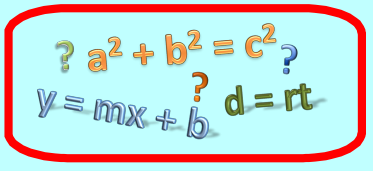
Math 115

Fall 2018

Lecture 17



Feb 19-8:47 AM

Use exponential rules to Simplify:

① $(-4x^5)^3 = (-4)^3(x^5)^3$

$= \boxed{-64x^{15}}$

② $\left(\frac{2x^2}{3y^6}\right)^2 = \frac{2^2(x^2)^2}{3^2(y^6)^2}$

$= \boxed{\frac{4x^4}{9y^{12}}}$

③ $\frac{x^{15}y^{-3}}{x^{-5}y^{10}}$

$= \frac{x^{15}x^5}{y^3y^{10}} = \boxed{\frac{x^{20}}{y^{13}}}$

④ $\left(\frac{3x}{y^5}\right)^{-2}$

$= \left(\frac{y^5}{3x}\right)^2 = \frac{(y^5)^2}{3^2x^2}$

$= \boxed{\frac{y^{10}}{9x^2}}$

Nov 20-6:02 AM

Identify degree & coef.

① $24x^6$

D=6

C=24

② $-x^3y^7$

D=3+7=10

C=-1

③ $x^1y^1z^1$

D=1+1+1=3

C=1

④ 100

D=0

Constant.

Nov 20-6:13 AM

Complete the following chart for

$-15x^6y^2+25x^3y^4-xy+8$

Monomials	D	C
$-15x^6y^2$	8	-15
$25x^3y^4$	7	25
$-xy$	2	-1
8	0	Constant

Degree for Polynomial: 8

Lead. Coeff. = -15

Constant = 8

Nov 20-6:18 AM

Simplify, write final ans in descending order

① $7x^2 - 15x - 4x^5 + 10x - 4 - 10x^2 - 6x^5$

$= -3x^2 - 5x - 10x^5 - 4 = \boxed{-10x^5 - 3x^2 - 5x - 4}$

D=5, L.C.=-10, Const=-4

② $-5(3 - 2x^2 + 7x) + 2(-8x^2 - 17x + 7)$

$= -15 + 10x^2 - 35x - 16x^2 - 34x + 14$

$= \boxed{-6x^2 - 69x - 1}$ Trinomial

D=2, L.C.=-6, Const. C=-1

Nov 20-6:23 AM

Use FOIL method to multiply:

① $(6x + 5)(2x - 3)$

$= 12x^2 - 18x + 10x - 15 = \boxed{12x^2 - 8x - 15}$

Trinomial
D=2, L.C.=12,
Const. = -15

② $(3x^2 - 4)(2x^2 - 5)$

$= 6x^4 - 15x^2 - 8x^2 + 20$

$= \boxed{6x^4 - 23x^2 + 20}$

Trinomial
D=4, L.C.=6,
Const=20

③ $(3x + 1)(9x^2 - 3x + 1)$

$= 27x^3 - 9x^2 + 3x + 9x^2 - 3x + 1$

$= \boxed{27x^3 + 1}$ Binomial

D=3
L.C.=27
Const=1

Nov 20-6:32 AM

Find $(x+5)^2$ Hint: $x^2 = x \cdot x$

$= (x+5)(x+5)$

$= x^2 + 5x + 5x + 25 = \boxed{x^2 + 10x + 25}$

Find $(3x-4)^2$ Hint: $x^2 = x \cdot x$

$= (3x-4)(3x-4)$

$= 9x^2 - 12x - 12x + 16 = \boxed{9x^2 - 24x + 16}$

Nov 20-6:42 AM

Find

① $(5x+2)^2 = (5x+2)(5x+2)$

$= 25x^2 + 10x + 10x + 4$

$= \boxed{25x^2 + 20x + 4}$

② $(5x-2)^2$

$= (5x-2)(5x-2)$

$= 25x^2 - 10x - 10x + 4 = \boxed{25x^2 - 20x + 4}$

③ $(5x+2)(5x-2)$

$= 25x^2 - \cancel{10x} + \cancel{10x} - 4 = \boxed{25x^2 - 4}$

Nov 20-6:47 AM

Simplify:

① $\frac{35x^5}{14x^2} = \frac{5x^3}{2} = \frac{5}{2}x^3$

② $\frac{-48x^7y^{10}}{12x^2y^7} = \frac{-4x^5y^3}{1} = -4x^5y^3$

③ $\frac{50x^8y^2}{10x^3y^{10}} = \frac{-5x^5}{y^8} = -\frac{5x^5}{y^8}$

④ $\frac{75x^2y^8}{25x^{10}y^{12}} = \frac{3}{x^8y^4}$

Nov 20-6:56 AM

Scientific Notation

It is used for very small or very large numbers.

