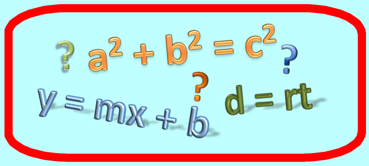
Math 115

Fall 2018

Lecture 16



Feb 19-8:47 AM

Monomial: It is when variable(s) are raised to whole number exponents and are multiplied by any number.

$5x^2$, $-7xy^3$, $23xy^2z^3$, 100, $\frac{2}{3}x^4$, $\frac{-3}{5}xy$

Coefficient

Exponent or Sum of exponents → Degrees.

when there is no variable → Constant

Nov 19-6:04 AM

$25x^3 \to$ Deg. $= 3$, Coef. $= 25$

$-17x^2y^4 \to$ Deg. $= 2+4 = 6$, Coef. $= -17$

$\frac{3}{4}xyz \to$ Deg. $= 1+1+1 = 3$, Coef. $= \frac{3}{4}$

$100 \to$ Constant $\to$ Deg. $= 0$

$-xy^2z^7 \to$ Monomial
$\to$ Coef. $= -1$
$\to$ Degree $= 1+2+7 = 10$

Nov 19-6:09 AM

Binomial: It is the sum of two monomials.

$4x + 7$, $-2x^3 + 8x$, $x - 10$, $\frac{2}{3}x^2 - \frac{3}{7}$

Highest Deg. $\to$ Degree of binomial

Coef. of the monomial with higest degree is Called the Leading Coef.

$-2x^3 + 8x$

Monomial	D	C
$-2x^3$	3	-2
$8x$	1	8

Deg. $= 3$, L.C. $= -2$

Nov 19-6:12 AM

$7x \quad -10$

Monomial	D	C
$7x$	1	7
-10	0	Constant

Deg. = 1

L.C. = 7

Const. = −10

$-3x^2y^3 + 10xy$

Monomial	D	C
$-3x^2y^3$	$2+3=5$	-3
$10xy$	$1+1=2$	10

Deg. = 5

L.C. = −3

No constant.

Nov 19-6:16 AM

Trinomial: It is the sum of three monomials.

x^2-5x+8, $3x^5-12x^3+18x$, $4x^2y^4-10xy^6+12$

The degree & leading Coef. are determined by the same method for binomials.

x^2-5x+8

Monomial	D	C
x^2	2	1
$-5x$	1	−5
8	0	Constant

D = 2

L.C. = 1

Const. = 8

Nov 19-6:21 AM

$-4x^3y^4 + 12xy - 100$

$D = 7$

L.C. $= -4$

Const. $= -100$

Monomial	D	C
$-4x^3y^4$	$3+4=7$	-4
$12xy$	$1+1=2$	12
-100	0	Constant

Polynomial : It is the sum of monomials.

Monomial is a polynomial with one term.

Binomial " " " " two terms.

Trinomial " " " " Three " .

Nov 19-6:26 AM

$$\underbrace{14x^6 - 3x^2 + 5x^3 - 3x^5 + 14 - 12x}_{\text{Polynomial}}$$

write it in descending order.

Power going down

$14x^6 - 3x^5 + 5x^3 - 3x^2 - 12x + 14$

$D = 6$

L.C. $= 14$

Const. $= 14$

Nov 19-6:33 AM

Consider

$32xy^3 \quad -15x^6y^2 \quad -100 + xy - x^2y^4$

Monomial	D	C
$32xy^3$	$1+3=4$	32
$-15x^6y^2$	$6+2=8$	-15
-100	0	Constant
xy	$1+1=2$	1
$-x^2y^4$	$2+4=6$	-1

D=8

L.C.=−15

Constant=−100

$-15x^6y^2 - x^2y^4 + 32xy^3 + xy - 100$

Nov 19-6:35 AM

To Simplify a polynomial, we can only Combine $\underbrace{\text{like monomials}}$

Same Variables

&

Same exponents

Simplify.

