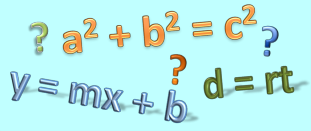
Math 115

Spring 2019

Lecture 1



Math 115 ⇔ Math 107

M – Th ⇔ M – Th

6:00 – 8:50 ⇔ 9:00 – 9:30

} 8-week Courses

You must also have access to Canvas and regular access to the internet with Printer

Max hours you can miss is about 6 hours. Class starts on time.

Order of operations:

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

② Exponents & Roots

③ Multiplication & Division from left to right.

④ Addition & Subtraction from left to right.

Simplify: $3^2 - 2^3$

$= 9 - 8$

$= 1$

$3^2 = 3 \cdot 3 = 9$

$2^3 = 2 \cdot 2 \cdot 2 = 8$

base Powers

Simplify: $8^2 - 4^3$

$= 64 - 64$

$= 0$

$8^2 = 8 \cdot 8 = 64$

$4^3 = 4 \cdot 4 \cdot 4 = 64$

Do not use ϕ for Zero.

Simplify: $\sqrt{100} - 2 \cdot 5$

$= 10 - 2 \cdot 5$

$= 10 - 10$

$= 0$

$\sqrt{100} = 10$ because $10^2 = 100$

$\sqrt{100}$ is a non-negative number such that to the 2nd Power becomes 100.

Simplify: $\sqrt{25} + \sqrt{16} - \sqrt{9}$

$= 5 + 4 - 3$

$= 9 - 3 = 6$

Simplify: $\sqrt{5^2 - 3^2} - 2^2$

$= \sqrt{25 - 9} - 2^2$

$= \sqrt{16} - 2^2$

$= 4 - 4$

$= 0$

Hint: Simplify under the radical first.

Simplify

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

$= 8(16 + 9) - 10^2$

$= 8 \cdot 25 - 10^2$

$= 8 \cdot 25 - 100$

$= 200 - 100 = 100$

Simplify: $\dfrac{2^5 + 4^1}{6^2}$

$2^5 = \underbrace{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}_{5 \text{ times}}$

$4^1 = 4$

$6^2 = \underbrace{6 \cdot 6}_{2 \text{ times}}$

$= \dfrac{32 + 4}{36}$

$= \dfrac{36}{36} = 1$

Simplify: $\dfrac{7 \cdot 3 - \sqrt{49}}{11 \cdot 2 - 1} = \dfrac{7 \cdot 3 - 7}{11 \cdot 2 - 1}$

Numerator

Fraction line

Denominator

$= \dfrac{21 - 7}{22 - 1} = \dfrac{14}{21}$

$= \dfrac{2 \cdot \cancel{7}}{3 \cdot \cancel{7}} = \dfrac{2}{3} = .66666\ldots$

$= .\overline{6}$

$\approx .667$

Mathematical Expression:

It is a combination of numbers, operations, and letters (variables). No = Sign

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

for now, we get to evaluate expressions

To do that, we replace every variable (letters) with its value, then we proceed by order of operations

Evaluate $x^2 + 5x$ for $x = 3$.

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

$= 9 + 5 \cdot 3$

$= 9 + 15$

$= \boxed{24}$

Evaluate $\sqrt{x^2+y^2}$ for $x = 6$ and $y = 8$.

$\sqrt{x^2+y^2} = \sqrt{(6)^2+(8)^2}$

$= \sqrt{36+64} = \sqrt{100} = \boxed{10}$

Evaluate $\sqrt{b^2-4ac}$ for $a = 3$, $b = 6$, and $c = a$.

$c = 3$

$\sqrt{b^2-4ac} = \sqrt{(6)^2-4(3)(3)}$

$= \sqrt{36 - \boxed{4 \cdot 3 \cdot 3}} = \sqrt{36-36}$

$= \sqrt{0} = \boxed{0}$

Do not use ϕ for Zero.

