boxed{2^3 \cdot 5}$

2) Simplify: $\frac{17}{3} - \frac{-13}{3} = \frac{17-(-13)}{3} = \frac{17+13}{3} = \frac{30}{3} = \boxed{10}$

3) Simplify: $2(x+5) - 3(x-2) - 16$ Hint: First Distribute

$= 2x + 10 - 3x + 6 - 16$

$= -1x + 16 - 16 = -x + 0 = \boxed{-x}$

# Ch. 2 Solving linear Equation

$2x-5$

Expression

$2x-5=7$

Equation

$x^2-3x+10$

$x(x-1)=12$

$\sqrt{3x-5}+1$

$\sqrt{x+4}-\sqrt{x}=2$

Expression $\Rightarrow$ Evaluate, simplify, ...

Equation $\Rightarrow$ Solve, graph, ...

when we Solve equation, we may get Solution.

Solution is a numerical value that Should Satisfy the equation.

Is $2$ a Solution of $x^2+3x=10$?

$$(2)^2+3(2)=10$$

$$4+6=10$$

$10=10$ ✓ True $\Rightarrow$ 2 is a Solution.

Is $-3$ a Solution of

$4x + 8 = 2x - 10$ ?

$4(-3) + 8 = 2(-3) - 10$

$-12 + 8 = -6 - 10$

$-4 \neq -16$ False $\Rightarrow -3$ is <u>not</u> a Solution.

Do not say, No Solution.

Linear Equation : $Ax + B = C$

$3x - 2 = 12$, $-2x + 8 = -10$, $\frac{2}{3}x = 1$,

$3(x+2) - 5 = 7x + 1$ (once we simplify, it will be)

Linear Equations may have

- exactly one Solution. (Conditional)
- Infinitely many Solutions. (Identity)
- No Solution. (Contradiction)

## Properties of equality:

If $A = B$, then

$A + C = B + C$

$A - C = B - C$

$A \cdot C = B \cdot C$

$\frac{A}{C} = \frac{B}{C}$ } $C \neq 0$

$x = 8$

$x + 2 = 8 + 2$

$x - 4 = 8 - 4$

$5 \cdot x = 5 \cdot 8$

$\frac{x}{10} = \frac{8}{10}$

Solve $x - 2 = 10$

$x - 2 + 2 = 10 + 2$

$x + 0 = 12$

$\boxed{x = 12}$

$\{12\}$

Always →

Solve $x + 5 = -7$

$x + 5 - 5 = -7 - 5$

$x + 0 = -12$

$\boxed{x = -12}$

$\{-12\}$

Solve

$4x = -36$

$\frac{4}{4}x = \frac{-36}{4}$

$1x = -9$

$\boxed{x = -9}$

$\{-9\}$

Solve

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

$\cancel{3} \cdot \frac{x}{\cancel{3}} = 3(15)$

$1x = 45$

$\boxed{x = 45}$ $\{45\}$

Solve

$2x - 3 = -27$

$2x - 3 + 3 = -27 + 3$

$2x = -24$

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

$\boxed{x = -12}$

$\{-12\}$

Solve

$-3x + 7 = 22$

$-3x + 7 - 7 = 22 - 7$

$-3x = 15$

$\frac{-3x}{-3} = \frac{15}{-3}$

$\boxed{x = -5}$ $\{-5\}$

$2(x-1)+7=-5$

Hint: Distribute, then Simplify

$2x-2+7=-5$

$2x+5=-5$

$2x+5-5=-5-5$

$2x=-10$

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

$x=-5 \rightarrow \{-5\}$

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

Solve

$3x-12+2x+6=-7$

$5x-6=-7$

$5x-6+6=-7+6$

$5x=-1$

$\frac{5}{5}x=\frac{-1}{5}$

$x=\frac{-1}{5}$ $x=-.2$ $\Rightarrow \{\frac{-1}{5}\}$ or $\{-.2\}$

Solve

$3(2x-5)-6(x+1)=21$

$6x-15-6x-6=21$

$-21=21$ False $\Rightarrow$ No Solution

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Solve

$-4(3x+5)+6(2x-5)=-50$

$-12x-20+12x-30=-50$

$-50=-50$ True $\Rightarrow$ infinitely Many Solutions

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4 more than twice Some number is equal to $-10$.

Find the number

Let $x$ be that number,

$2x+4=-10$

Solve for $x$.