$7x^3 + 2x^2 \cancel{-8x} + 1 - 2x^3 \cancel{+8x} - 5x^2 - 7$

$= \boxed{5x^3 - 3x^2 - 6}$

Trinomial

D=3, L.C.=5, Const.=−6

Nov 19-6:42 AM

Simplify

$\cancel{7xy} - 4x^3y^2 + 5x^2y^3 + 3x^3y^2 - \cancel{7xy} + 12x^2y^3$

$= -1x^3y^2 + 17x^2y^3$

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

Binomial

Degree $= 5$

L.C. $= -1$

Simplify

$12x^6y^2 - \cancel{17x^2y^6} - 11x^6y^2 + \cancel{xy} + \cancel{17x^2y^6} - \cancel{xy}$

$= \boxed{x^6y^2}$ Monomial, $D=8$, $C=1$

Nov 19-6:45 AM

Use exponentials rules to Simplify:

$(-2x^4)^3 \cdot x^5 = (-2)^3(x^4)^3 \cdot x^5$

$= -8x^{12} \cdot x^5$

$= \boxed{-8x^{17}}$

Monomial

$D=17$, $C=-8$

$(-3x^5)^2 \cdot (-4x^6)^3$

$= (-3)^2(x^5)^2 \cdot (-4)^3(x^6)^3 = 9x^{10} \cdot (-64)x^{18}$

$= 9 \cdot (-64)\, x^{10}x^{18}$

$= \boxed{-576x^{28}}$

Monomial, $D=28$, $C=-576$

Nov 19-6:53 AM

Distribute & Simplify

$4(2x^2 - 5x - 1) - 3(3x^2 - 7x + 1)$

$= 8x^2 - 20x - 4 - 9x^2 + 21x - 3$

$= \boxed{-x^2 + x - 7}$ Trinomial

D=2, L.C.=-1, Const.=-7

$-5(3x^2y^3 - 8xy^2 + 3) - 3(5x^2y^3 + 13xy^2 - 5)$

$= -15x^2y^3 + 40xy^2 \cancel{-15} - 15x^2y^3 - 39xy^2 \cancel{+15}$

$= \boxed{-30x^2y^3 + xy^2}$ Binomial

D=5, L.C.=-30, No constant

Nov 19-7:01 AM

Distribute & Simplify

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

$= 4x^2 \cdot 3x^3 - 4x^2 \cdot 5x^2 + 4x^2 \cdot 6$

$= \boxed{12x^5 - 20x^4 + 24x^2}$ Trinomial

D=5, L.C.=12

No Constant

Distribute & Simplify:

$-2x^2y^3(5x^3y - 4xy + 1)$

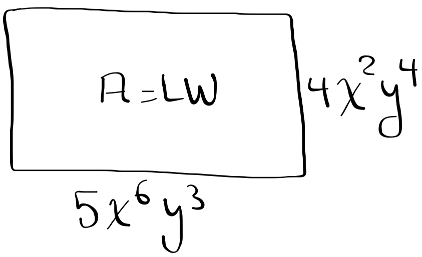
$= -2x^2y^3 \cdot 5x^3y - 2x^2y^3 \cdot (-4xy) - 2x^2y^3 \cdot \boxed{1}$

