

Math 115

Fall 2018

Lecture 1

$$\begin{array}{c} ? a^2 + b^2 = c^2 ? \\ y = mx + b \quad ? \quad d = rt \end{array}$$

Math 115

Math 107

M - Th

\Leftrightarrow M - Th

6:00 - 8:50

9:15 - 9:45

You must also have access to Canvas
and regular access to the internet.

Max hours you can miss is about
6 hours.

Order of operations:

① Do groups: $()$, $[]$, $\{ \}$, $—$, $\sqrt{\quad}$

② Exponents & Roots

③ Multiplication & Division from left to right.

④ Addition & Subtraction from left to right.

$$\begin{aligned}
 \text{Simplify : } 2^3 - (-3)^2 \\
 = 8 - 9 \\
 = 8 + (-9) \\
 = \boxed{-1}
 \end{aligned}$$

$$\begin{aligned}
 \text{Simplify} \\
 (\sqrt{25} - \sqrt{16})^2 \\
 = (5 - 4)^2 \\
 = 1^2 \\
 = \boxed{1}
 \end{aligned}$$

$$\begin{aligned}
 \text{Simplify : } (-5)^2 - 4(-1)(-4) \\
 = 25 - 4(-1)(-4) \\
 = 25 - 16 = \boxed{9}
 \end{aligned}$$

Simplify:

$$-|-12| - (-3)(-2)^2$$

$$= -12 - (-3) \cdot 4$$

$$= -12 - (-12)$$

$$= -12 + 12$$

$$= \boxed{0}$$

Do not
use \emptyset for
zero.

Simplify:

$$\sqrt{(-6)^2 + (-8)^2}$$

$$= \sqrt{36 + 64}$$

$$= \sqrt{100}$$

$$= \boxed{10}$$

Simplify:

$$\frac{5 \cdot 3 + 2(-7)}{2\sqrt{100} - 3(7)} = \frac{15 + (-14)}{2 \cdot 10 - 3 \cdot 7}$$

$$= \frac{1}{20 - 21}$$

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

$$= \boxed{-1}$$

Simplify:

$$\frac{(2)^2(3)^2 - (-6)^2}{\sqrt{9}\sqrt{25} - \sqrt{|-36|}}$$

$$= \frac{4 \cdot 9 - 36}{3 \cdot 5 - \sqrt{36}}$$

$$= \frac{36 - 36}{15 - 6}$$

$$= \frac{0}{9} = \boxed{0}$$

Do not use \emptyset for 0.

Simplify

$$\begin{aligned}
 \frac{-4(5-4^2) + \sqrt{(-5)^2}}{(-3)^4 - (-9)^2} &= \frac{-4(5-16) + \sqrt{25}}{81 - 81} \\
 &= \frac{-4(-11) + 5}{0} \\
 &= \frac{44 + 5}{0} \\
 &= \frac{49}{0} \quad \text{undefined} \\
 &\quad \emptyset
 \end{aligned}$$

Simplify:

$$\begin{aligned}
 \frac{10^2 + (-4)^3 - (-6)^2}{(-3)^2 \cdot \sqrt{64} + (-2)^3 \cdot |\sqrt{81}|} \\
 &= \frac{100 + (-64) - 36}{9 \cdot 8 + (-8) \cdot |9|} \\
 &= \frac{36 - 36}{72 + (-8) \cdot 9} \\
 &= \frac{0}{72 + (-72)} = \frac{0}{0}
 \end{aligned}$$

Indeterminate

Zero	= Zero
NonZero	
NonZero	= undefined
Zero	
Zero	= indeterminate
Zero	

Letters are called variables in Math.

Variables are used to represent unknowns.

The sum of Some number and 10.

x

$x + 10$ ← an expression

Translate:

Twice Some number reduced by 10.

x

$2x - 10$ ← Expression

Translate:

3 times the sum of Some number and 5
is equal to
the number increased by -5 .

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

Mathematical Expression:

It is a combination of numbers, operations, and variables. "NO = Sign"

$$3x - 5, \quad 2(x - 4) + 7, \quad \sqrt{b^2 - 4ac}, \quad \frac{x^2 + 3x}{x - 5}$$

$$-3x^2 + 10x - 4, \quad \frac{y_2 - y_1}{x_2 - x_1}$$

For now, we evaluate mathematical Expressions.

Evaluate $x^2 - 10x + 5$ for $x = 0$.

Plug in 0 for x , then do order of operations

$$(0)^2 - 10(0) + 5 = 0 - 0 + 5 \\ = \boxed{5}$$

Evaluate $-3x - 6$ for $x = -2$.

$$-3x - 6 = -3(-2) - 6 = 6 - 6 = \boxed{0}$$

Evaluate $-4x^2 - 10x - 8$ for $x = -3$.

$$-4x^2 - 10x - 8 = -4(-3)^2 - 10(-3) - 8$$

$$= -4 \cdot 9 - 10(-3) - 8$$

$$= -36 + 30 - 8$$

$$= -6 - 8$$

$$= \boxed{-14}$$

Evaluate $\frac{x^2 - 3x}{x + 3}$ for

$x = 0$	$x = 3$	$x = -3$
$= \frac{0^2 - 3(0)}{0 + 3}$	$= \frac{3^2 - 3(3)}{3 + 3}$	$= \frac{(-3)^2 - 3(-3)}{-3 + 3}$
$= \frac{0 - 0}{3}$	$= \frac{9 - 9}{6}$	$= \frac{9 + 9}{0}$
$= \frac{0}{3}$	$= \frac{0}{6} = \boxed{0}$	$= \frac{18}{0}$ undefined
$= \boxed{0}$		\emptyset