Evaluate $mx + b$ for $m=4$, $x=1$, and $b=m+x$

$b = 4+1$

$\boxed{b=5}$

$mx + b = 4(1) + 5$

$= 4 + 5$

$= \boxed{9}$

Evaluate $\frac{x-3}{x+1}$ for $x=3$.

$\frac{x-3}{x+1} = \frac{3-3}{3+1}$

$= \frac{0}{4} = \boxed{0}$

Evaluate $\frac{x+1}{x-3}$ for $x=3$.

$\frac{x+1}{x-3} = \frac{3+1}{3-3}$

$= \frac{4}{0}$ undefined

$\emptyset$

Evaluate $\frac{A-B}{C-D}$ for $A=8$, $B=3$, $C=2$, and $D=1$.

$\frac{A-B}{C-D} = \frac{8-3}{2-1} = \frac{5}{1} = \boxed{5}$

Evaluate $x^3 - 2x$ for

a) $x=0$

$x^3 - 2x = 0^3 - 2(0)$

$= 0 - 0$

$= \boxed{0}$

b) $x=2$

$x^3 - 2x = (2)^3 - 2(2)$

$= 8 - 4$

$= \boxed{4}$

c) $x=3$

$x^3 - 2x = 3^3 - 2(3)$

$= 27 - 2 \cdot 3$

$= 27 - 6$

$= \boxed{21}$

Math 115

8 - week Course

Final exam : March 27, 2019

6:00 AM to 8:50 AM

$\Leftrightarrow$

Math 107

8-week Course

9:00 AM - 9:30 AM

M - Th

2nd 8 weeks $\Rightarrow$ Math 125

$\Rightarrow$ Math 227

$\Rightarrow$ Math 245

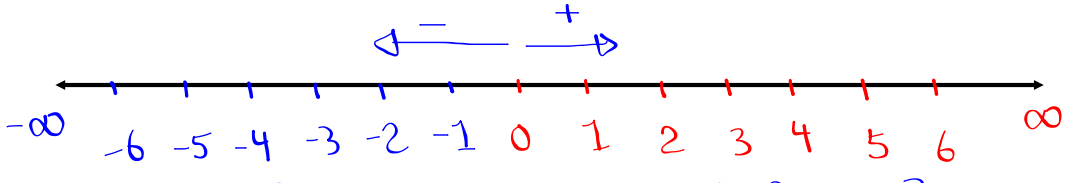
$\Rightarrow$ . . . .

Digits = $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

Natural numbers = $\{1, 2, 3, 4, \ldots\}$

Whole numbers = $\{0, 1, 2, 3, \ldots\}$

Integers are whole number and their opposite.



Integers = $\{\ldots, -3, -2, -1, 0, 1, 2, \ldots\}$

Real numbers: natural, whole, integers, decimals, fractions

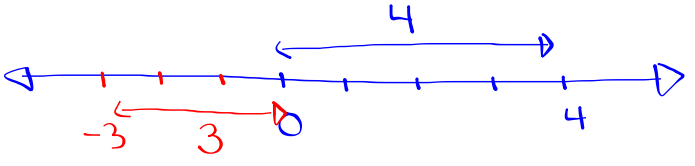
$-5, \quad \frac{1}{2}, \quad .125, \quad \sqrt{5}, \quad -4.\overline{3}, \quad .0\overline{52}$

Absolute Value: distance from 0 on the number line system.

Abs. Value Notation $|\ |$

$|4| = 4$

$|-3| = 3$



Find $|-7|, |6|, |0|$

$= 7 \quad = 6 \quad = 0$

Simplify: $|-10| - |-4|$

Hint: treat $|\ |$ as a group.