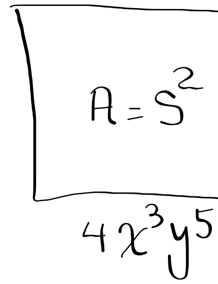
$= -10x^5y^4 + 8x^3y^4 - 2x^2y^3$

Trinomial, D=9, L.C.=-10

Nov 19-7:27 AM

Find Area





$A = LW$

$= (5x^6y^3)(4x^2y^4)$

$= \boxed{20x^8y^7}$

units^2

Monomial

D = 8 + 7 = 15

C = 20

$A = S^2$

$= (4x^3y^5)^2$

$= 4^2(x^3)^2(y^5)^2$

$= \boxed{16x^6y^{10}}$ units^2

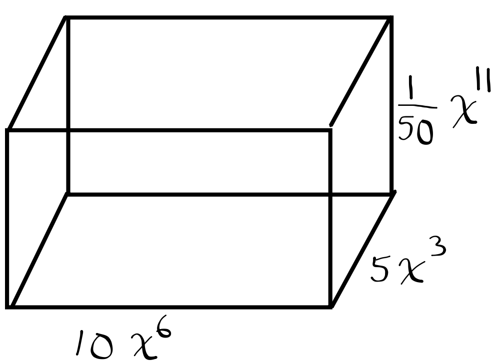
Monomial

D = 16

C = 16

Nov 19-7:35 AM

Find the Volume



$V = LWH$

$V = \cancel{10}x^6 \cdot \cancel{5}x^3 \cdot \frac{1}{\cancel{50}}x^{11}$

$= x^6 x^3 x^{11}$

$= \boxed{x^{20}}$

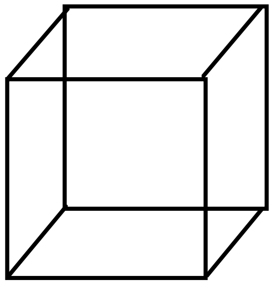
units^3

Monomial

D = 20, C = 1

Nov 19-7:40 AM

Find the Volume $\quad V = S^3$



$5x^4y^6$

$$V = (5x^4y^6)^3$$

$$= 5^3 (x^4)^3 (y^6)^3$$

$$\boxed{V = 125x^{12}y^{18}} \text{ units}^3$$

Monomial

$D = 12 + 18 = 30$, $C = 125$

Nov 19-7:45 AM

FOIL method:

First ones

outside ones

Inside ones

Last ones

Multiply:

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

$$= 2x \cdot 4x + 2x \cdot 5 + 3 \cdot 4x + 3 \cdot 5$$

$$= 8x^2 + 10x + 12x + 15$$

$$= 8x^2 + 22x + 15$$

Trinomial

$D = 2$

L.C. $= 8$

Const $= 15$

Nov 19-7:51 AM

Multiply using FOIL:

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

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

$=\boxed{8x^2 - 14x - 15}$

Trinomial
D=2, L.C.=8
Const. −15

$(5x^2+6)(5x^2-6)$

$=25x^4 \cancel{-30x^2} + \cancel{30x^2} - 36$

$=\boxed{25x^4 - 36}$

Binomial
D=4, L.C.=25, Const. −36

Nov 19-7:54 AM

Solve & graph

$-4 < 2x - 6 \le 4$

$-4+6 < 2x - 6 + 6 \le 4 + 6$

$2 < 2x \le 10$

$\frac{2}{2} < \frac{2}{2}x \le \frac{10}{2}$

$1 < x \le 5$

$(1,5]$

$\{x \mid 1 < x \le 5\}$

Nov 19-8:03 AM

Shade the Solution

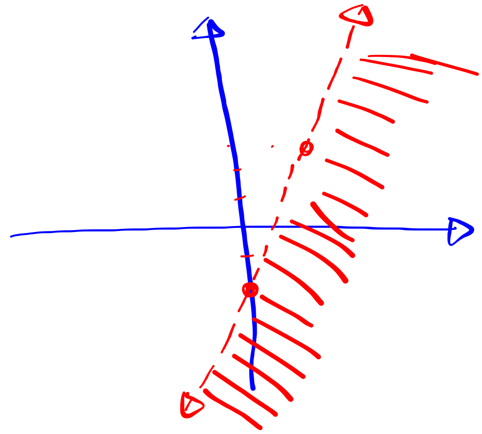
Hint: write in Slope-Int form

$5x - 2y > 4$

$-2y > -5x + 4$

$\frac{-2}{-2}y < \frac{-5}{-2}x + \frac{4}{-2}$

$y < \frac{5}{2}x - 2$



Nov 19-8:06 AM

Find eqn of a line that contains $(4,-3)$ with slope $\frac{3}{2}$. Graph & label clearly.

