Math 115

Fall 2017

Lecture 1

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MATH 115 → M-Th 9:00-11:35

MATH 107 → MW 12:10-1:00PM

MATH 125 → M-Th 9:00-11:35

Oct 23 → Dec. 17.

Simplify

1) $5^2 = 5 \cdot 5 = \boxed{25}$

2) $\sqrt{100} = \boxed{10}$

3) $|-8| = \boxed{8}$

4) $(-3)^3 = (-3)(-3)(-3) = \boxed{-27}$

5) $(-2)^4 = (-2)(-2)(-2)(-2) = \boxed{16}$

6) $-(-(-5)) = \boxed{-5}$

7) $0 \cdot (-8) = \boxed{0}$

8) $\frac{12}{0}$ undefined $\emptyset$

9) $\frac{0}{-15} = \boxed{0}$

10) $-4^2 = \boxed{-16}$

11) $-(-2)^6 = \boxed{-64}$

Order of operations:

1) Do inside of groups: ( ), [ ], { }

——, $\sqrt{\ }$, . . .

2) Do exponents & Roots

3) Multiplication & Division from left to right.

4) Addition & Subtraction from Left to right.

Simplify

$5^2 - 5 \cdot 2 = 25 - 5 \cdot 2$

$= 25 - 10$

$= \boxed{15}$

$\sqrt{100} - |-8| = 10 - |-8|$

$= 10 - 8$

$= \boxed{2}$

$(-3)^4 - 9^2$

$= 81 - 81$

$= \boxed{0}$

Do not use $\emptyset$ for zero.

$(5 \cdot 3 - 3^2) \cdot |-5|$

$= (5 \cdot 3 - 9) \cdot 5$

$= (15 - 9) \cdot 5$

$= 6 \cdot 5$

$= \boxed{30}$

$\dfrac{\sqrt{121} - 5 \cdot 2}{3^2 - 2^3}$

$= \dfrac{11 - 5 \cdot 2}{9 - 8}$

$= \dfrac{11 - 10}{1}$

$= \dfrac{1}{1} = \boxed{1}$

Simplify

$$\frac{7^2 - 3\cdot 4 + \sqrt{64}}{\sqrt{100} - 5\cdot 2} = \frac{49 - 12 + 8}{10 - 5\cdot 2} = \frac{37+8}{10-10} = \frac{45}{0}$$

Undefined

$\emptyset$

Prime numbers are natural numbers greater than 1 and are only divisible by itself and 1.

2, 3, 5, 7, 11, 13, 17, 19, 23, ----

Composite numbers

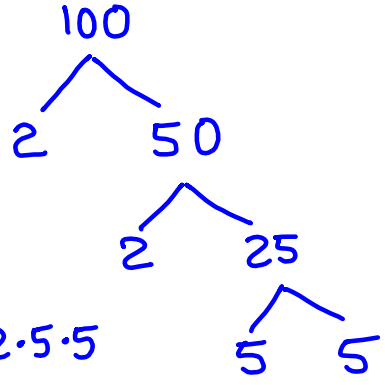
4, 6, 8, 9, 10, 12, ----

The process of taking any composite #, and write it as product of prime numbers is called prime factorization.

$10 = 2\cdot 5$

$42 = 2\cdot 21$

$= 2\cdot 3\cdot 7$



$100 = 2\cdot 2\cdot 5\cdot 5$

Find prime factorization for

1) 75

$= 3 \cdot 25$

$= 3 \cdot 5 \cdot 5$

$75 = 3 \cdot 5^2$

2) 210

$= 10 \cdot 21$

$= 2 \cdot 5 \cdot 3 \cdot 7$

$210 = 2 \cdot 3 \cdot 5 \cdot 7$

3) 405

$= 5 \cdot 81$

$= 5 \cdot 9 \cdot 9$

$= 5 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

$405 = 3^4 \cdot 5$

Simplify

$-5 \cdot 2 + 2^3 = -5 \cdot 2 + 8$

$= -10 + 8$

$= -2$

$-3 \cdot 4 + (-4)^3 = -3 \cdot 4 + (-64)$

$= -12 + (-64)$

$= -76$

$-6\cdot(-3)-(-12)=18-(-12)$

$=18+12$

$=30$

$A-B=A+(-B)$

$-8\cdot5-\boxed{5^2}=\boxed{-8\cdot5}-25$

$=-40-25$

$=-40+(-25)$

$=\boxed{-65}$

$-|-10|\cdot(\sqrt{9}-\sqrt{16})$

$=-10(3-4)$

$=-10(3+(-4))=-10(-1)=+10$

$=\boxed{10}$

$\dfrac{-\sqrt{49}-|-3|}{-\sqrt{25}+2^2}=\dfrac{-7-3}{-5+4}=\dfrac{-7+(-3)}{-1}=\dfrac{-10}{-1}$

$=\boxed{10}$

Expression: Combination of numbers, operations, and letters (variables).

