Happy Wednesday, September 21!

I'm so proud of you!

Do Now:

1) Correct one problem from your test. If you don't have any to correct, then create a problem and solve it!

Bellwork
Classifying Polynomials

by degree

largest exponent
among all terms

by number of terms
"omial"

quartics $4x^{④} + x^3 + 2x - 1$

Cubic $\longrightarrow$ $3x + 2x^2 - 5x^{③}$

quadratics $x^2 + 6x$

3

$2x - 9$

Instructional Focus:

IF.5   I can find the zeros of a polynomial .

Definitions!

Polynomial Function: A function with positive values for exponents.

Pull

standard form   factored form

$$3x^4 + 6x^2 \longrightarrow 3x^2(x^2 + 2)$$

$$x^2 + 5x + 6 \qquad\qquad (x+2)(x+3)$$

Zeros of a Polynomial Function

The <u>Zeros</u> of a *Polynomial Function* ARE the <u>Solutions</u> to the *Polynomial Equation* when the polynomial equals zero.

$$\cancel{f} = x^3 + 8$$

$$x^3 + 8 = 0$$

Other Names for Zeros

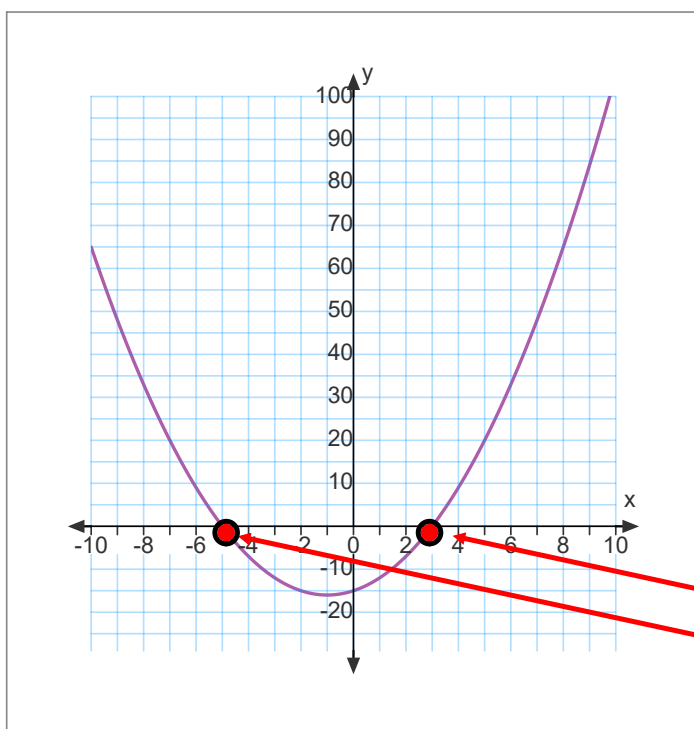| Zeros	Solutions $x=$	Roots
Where the polynomial equals zero	What x equals when the polynomial is zero	Where the graph touches the x-axis

SAME THING
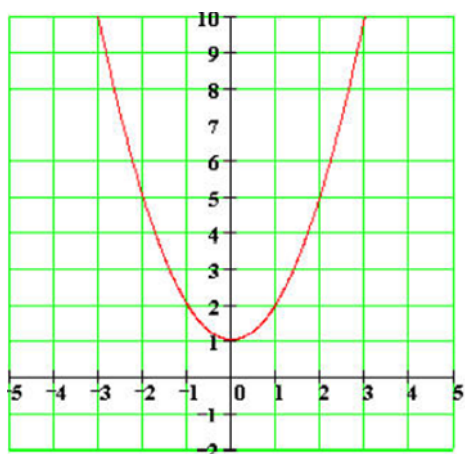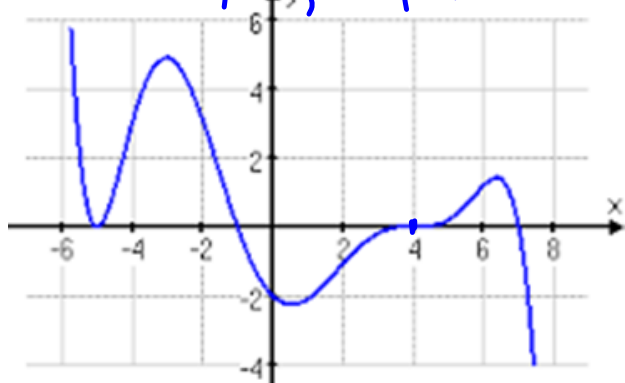
Graph of a Polynomial Function

$$y = x^2 + 2x - 15$$

zeros are the

x-values where

y equals zero

X = 3　X = -5

zeros!

Try the other two examples on your worksheet!