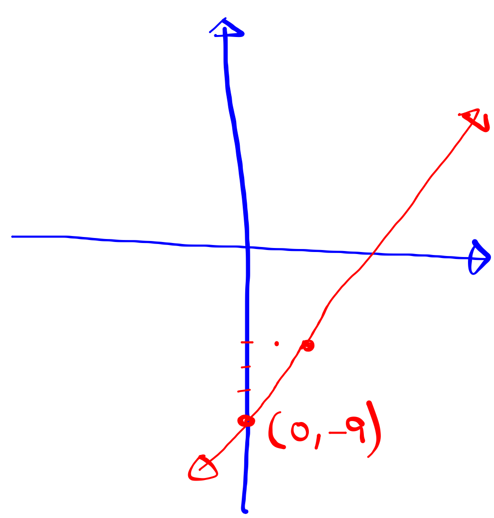
$y - y_1 = m(x - x_1)$

$y - (-3) = \frac{3}{2}(x - 4)$

$y + 3 = \frac{3}{2}x - \frac{3}{2} \cdot 4$

$y = \frac{3}{2}x - 6 - 3$

$\boxed{y = \frac{3}{2}x - 9}$



Nov 19-8:11 AM

Solve by Subs. method:

$$\begin{cases} 3x + 2y = 8 \\ y = 4 - x \end{cases}$$

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

$3x + 8 - 2x = 8$

$x = 8 - 8$

$\boxed{x = 0}$

$y = 4 - 0$

$\boxed{y = 4}$

$\{(0,4)\}$

$(0, 4)$

Nov 19-8:15 AM

Solve

$$\begin{array}{r} 3 \\ -4 \end{array}\begin{cases} 3x + 4y = -2 \\ 4x + 3y = 2 \end{cases} \Rightarrow \begin{cases} 9x + 12y = -6 \\ -16x - 12y = -8 \end{cases}$$

$-7x = -14$

$\boxed{x = 2}$

$3(2) + 4y = -2$

$6 + 4y = -2$

$4y = -8$

$\boxed{y = -2}$

$(2, -2)$

Nov 19-8:19 AM

Find eqn of a line that contains $(1,-5)$ and is perpendicular to $y = \boxed{\frac{-1}{3}}x + 6$.

Graph both lines.

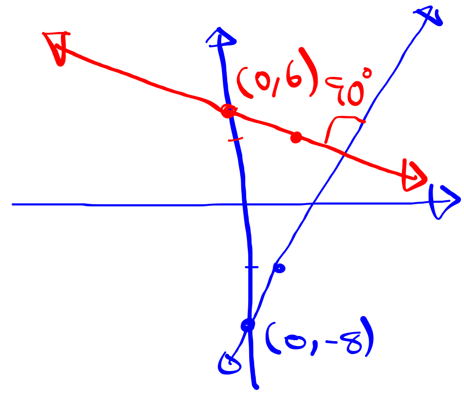
$m = -\left(\frac{-3}{1}\right) = 3$

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

$y - (-5) = 3(x - 1)$

$y + 5 = 3x - 3$

$\boxed{y = 3x - 8}$



Nov 19-8:24 AM

Mr. Flores bought a phone for \$135.

Sale's tax rate is 8%.

Find actual price.

Phone → x

Tax → 8% x

Phone + Tax = 135

$x + .08x = 135$

$1.08x = 135$

$x = \frac{135}{1.08}$

$x = 125$

\$125

Nov 19-8:33 AM

Find two consecutive odd integers such that the sum of 4 times the smaller one and 3 times the larger one is 167.

x & $x+2$

$4 \cdot \text{Smaller} + 3 \cdot \text{larger} = 167$

$4 \cdot x + 3(x+2) = 167$

$4x + 3x + 6 = 167$

$7x = 161$ $\boxed{x = 23}$

23 & 25

Nov 19-8:51 AM

Find two Supplementary angles such that 3 times one of them is equal to 240° more than the other one.