$N \times 10^{n}$ (n: any integer)

$1 \le N < 10$

2.5×10^{18}, 1.28×10^{-7}

7.2×10^{-15}, 6.25×10^{8}

Nov 20-7:06 AM

write

$527,000,000,000$ in S.N.

11 digits

5.27×10^{11}

0.000000000000000075 in S.N.

7.5×10^{-16}

Nov 20-7:09 AM

write in S.N.

① $2,500,000,000,000,000$

$= 2.5 \times 10^{15}$

② 0.0000000000000052

$= 5.2 \times 10^{-14}$

Nov 20-7:12 AM

Write in standard notation

① $6.3 \times 10^{5} = 630{,}000$

② $1.5 \times 10^{-8} = 0.000\,000\,015$ (optional)

Nov 20-7:17 AM

Find equation of a line that contains $(0, 3)$ & $(4, 0)$.

$m = \frac{3-0}{0-4} = \frac{-3}{4}$

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{-3}{4}(x - 0)$

$y - 3 = \frac{-3}{4}x$

$y = \frac{-3}{4}x + 3$

Slope - Int

$4y = -3x + 12$

$3x + 4y = 12$

Standard form

Nov 20-7:43 AM

Graph $5x-3y=-9$, then draw a line that contains the origin and is perpendicular to this line. Find eqn of the new line.

Hint: Convert to slope-Int form.