$3x+5$, x^2-2x , $\sqrt{x^2+y^2}$, $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

We can simplify or evaluate expressions.

$4x(-2)+3x(+8) = 7x(+6) = 7x+6$

$2x^2-3x+10+3x^2+3x-9 = 5x^2+1 = 5x^2+1$

Evaluate x^3+4x for $x=5$.

Replace every x with the given value

$x^3+4x = (5)^3+4(5)$

$= 125+4\cdot 5$

$= 125+20$

$= 145$

Evaluate $\sqrt{b^2-4ac}$ for $a=3$, $b=-2$, and $c=-5$.

$$\sqrt{b^2-4ac} = \sqrt{(-2)^2-4(3)(-5)}$$

$$= \sqrt{4-4(3)(-5)}$$

$$= \sqrt{4-(-60)}$$

$$= \sqrt{4+60}$$

$$= \sqrt{64} = \boxed{8}$$

Two 70-Minute lectures with 10-15 minutes break.

Using Common Sense to do translation.

1) The sum of $\boxed{x}$ and $\boxed{10}$.

$x + 10$

2) $\boxed{3 \text{ is added}}$ to twice x.

$2x + 3$

3) The difference of $\boxed{x^2}$ and $\boxed{100}$.

$x^2 - 100$

3 times x reduced by -10.

$3x - (-10)$

$= 3x + 10$

Square root of x is equal to 5.

$\sqrt{x} = 5$

4 times the sum of x^2 and -8.

$4 \cdot (x^2 + (-8)) = 4(x^2 - 8)$

The quotient of some number and 5

$\frac{x}{5}$

Square of Some number reduced by 6 is equal to five times the number.

$$x^2 - 6 = 5x$$

Twice Some number increased by 8 is equal to the number less 5.

$$2x + 8 = x - 5$$

A less B $\Rightarrow$ A − B , A less than B $\Rightarrow$ B − A

A Added to B $\Rightarrow$ B + A

A Subtract from B $\Rightarrow$ B − A

A more than B $\Rightarrow$ B + A

A less than B $\Rightarrow$ B − A

} Reverse them

John is 5 Yrs older than Maria.

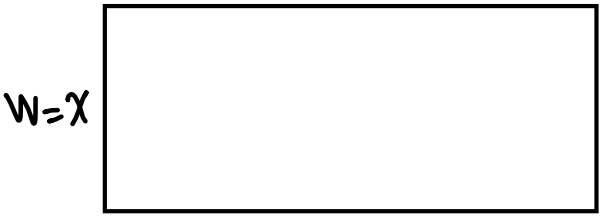
Lisa is 8 Yrs Younger than Maria.

Age

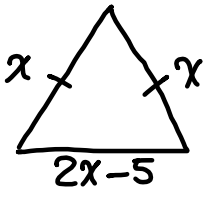
Maria	John	Lisa
x	$x+5$	$x-8$

The length of a rectangular garden is 4 ft shorter than 5 times its width.

Draw & label such garden.



Draw a triangle with two equal sides and the third side is 5 inches less than the sum of equal sides.



Looking Ahead

! factorial , $2! = 2 \cdot 1$

$3! = 3 \cdot 2 \cdot 1$

$4! = 4 \cdot 3 \cdot 2 \cdot 1$

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

Simplify

$4! + 2! = 4 \cdot 3 \cdot 2 \cdot 1 + 2 \cdot 1$

$= 24 + 2 = \boxed{26}$

$6! - 5! = \underbrace{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} - \underbrace{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$

$= 720 - 120$

$= \boxed{600}$

$\frac{6!}{4!} = \frac{6 \cdot 5 \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}}{\cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{1}} = 6 \cdot 5 = \boxed{30}$

$0! = 1, \quad 1! = 1$