Math 115
Winter 2017
Lecture 1

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F7-110 MTWTh 6:00AM to 10:50AM

You must purchase Beg. Algebra Study Guides for this class from Bookstore.

All materials including Syllabus is avialable on my website www.mymathclasses.com

Order of operations:

1) Do inside of grouping symbols such as

( ), { }, [ ], ——, | |, $\sqrt{}$, ...

2) Do exponents & Roots

3) Do multiplication & Division from left to right whichever comes first.

4) Do addition & Subtractions from left to right whichever comes first.

① Simplify: $3^4 - 9^2 =$

$81 - 81 =$

$\boxed{0}$ Do not use $\emptyset$ for Zero.

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

$-2 \cdot 10 - 32 =$

$-10 - 32 =$

$-10 + (-32) = \boxed{-42}$

③ Simplify: $\dfrac{(-3)^2+(-4)^2}{(-1-4)^2} = \dfrac{9+16}{(-5)^2}$

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

$= -5$

$= \dfrac{25}{25} = \boxed{1}$

④ Simplify: $-2\{-3-(3^2-1)\} - |-25|$

$= -2\{-3-(9-1)\} - 25$

$= -2\{-3-8\} - 25 = -2\{-11\} - 25$

$= 22 - 25$

$= 22 + (-25) = \boxed{-3}$

Simplify:

① $\sqrt{(-3)^2+(-4)^2} = \sqrt{9+16} = \sqrt{25} = \boxed{5}$

② $\dfrac{4(5-2^2)}{\sqrt{5^2-3^2}} = \dfrac{4(5-4)}{\sqrt{25-9}} = \dfrac{4\cdot 1}{\sqrt{16}} = \dfrac{4}{4}$

$= \boxed{1}$

③ $2\frac{2}{3} - \frac{29}{6} = \frac{8}{3} - \frac{29}{6} = \frac{8\cdot 2}{3\cdot 2} - \frac{29}{6}$

$= \frac{16}{6} - \frac{29}{6} = \frac{16-29}{6} = \boxed{\frac{-13}{6}} = \boxed{-2\frac{1}{6}}$

Simplify

① $\sqrt{\frac{100}{9}} \cdot \left(\frac{1}{2} - \frac{2}{5}\right)$

$= \frac{10}{3} \cdot \left(\frac{1 \cdot 5}{2 \cdot 5} - \frac{2 \cdot 2}{5 \cdot 2}\right) = \frac{10}{3} \cdot \frac{5-4}{10}$

$= \frac{\cancel{10}}{3} \cdot \frac{1}{\cancel{10}} = \boxed{\frac{1}{3}}$

② $-3\frac{1}{4} \div 5\frac{1}{2}$

$= -\frac{13}{4} \div \frac{11}{2} = \frac{-13}{\cancel{4}_{2}} \cdot \frac{\cancel{2}^{1}}{11} = \boxed{\frac{-13}{22}}$

Recall: $\frac{\text{Zero}}{\text{Non zero}} = \text{zero}$, $\frac{\text{Non zero}}{\text{zero}} = \text{undefined}$

$\frac{\text{Zero}}{\text{Zero}}$ indeterminate

Simplify: $-5(4-10) - \sqrt{900}$

$= -5(-6) - \sqrt{900}$

$= 30 - 30 = \boxed{0}$

Do not use ϕ for zero.

Simplify: $\frac{\sqrt{400} - (-20)}{81 - (-9)^2} = \frac{20 + 20}{81 - 81} = \frac{40}{0}$ $\boxed{\text{undefined}}$

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

NO = Sign

ex: $2x+5$, x^2-4x+8, $\sqrt{x^2-y^2}$, $\frac{2x-7}{x^2-10}$, $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

we usually evaluate or simplify expressions.

Evaluate x^2-5x for $x=-2$.

Replace every x with -2.

$$(-2)^2-5(-2)=4-5(-2)$$

$(-2)(-2)=+4=4$

$=4+10$

$=\boxed{14}$

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

$(3)^2-5(3)=9-15=9+(-15)=\boxed{-6}$

Evaluate $\sqrt{x^2-y^2}$ for $x=-5$ & $y=-4$

$$\sqrt{(-5)^2-(-4)^2} = \sqrt{25-16} = \sqrt{9} = \boxed{3}$$

Evaluate $\dfrac{|x|-y^3}{\sqrt{x+y}}$ for $x=-2$ and $y=3$

$$\frac{|-2|-(3)^3}{\sqrt{-2+3}} = \frac{2-3^3}{\sqrt{1}} = \frac{2-27}{1} = \frac{-25}{1} = \boxed{-25}$$

Transate: Square of Some number

increased by twice the number.

Let x be Some number,

$$\boxed{x^2+2x}$$

Some number reduced by 10. Let x be Some number.

$$\boxed{x-10}$$

half Some number divide by the Sum of the number cubed and (-5).