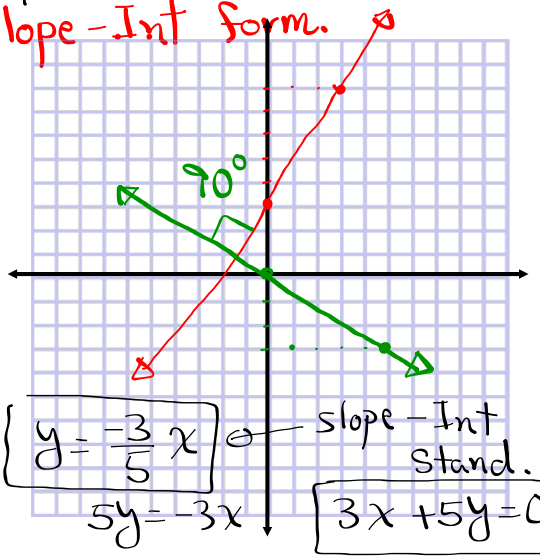
$-3y=-5x-9$

$\boxed{y=\frac{5}{3}x+3}$

New line has a slope of $\frac{-3}{5}$

$y-y_1=m(x-x_1)$

$y-0=\frac{-3}{5}(x-0)$



$\boxed{y=\frac{-3}{5}x}$ ← slope-Int

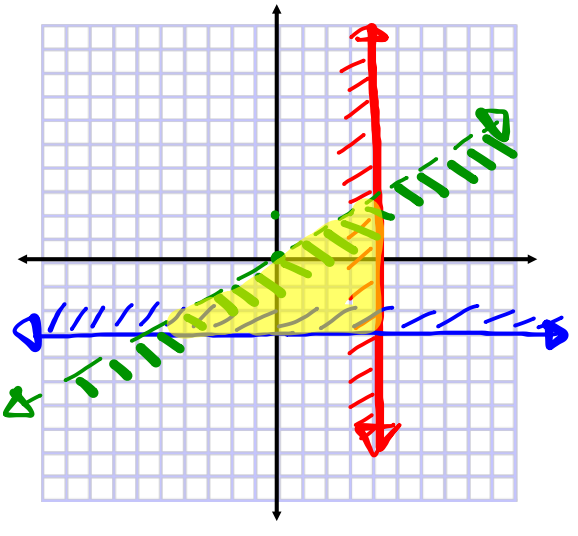
$5y=-3x$

Stand. form $\boxed{3x+5y=0}$

Nov 20-7:48 AM

Graph & shade the Solution

$$\begin{cases} x\le 4 \\ y\ge -3 \\ y<\frac{2}{3}x \end{cases}$$



Nov 20-7:56 AM

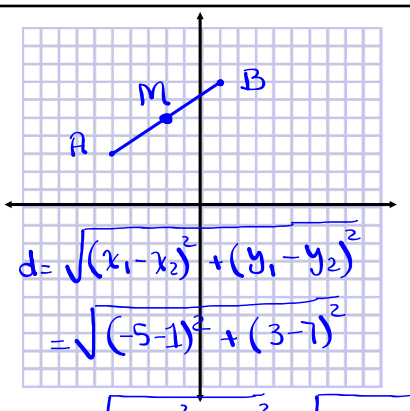
A(−5, 3) , B(1, 7)

① Draw $\overline{AB}$

② Find d(A, B)

③ Find M of $\overline{AB}$.

④ Find m of $\overline{AB}$.



$d = \sqrt{(x_1-x_2)^2+(y_1-y_2)^2}$

$= \sqrt{(-5-1)^2+(3-7)^2}$

$= \sqrt{(-6)^2+(-4)^2} = \sqrt{36+16}$

$= \sqrt{52}$

$\approx \boxed{7.2}$

$m\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$m\left(\frac{-5+1}{2}, \frac{3+7}{2}\right) = M\left(\frac{-4}{2}, \frac{10}{2}\right) = \boxed{M(-2, 5)}$

$m = \frac{y_1-y_2}{x_1-x_2} = \frac{3-7}{-5-1} = \frac{-4}{-6} = \boxed{\frac{2}{3}}$

(−5, 3), (1, 7)

Nov 20-8:02 AM

Find eqn of a line that contains (5, −2)

a) with Zero Slope.

H.L. → $y = -2$

b) with undefined slope.

V.L. → $x = 5$

Evaluate $\frac{x-6}{x+2}$ for $x = 0$, $x = 6$, and $x = -2$.

$\frac{0-6}{0+2}$

$= \frac{-6}{2}$

$= \boxed{-3}$

$\frac{6-6}{6+2}$

$= \frac{0}{8}$

$= \boxed{0}$

$\frac{-2-6}{-2+2} = \frac{-8}{0}$

undefined

$\emptyset$

Nov 20-8:10 AM

Graph Solution For $-2 < 3-5x \leq 3$

express final answer in interval notation.