Evaluate $-b - \sqrt{b^2 - 4ac}$

for $a=1$, $b=-6$, and $c=9$.

$$\begin{aligned}
 -b - \sqrt{b^2 - 4ac} &= -(-6) - \sqrt{(-6)^2 - 4(1)(9)} \\
 &= 6 - \sqrt{36 - 36} \\
 &= 6 - \sqrt{0} \\
 &= 6 - 0 = \boxed{6}
 \end{aligned}$$

Evaluate $\frac{x^2 - 4x + 4}{x - 2}$ for

$x=0$	$x=-1$	$x=2$
$= \frac{0^2 - 4(0) + 4}{0 - 2}$	$= \frac{(-1)^2 - 4(-1) + 4}{-1 - 2}$	$= \frac{2^2 - 4(2) + 4}{2 - 2}$
$= \frac{0 - 0 + 4}{-2}$	$= \frac{1 + 4 + 4}{-3}$	$= \frac{4 - 8 + 4}{0}$
$= \frac{4}{-2}$	$= \frac{9}{-3}$	$= \frac{-4 + 4}{0} = \frac{0}{0}$
$= \boxed{-2}$	$= \boxed{-3}$	Indeterminate

Properties of real numbers:

① Commutative

$$a + b = b + a \quad , \quad a \cdot b = b \cdot a$$

$$x + 2 = 2 + x \quad , \quad 7 \cdot (-5) = (-5) \cdot 7$$

② Associative

$$(a + b) + c = a + (b + c)$$

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

$$(x + 8) + 2 = x + (8 + 2)$$

$$5 \cdot (10 \cdot x) = (5 \cdot 10) \cdot x$$

③ Distributive

$$a(b + c) = a \cdot b + a \cdot c$$

$$4(x + 10) = 4 \cdot x + 4 \cdot 10$$

$$-3(2x - 5) = -3 \cdot (2x) - (-3) \cdot 5$$

④ Identity

$$a + 0 = a$$

$$a \cdot 1 = a$$

$$-10 + 0 = -10$$

$$100 \cdot 1 = 100$$

⑤ Inverse

$$a + (-a) = 0$$

$$a \cdot \frac{1}{a} = 1 \quad a \neq 0$$

$$25 + (-25) = 0$$

$$8 \cdot \frac{1}{8} = 1$$

$$-\frac{2}{3} + \frac{2}{3} = 0$$

$$\frac{-3}{4} \cdot \frac{-4}{3} = 1$$

Simplify $3(x+2) + (-6)$

$$= 3x + 3 \cdot 2 + (-6) \quad \text{Distributive}$$

$$= 3x + 6 + (-6)$$

$$= 3x + 0$$

$$= \boxed{3x}$$

Inverse
Identity

Simplify, name the property used in the process.

$$4\left(\frac{1}{4}x + 1\right) - 4$$

$$= 4 \cdot \left(\frac{1}{4}x\right) + 4 \cdot 1 - 4 \quad \text{Distributive}$$

$$= (4 \cdot \frac{1}{4})x + 4 \cdot 1 - 4 \quad \text{Associative}$$

$$= 1 \cdot x + 4 \cdot 1 - 4 \quad \text{Inverse}$$

$$= x + 4 - 4 \quad \text{Identity}$$

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

$$= \boxed{x}$$

Identity

Simplify

$$3(2x^2 + 5x - 1) - 5(x^2 + 3x - 1) - 2$$

Hint:

Distribute

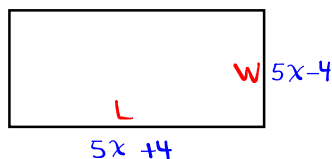
$$= 3(2x^2) + 3(5x) - 3 \cdot 1 - 5x^2 - 5(3x) - 5(-1) - 2$$

$$= 6x^2 + 15x - 3 - 5x^2 - 15x + 5 - 2$$

$$= 1x^2 + 0 + 0$$

$$= x^2 + 0 = x^2$$

Find an expression in Simplest form for the perimeter of the rectangle below



$$P = 2L + 2W$$

$$P = 2(5x + 4) + 2(5x - 4)$$

$$= 2 \cdot (5x) + 2 \cdot 4 + 2 \cdot (5x) - 2 \cdot 4$$

$$= (2 \cdot 5)x + 8 + (2 \cdot 5)x - 8$$

$$= 10x + 8 + 10x - 8$$

$$= 10x + 10x + 8 - 8$$

$$= 20x + 0$$

$$= 20x$$

Fake QZ

① Evaluate $x^3 - y^2$ for $x=4$, $y=-8$

$$x^3 - y^2 = (4)^3 - (-8)^2 = 64 - 64 = \boxed{0}$$

② Simplify: $\frac{\sqrt{100} - 2 \cdot 5}{\sqrt{25} - \sqrt{16} - 1}$

$$= \frac{10 - 10}{5 - 4 - 1} = \frac{0}{1 - 1}$$

Indeterminate

$$\rightarrow = \frac{0}{0}$$

STERN

TERSE

Only cost for this class
is to purchase Study Guide Package
\$15

www.mymathclasses.com