$= 10 - 4$

$= 6$

Simplify $|-6|(4.3 - |-2|)$

$= 6 \cdot (4.3 - 2) = 6(12 - 2)$

$= 6 \cdot 10 = 60$

Operations with Signed numbers:

1) Multiplication

$(+)(+) = +$

$(+)(-) = -$

$(-)(+) = -$

$(-)(-) = +$

→ Opposite Signs → −

→ Same Signs ⇓ +

Simplify $-5 \cdot 4 = \boxed{-20}$

Simplify $-8 \cdot (-3) = +24 = \boxed{24}$

Simplify: $(-7)(-3) - 2 \cdot 5$

$= 21 - 10 = \boxed{11}$

Simplify: $|-8 \cdot 5| - 2^2 \cdot 10$

$= |-40| - 2^2 \cdot 10$

$= 40 - 2^2 \cdot 10$

$= 40 - 4 \cdot 10 = 40 - 40$

$= \boxed{0}$

Do not use ∅ for

Evaluate $|x| + |y| + xy$ for $x = -3$ and $y = -6$.

$|x| + |y| + xy = |-3| + |-6| + (-3)(-6)$

$= 3 + 6 + 18$

$= 9 + 18 = \boxed{27}$

2) Division

$\frac{+}{+} = +$

$\frac{+}{-} = -$

$\frac{-}{+} = -$

$\frac{-}{-} = +$

Opposite Signs → −

Same Signs → +

Simplify: $\frac{-32}{4} = \boxed{-8}$

Simplify: $\frac{-120}{-10} = +12 = \boxed{12}$

Simplify: $\frac{-|-20|}{5 \cdot (-4)}$

$= \frac{-20}{-20} = +1 = \boxed{1}$

Simplify: $\frac{\sqrt{|-100|} - 1}{-(3)^2} = \frac{\sqrt{100} - 1}{-9} = \frac{10-1}{-9}$

$= \frac{9}{-9} = \boxed{-1}$

3) Exponents

$(-)^{\text{even}} = +$, $(-)^{\text{odd}} = -$

$(-4)^2 = +16$ $\quad$ $(-3)^3 = \boxed{-27}$

$= \boxed{16}$

Simplify: $(-5)^3 \cdot (-2)^2 =$

$5 \cdot 5 \cdot 5 =$
$25 \cdot 5 =$
125

$-125 \cdot 4 =$

$\boxed{-500}$

Simplify: $\dfrac{(-4)^3 \cdot \sqrt{|-25|}}{(-4)(-5) - (-2)(-10)}$

$= \dfrac{-64 \cdot \sqrt{25}}{20 \quad -20}$

$= \dfrac{-64 \cdot 5}{0} = \dfrac{-320}{0}$

undefined

$\emptyset$

④ Addition:

$(+) + (+) = +$

$(+) + (-)$

$(-) + (+)$ ⇒ Keep the sign of the large number in Abs. Value followed by their Positive difference in abs. Value.

$(-) + (-) = -$

$(-12) + (-8) = \boxed{-20}$

$24 + (-4) = +20 = \boxed{20}$

$-15 + 10 = \boxed{-5}$

Simplify $(-2)^3 + (4)(-3)$

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

$= -8 + (-12)$

$= \boxed{-20}$

Simplify

$$\frac{\sqrt{-(-16) + (-3)^2}}{3^2 - 2^3} = \frac{\sqrt{16 + 9}}{9 - 8} = \frac{\sqrt{25}}{1}$$

$$= \frac{5}{1} = \boxed{5}$$

Simplify $\dfrac{x^2+y^2}{x+y}$ $x=-3$ and $y=-4$

$$\frac{x^2+y^2}{x+y} = \frac{(-3)^2+(-4)^2}{(-3)+(-4)} = \frac{9+16}{-7} = \frac{25}{-7}$$

$$= \boxed{-\frac{25}{7}} = \boxed{\frac{-25}{7}}$$

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

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

Translate: 12 less than the product of -2 and -6.

~~$12-(-2)(-6)$~~

$(-2)(-6)-12$ ✓

Translate: 4 times the sum of some number and 10.

$4\cdot(x+10)$