Name: _____ Date: _____

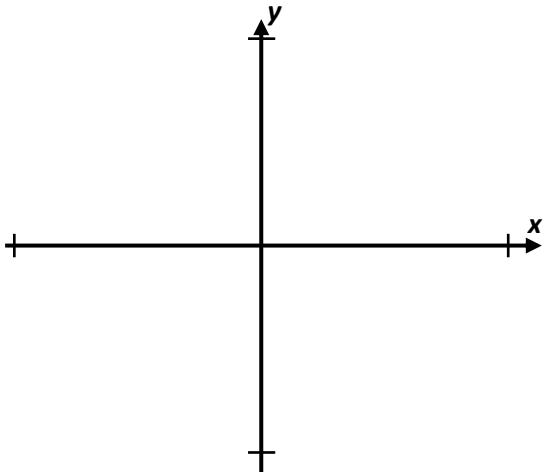
UNIT 1 **LESSON 4**

AIM: HOW DO WE DETERMINE THE DIFFERENCE BETWEEN FACTORS AND ROOTS?

Do Now:

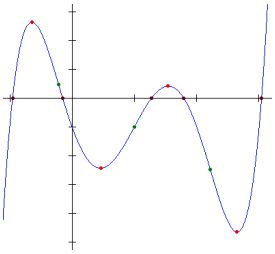
a) Using your graphing calculator, sketch $f(x) = x^2 - x - 20$ on the coordinate axis below.

b) Factor: $f(x) = x^2 - x - 20$



c) Identify the x-intercepts of the function based on the graph.

d) What similarities do you notice?

ROOTS	FACTORS
	$x^2 - x - 6 = 0$ Factor: $(x-3)(x+2) = 0$ Blobs = 0: $x-3=0$ or $x+2=0$ Solve: $+3\ +3$ ↑ $-2\ -2$ $x = 3$ ↑ $x = -2$ This "or" is kind of important since x cannot be 3 AND -2 at the same time!
• X-intercepts have several words with the same meaning: _____,_____, _____, • When a function crosses the x-axis, the y-value is _____. • When we set a polynomial equal to zero and factor, the answers we find are _____ or _____. • Roots are always represented as _____ • The _____ of a polynomial will always tell us how many roots there are - both real and non-real!	• _____ break a polynomial into simpler terms such that when the terms are multiplied together, they equal the original polynomial. • FACTORS are either represented using _____ or _____. • We set _____ equal to zero to find _____. • This process is called the _____ _____ _____.

EXAMPLES:

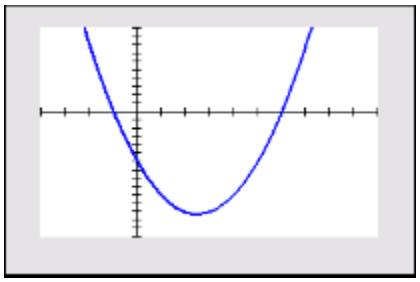
1) Find all the factors of $f(x) = x^3 + 2x^2 - 5x - 6$ if $(x-2)$ is a factor.

2) The function $P(x) = 2x^3 + 4x^2 - 14x + 8$ has a root of -4. Find ***all*** real solutions.

3) (Graphing Calculator Practice.) What is the quotient of $\frac{x^2+6x+9}{x+3}$?

1) x + 3
2) $x^2 + 2x + 3$
3) x + 2x
4) x + 5

4) For the polynomial function graphed to the right, identify:



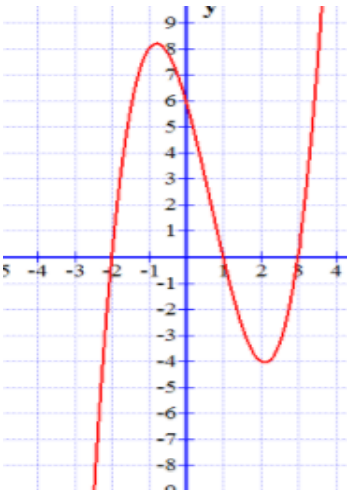
a) Its roots:

b) Its factors:

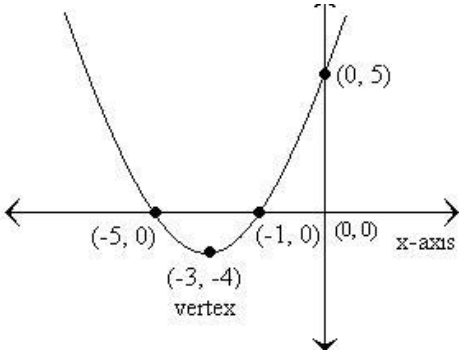
c) Its equation:

PARTNER PRACTICE:

1) What is the equation of this function?



2) What are one of the factors of the parabola on the right?



A) $x-5$
B) $x+3$
C) $x+1$
D) $x+4$

3) In the equation, $y = 2x^4 + 3x^3 - 3x^2 + 2x - 8$,

a) What is the degree of the equation?

b) What is the y-intercept?

4)

$$ax^3 + bx^2 + cx + d = 0$$

In the equation above, a, b, c, and d are constants. If the equation has roots -1, -3, and 5, which of the following is a factor of $ax^3 + bx^2 + cx + d$?

A) $x - 1$
B) $x + 1$
C) $x - 3$
D) $x + 5$

5)

x	$f(x)$
0	3
2	1
4	0
5	−2

The function f is defined by a polynomial. Some values of x and $f(x)$ are shown in the table above. Which of the following must be a factor of $f(x)$?

A) $x - 2$
B) $x - 3$
C) $x - 4$
D) $x - 5$