$2x+4-4=-10-4$

$2x=-14$

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

$x=-7$

the number is $-7$

3 times the sum of some number and 8 reduced by 4 is equal to 20.

find the number.

Let $x$ be the number

$3(x+8)-4=20$

Solve

$3x+24-4=20$

$3x+20=20$

$3x+20-20=20-20$

$3x=0$

$\frac{3x}{3}=\frac{0}{3}$

$x=0$

the number is 0.

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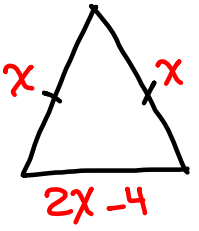
Two sides of a triangle are equal.

The third side is 4 inches shorter than the sum of equal sides.

1) Draw such triangle.




2) find all three sides if the perimeter is 24 inches.

$P=24$

$a+b+c=24$

$x+2x-4+x=24$

$4x-4=24$

$4x=24+4$

$4x=28$

$x=7$

$2(7)-4=14-4=10$

7in., 7in., and 10in.

Solve

$3x - 7 = x + 13$

$3x - 7 + 7 = x + 13 + 7$

$3x = x + 20$

$3x - x = x + 20 - x$

$2x = 20$

$\boxed{x = 10} \Rightarrow \{10\}$ Equation is Conditional.

Solve

$4x + 8 = -x + 28$

$4x + 8 - 8 = -x + 28 - 8$

$4x = -x + 20$

$4x + x = -x + 20 + x$

$5x = 20$

$\boxed{x = 4} \rightarrow \{4\}$

Conditional Eqn.

3 times some number reduced by 10 is equal to the difference of 30 and the number. Let $x$ be the number, find the number.

$3x - 10 = 30 - x$

Difference of A and B

A − B

Solve

$3x - 10 + 10 = 30 - x + 10$

$3x = 40 - x$

$3x + x = 40 - x + x$

$4x = 40$

$x = 10$

The number is 10.

Maria has 42 coins.

Nickels & Dimes only.

The number of dimes is 6 more than twice the number of nickels.

How many of each? Dimes → $2x + 6$

Nickels → $x$

Nickels + Dimes = 42 Coins total

$x + 2x + 6 = 42$

$3x + 6 = 42$

$3x = 42 - 6$

$3x = 36$

$x = \frac{36}{3}$

$x = 12$

12 Nickels & 30 Dimes

4 times the sum of some number and 5 reduced by 3 is equal to twice the number increased by −23.

$4(x+5)-3=2x+(-23)$

Find the number.

$4(x+5)-3=2x-23$

$4x+20-3=2x-23$

$4x+17=2x-23$

$4x-2x=-23-17$

$2x=-40$

$x=-20$

The number is −20.

When you have fractions, use LCD to clear fractions.

Solve $\frac{2}{3}x-\frac{1}{2}=\frac{1}{2}x+\frac{5}{6}$

LCD = 6

$6\cdot\frac{2}{3}x-6\cdot\frac{1}{2}=6\cdot\frac{1}{2}x+6\cdot\frac{5}{6}$

$4x-3=3x+5$

$4x-3x=5+3$

$x=8 \Rightarrow \{8\}$

Solve

$$\frac{3}{5}x + \frac{2}{3} = x - \frac{3}{10}$$

LCD = 30

$$\cancel{30}^{6} \cdot \frac{3}{\cancel{5}}x + \cancel{30}^{10} \cdot \frac{2}{\cancel{3}} = 30x - \cancel{30}^{3} \cdot \frac{3}{\cancel{10}}$$

$$18x + 20 = 30x - 9$$

$$18x - 30x = -9 - 20$$

$$-12x = -29$$

$$x = \frac{-29}{-12}$$

$$x = \frac{29}{12}$$

$$\left\{\frac{29}{12}\right\}$$

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one-fourth of some number less 10

is equal to

two-thirds of the number.

Find the number.

LCD = 12

$$\frac{1}{4}x - 10 = \frac{2}{3}x$$

$$\cancel{12}^{3} \cdot \frac{1}{\cancel{4}}x - 12 \cdot 10 = \cancel{12}^{4} \cdot \frac{2}{\cancel{3}}x$$

$$3x - 120 = 8x$$

$$3x - 8x = 120$$

$$-5x = 120$$

$$x = \frac{120}{-5}$$

$$x = -24$$

The number is −24.

Due Thursday

1) SG2 & WP 1 @ 9:00 AM

2) Quiz @ 9:00 AM

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Continue with ch. 2