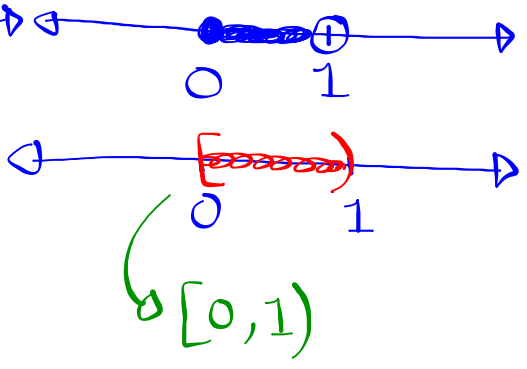
$-2 < -5x + 3 \leq 3$

$-2-3 < -5x + 3 - 3 \leq 3-3$

$-5 < -5x \leq 0$

$\frac{-5}{-5} > \frac{-5}{-5}x \geq \frac{0}{-5}$

$1 > x \geq 0$



Nov 20-8:21 AM

Solve

$\begin{cases} 3x - 4y = 6 \\ y = x \end{cases}$

$3x - 4x = 6$

$-x = 6 \rightarrow x = -6$

$y = -6$

Final Ans $(-6,-6)$

Solve

$2\{4x - 3y = 12$

$3\{5x + 2y = -8$

$\Rightarrow \begin{cases} 8x - 6y = 24 \\ 15x + 6y = -24 \end{cases}$

$23x = 0$

$x = 0$

$5(0) + 2y = -8$

$2y = -8$

$y = -4$

Final Ans $(0,-4)$

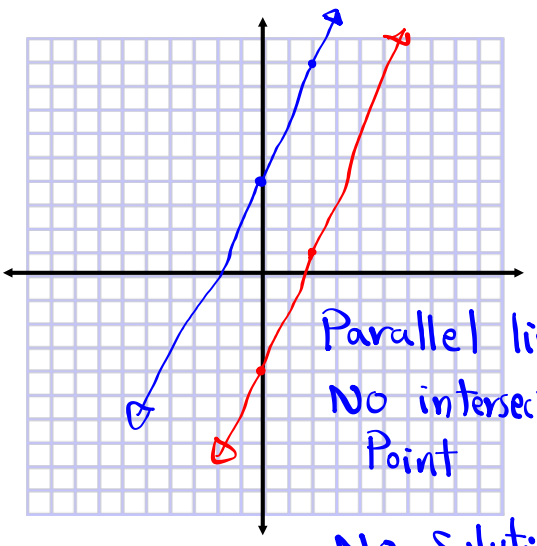
Nov 20-8:27 AM

Solve by graphing:

$$\begin{cases} 5x - 2y = -8 \\ y = \frac{5}{2}x - 4 \end{cases}$$

$-2y = -5x - 8$

$y = \frac{5}{2}x + 4$



Parallel lines
No intersection Point

No Solution

Nov 20-8:34 AM

Translate only:

4 times square of some number reduced by 3 is equal to the number.

Let x be the number,

$4 \cdot x^2 - 3 = x$

2.25 inches on the map represents 400 miles. Two cities were 6.75 inches apart on the map. Find actual distance using Proportion.

$$\frac{2.25 \text{ inches}}{400 \text{ Miles}} = \frac{6.75 \text{ inches}}{x \text{ Miles}}$$

1200 Miles

$2.25x = 400(6.75)$

$x = \frac{400(6.75)}{2.25}$

$x = 1200$

Nov 20-8:51 AM

What is 22% of 520? Round up to a whole number.

$x = .22(520)$

$x = 114.4$

$x \approx 115$

Nov 20-8:58 AM

Find two consecutive even integers such that 5 times the smaller one less 3 times the larger one is equal to 194.

x & $x+2$

$5x - 3(x+2) = 194$

$5x - 3x - 6 = 194$

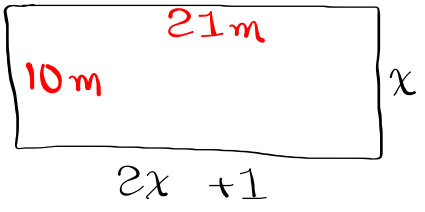
$2x = 200$

$x = 100$

100 & 102

Nov 20-9:00 AM

The length of a rectangular shape is 1 m longer than twice its width. The perimeter is 62 m. Find its area.



$P = 62$

$2L + 2W = 62$

$2(2x+1) + 2x = 62$

$4x + 2 + 2x = 62$

$6x = 60$

$x = 10$

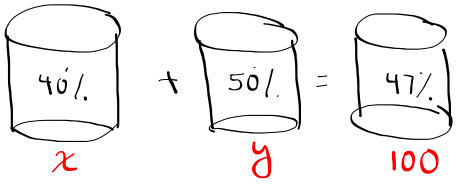
$A = LW$

$= 10(21)$

$A = 210\ m^2$

Nov 20-9:06 AM

Annie needs 100 liters of 47% acid Soln. Raul has unlimited supply of 40% & 50% acid Solns. How many liters of each should he mix to help Annie?



$\begin{cases} x + y = 100 \\ .4x + .5y = .47(100) \end{cases}$ (10)

$\begin{cases} x + y = 100 \\ 4x + 5y = 470 \end{cases}$ (−4)

$\begin{cases} -4x - 4y = -400 \\ 4x + 5y = 470 \end{cases}$

$y = 70$

70 liters of 50% & 30 liters of 40%.

Nov 20-9:11 AM

School paid $199 to purchase 30 tkts for a trip to the zoo.

Kid's TKT → $5

Adult's Tkt → $12

How many tickets of each?

$$\begin{cases} K + A = 30 \\ 5K + 12A = 199 \end{cases}$$

$K = 23$

$A = 7$

Nov 20-9:17 AM

Find an angle such that the sum of twice its Complement and 3 times its Supplement is equal to 670°.

Angle → x

Complement → $90 - x$

Supplement → $180 - x$

$2(90 - x) + 3(180 - x) = 670$

$\vdots$

$x = 10$

The angle is 10°

Nov 20-9:21 AM