x & $180 - x$

$3\boxed{x} = \boxed{180 - x} + 240$

$3x + x = 420$

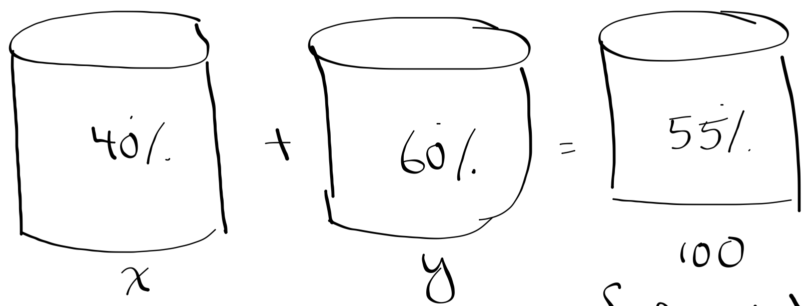
$4x = 420$

$\boxed{x = 105}$

105° & 75°

Nov 19-8:59 AM

I need 100 liters of 55% acid solution.
I have unlimited supply of 40% acid & 60% acid solutions.
How many liters of each?



$$\begin{cases} x + y = 100 \\ 40\% x + 60\% y = 55\%(100) \end{cases}$$

$$10\begin{cases} x + y = 100 \\ .4x + .6y = 55 \end{cases}$$

Nov 19-9:04 AM

$$\div 2\begin{cases} x + y = 100 \\ 4x + 6y = 550 \end{cases}$$

$$-2\begin{cases} x + y = 100 \\ 2x + 3y = 275 \end{cases}$$

$$\begin{cases} -2x - 2y = -200 \\ 2x + 3y = 275 \end{cases}$$

$$y = 75$$

75 liters of 60%
&
25 liters of 40%

Nov 19-9:07 AM

Mike has \$5.20 in Quarter & Dimes only. He has 25 Coins in total. How many of each?

R → Quarters

D → Dimes

$$\begin{cases} R + D = 25 \\ 25R + 10D = 520 \end{cases} \div 5$$

$$-2\begin{cases} R + D = 25 \\ 5R + 2D = 104 \end{cases} \Rightarrow \begin{cases} -2R - 2D = -50 \\ 5R + 2D = 104 \end{cases}$$

$$3R = 54$$

$$R = 18$$

18 Quarters & 7 Dimes.

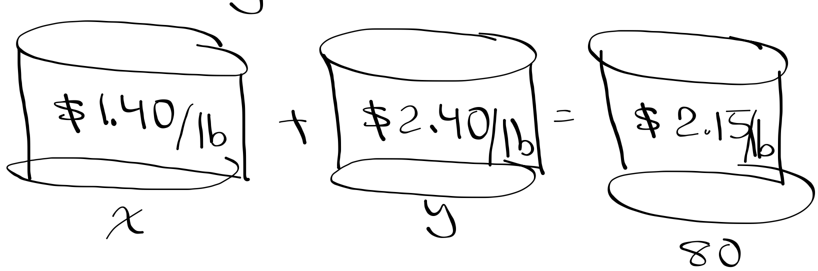
Nov 19-9:10 AM

Lisa needs 80 pounds of Coffee at \$2.15/lb.

Store has two brands of coffee.

one sells @ \$1.40/lb, other one sells @ \$2.40/lb.

How many pounds of each?



$$\begin{cases} x + y = 80 \\ 1.40x + 2.40y = 2.15(80) \end{cases} \Rightarrow \begin{cases} x + y = 80 \\ 1.4x + 2.4y = 172 \end{cases} 10$$

Nov 19-9:16 AM

$$\begin{cases} x + y = 80 \\ 14x + 24y = 1720 \end{cases} \div 2$$

$$\xrightarrow{-7} \begin{cases} x + y = 80 \\ 7x + 12y = 860 \end{cases}$$

$$\begin{cases} -7x - 7y = -560 \\ 7x + 12y = 860 \end{cases}$$

$$5y = 300$$

$$y = 60$$

60 lb. of \$2.40 brand & 20 lb. of \$1.40 brand.

Nov 19-9:21 AM