Let x be the number,

$\frac{1}{2} \cdot x$, $\frac{1}{2}x$, $\frac{x}{2}$

x^3 + $\frac{\frac{x}{2}}{x^3 + (-5)} = \frac{\frac{x}{2}}{x^3 - 5}$

Translate:

4 times the Sum of two numbers x & y

reduced by Square root of their product.

$$4(x+y) - \sqrt{x \cdot y} = 4(x+y) - \sqrt{xy}$$

Traslate into words

$-2x^2 + 10x$

-2 times square some number increased by 10 times the number.

Distributive Prop.

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

$a(b-c) = ab - ac$

ex: $4(x-5) = 4 \cdot x - 4 \cdot 5 = \boxed{4x-20}$

$-6(5-x) + \sqrt{900}$ Distribute & Simplify

$= -6 \cdot 5 - 6(-x) + \sqrt{900}$

$= -30 + 6x + 30 = \boxed{6x}$

Simplify: $10(x+2) - 10x - 20$

$= 10x + 20 - 10x - 20 = \boxed{0}$

Do not use $\emptyset$ for zero.

$a(bc) = (ab)c$

$7(3 \cdot 2) = (7 \cdot 3) \cdot 2$

$7 \cdot 6 = 21 \cdot 2$

$42 = 42$

Simplify

$5(2x - 8) - 3(3x) + 40$

$= 10x - 40 - 9x + 40$

$= 10x - 9x$

$= 1x = \boxed{x}$

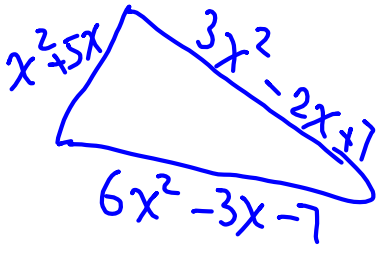
Simplify:

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

$= -24x - 18 + 25x + 20 - 2$

$= 1x = \boxed{x}$

Find an expression for the perimeter of



Shape : Triangle

$P = a + b + c$

$P = x^2 + 5x + 3x^2 - 2x + 7 + 6x^2 - 3x - 7$

$= \boxed{10x^2}$

Evaluate $x \div y$ where $x = -4\frac{2}{3}$, $y = 1\frac{2}{5}$

$x \div y = -4\frac{2}{3} \div 1\frac{2}{5}$

$= -\frac{14}{3} \div \frac{7}{5} = \frac{-\overset{2}{\cancel{14}}}{3} \cdot \frac{5}{\cancel{7}}$

$= \frac{-2}{3} \cdot \frac{5}{1} = \frac{-10}{3}$

$= \boxed{-3\frac{1}{3}}$

Simplify

$x^2 - y$ for $x = \frac{-1}{2}$ and $y = \frac{3}{4}$

$$= \left(\frac{-1}{2}\right)^2 - \left(\frac{3}{4}\right) = \frac{1}{4} - \frac{3}{4} = \frac{1-3}{4}$$

$$= \frac{-2}{4} = \boxed{-\frac{1}{2}}$$

Simplify

$(x - y)^2 - xy$ for $x = \frac{2}{3}$, $y = \frac{3}{2}$

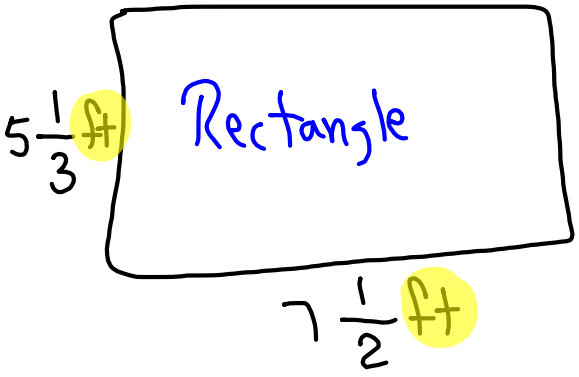
$$\left(\frac{2}{3} - \frac{3}{2}\right)^2 - \frac{2}{3}\cdot\frac{3}{2} = \left(\frac{2\cdot 2}{3\cdot 2} - \frac{3\cdot 3}{2\cdot 3}\right)^2 - 1$$

LCD = 6

$$= \left(\frac{4}{6} - \frac{9}{6}\right)^2 - 1 = \left(\frac{-5}{6}\right)^2 - 1 = \frac{25}{36} - 1 = \frac{25}{36} - \frac{36}{36}$$

$= \frac{25}{36} - \frac{36}{36} = \frac{25-36}{36} = \boxed{\frac{-11}{36}}$

Find the area $A = LW$

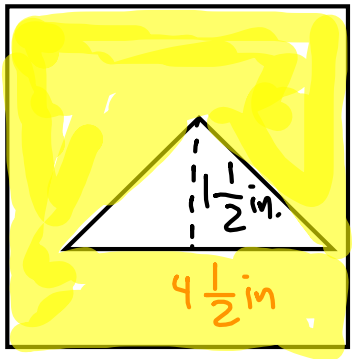


$A = 7\frac{1}{2} \cdot 5\frac{1}{3}$

$= \frac{15}{2} \cdot \frac{16}{3}$

$A = 40 \text{ ft}^2$

Find the Shaded area:



Shaded Area = $A_{Square} - A_{Triangle}$

$= S^2 - \frac{1}{2} b \cdot h$

$= \left(6\frac{2}{3}\right)^2 - \frac{1}{2} \cdot 4\frac{1}{2} \cdot 1\frac{1}{2}$

$= \left(\frac{20}{3}\right)^2 - \frac{1}{2} \cdot \frac{9}{2} \cdot \frac{3}{2}$

$$= \frac{400}{9} - \frac{27}{8} = \frac{400 \cdot 8}{9 \cdot 8} - \frac{27 \cdot 9}{8 \cdot 9}$$

LCD $= 9 \cdot 8$

$= 72$

$$= \frac{3200}{72} - \frac{243}{72}$$

$$= \boxed{\frac{2957}{72} \text{ in}^2}$$

$2957 - 41 \cdot 72$

$= \boxed{5}$

$$= \boxed{41\frac{5}{72} \text{ in}^2}$$

Evaluate $3x^2 - 7x + 4$ for $x = 2$

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

$= 3 \cdot 4 - 7 \cdot 2 + 4$

$= 12 - 14 + 4$

$= -2 + 4 = \boxed{2}$

Evaluate $\frac{x+8}{x-2}$ for

a) $x=0$

$= \frac{0+8}{0-2}$

$= \frac{8}{-2}$

$= \boxed{-4}$

b) $x=-8$

$= \frac{-8+8}{-8-2}$

$= \frac{0}{-10}$

$= \boxed{0}$

c) $x=2$

$= \frac{2+8}{2-2}$

$= \frac{10}{0}$

$= \boxed{\emptyset}$ undefined

Evaluate $\frac{x^2-49}{2x+14}$ for $x=-7$

$= \frac{(-7)^2-49}{2(-7)+14}$ $= \frac{49-49}{-14+14}$

$= \frac{0}{0}$ indeterminate

Simplify:

$4(x^2+3x-5)-2(2x^2+6x-10)$

$= 4x^2 + 12x - 20 - 4x^2 - 12x + 20$

$= 0$

Do not use ϕ for Zero.

Properties of real numbers:

1) Commutative

$a+b = b+a$ $\quad 7+2x = 2x+7$

$a \cdot b = b \cdot a$ $\quad 8 \cdot (-5) = -5 \cdot 8$

$x + y^2 = y^2 + x$, $x \cdot y^2 = y^2 \cdot x$

$8(2x+7) = (2x+7) \cdot 8$

$x^3 + 5x = 5x + x^3$

2) Associative

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

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

$4x + (x+8) = (4x + x) + 8 = \boxed{5x+8}$

$-4(3x) = (-4 \cdot 3) \cdot x = \boxed{-12x}$

$-7x + (8x - 2) = (-7x + 8x) - 2 = \boxed{x - 2}$

3) Distributive

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

$a(b-c) = ab - ac$

$7(x+4) = 7x + 7 \cdot 4 = \boxed{7x + 28}$

$-3(5x - 8) = -3 \cdot 5x - (-3) \cdot 8$

$= \boxed{-15x + 24}$

4) Identity Prop:

$a + 0 = a$

$a \cdot 1 = a$

$3x + 0 = 3x$, $-100 + 0 = -100$

$-10 \cdot 1 = -10$ $\quad 8 \cdot 1 = 8$

$-2x^2 + 0 = -2x^2$ $\quad (x^2 - 5x - 3) \cdot 1 = x^2 - 5x - 3$

5) Inverse

$a + (-a) = 0$

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

$17 + \boxed{-17} = 0$ $\quad -3x^2 + \boxed{3x^2} = 0$

$\frac{3}{5} \cdot \boxed{\frac{5}{3}} = 1$ $\quad -8 \cdot \boxed{\frac{1}{-8}} = 1$ → $-\frac{1}{8}$

$17x^4 + \boxed{0} = 17x^4$ Identity

$-25xy + \boxed{25xy} = 0$ inverse

$\frac{-3}{5} \cdot \boxed{1} = \frac{-3}{5}$ Identity

$\frac{x+8}{x-2} \cdot \boxed{\frac{x-2}{x+8}} = 1$ inverse

Name properties:

$4\left(3x + \frac{1}{4}\right) - 1 =$ Distributive

$4(3x) + 4\left(\frac{1}{4}\right) - 1 =$ Associative

$(4 \cdot 3)x + 4\left(\frac{1}{4}\right) - 1 =$ Inverse

$12x + 1 - 1 =$ Inverse

$12x + 0 = 12x$ Identity

Simplify, Name properties used

$$\frac{3}{2}\left(\frac{2}{3}x - 1\right) + \frac{3}{2}$$ Distributive

$$= \frac{3}{2}\cdot\left(\frac{2}{3}x\right) - \frac{3}{2}\cdot 1 + \frac{3}{2}$$ Associative & Identity

$$= \left(\frac{3}{2}\cdot\frac{2}{3}\right)x - \frac{3}{2} + \frac{3}{2}$$ Inverse

$$= 1\cdot x + 0$$ Identity

$$= \boxed{x}$$