$x = -5, -1, 4, 7$

No Real Zeros

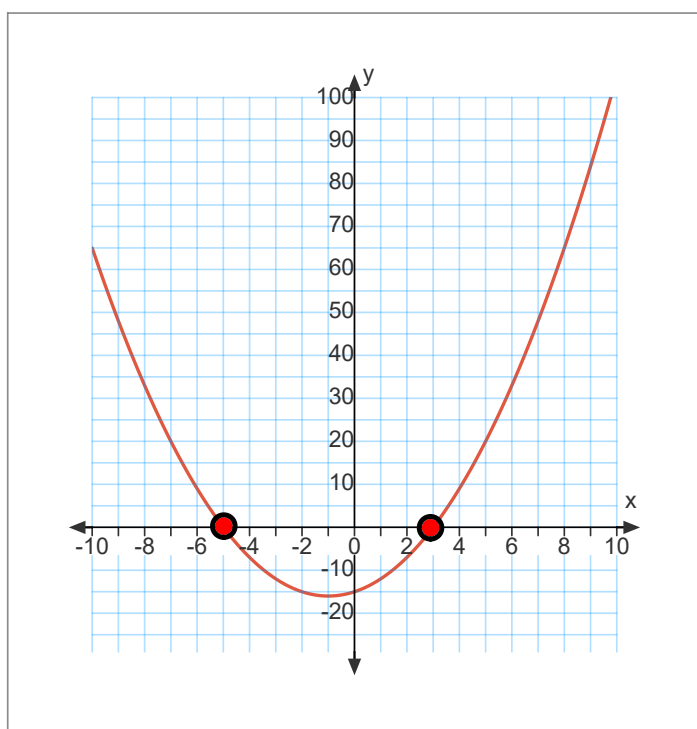$$\frac{\sqrt{-4}}{2} = \frac{\pm 2i}{2}$$

$$\boxed{x = \pm i}$$

$$y = x^2 + 1$$
$$0 = x^2 + 1$$
$$\frac{0 \pm \sqrt{0 - 4(1)}}{2}$$

x-Intercepts of a Polynomial

$$y = x^2 + 2x - 15$$

The points where y = 0 are called the *x*-intercepts of the graph.
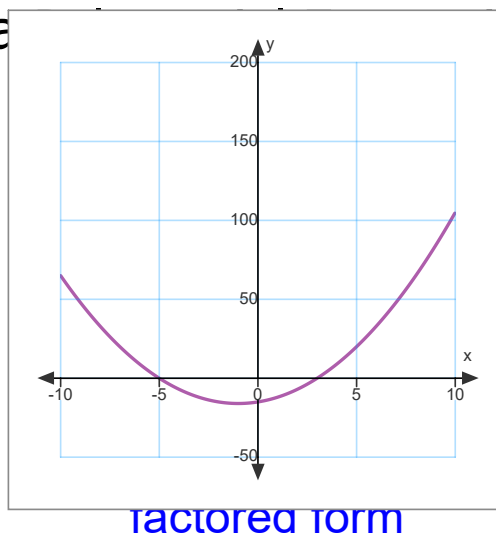
The *x*-intercepts for our graph are the points...

(-5, 0)　(3, 0)

When the <u>Factors</u> of a ~~polynomial equation~~ on are set equal to zero, we get ~~the solution~~s of the Polynomial Equation.

$$x^2 + 2x - 15$$

$$x^2 + 2x - 15 = 0$$

(x+5)(x-3)=0

factored form

(x+5) = 0   (x-3) = 0   SOLVE!

x = -5   x = 3 ←————•solutions/roots

(-5,0)   (3,0)   x intercepts

The *Solutions/Roots* of the *Polynomial Equation* are the *x-coordinates* for the   *x-Intercepts* of the *Polynomial Graph!*

Factors, Roots, Zeros

For our *Polynomial Function*:

$$y = x^2 + 2x - 15$$

The *Factors* are: $(x + 5)$ & $(x - 3)$

The *Roots/Solutions* are: $x = -5$ and 3

The *Zeros* are at: $(-5, 0)$ and $(3, 0)$

What are the zeros of y = x(x + 2)(x - 1)(x - 3) ?

$x = 0$

$x = -2$

$x = 1$

$x = 3$

$(x+2) = 0$

$x = -2$

$x = 0$

$(3-3)(6-5) =$

$0 \cdot \bar{\ }1$

$4x(x-1) = 0$

$x - 1 = 0$

$4x = 0$

$x = 0 \qquad x = 1$

Your Turn

What are the zeros of y= x(x + 7)(x - 5)(x - 3) ?

$4x(x+2) = 0$

$x = -2$

$4x + 8 = 0$

$4x = -8$

$x = \dfrac{-8}{4}$

$x = -2$

$X(x+6) = 0$

$x = 0$ $x = -6$

What are the zeros of $y = 2x(x-3)^2$

What are the zeros of $y = 5x(x+1)^3$

What are the zeros of $y = 3x(4x + 5)$

(number 7 on your homework)

What are the zeros of $y = 18x^3 - 6x$

Exit Slip: Write the three different names for "zeros" of a polynomial function.

Homework: Finish worksheet examples