

Algebra 2
5-2a Polynomials, Linear Factors & Zeros

Name _____
Date _____ **A#3**



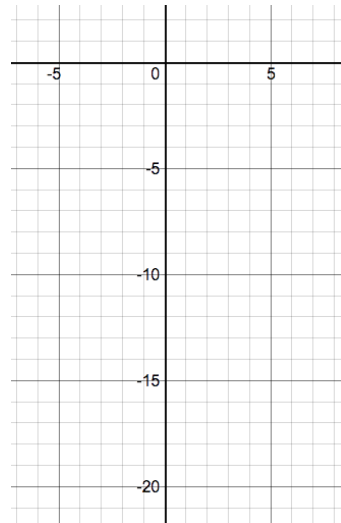
- Goal:** a. To analyze the factored form of a polynomial
b. To write a polynomial function from its zeros

I. Review: a. Solve $x^2 - 3x - 18 = 0$ by factoring. Be sure to use the Zero-Product Property.

b. Use a graphing calculator to graph the corresponding function: $y = x^2 - 3x - 18$. Sketch it in the coordinate plane to the right.

c. How do the solutions from (a) compare to the graph in (b)?

d. Explain how you know the end behavior of the graph based on the function.



Super-Secret Key Idea: Finding the zeros of a polynomial function will help you *factor* it, *graph* it, and *solve* the corresponding equation. Boom! All that from a big fat ZERO?! You better believe your chapped calculator.

II. Factoring Polynomials... for the Fun of it!

Work

$$2x^3 + 10x^2 + 12x$$

Reason

Practice: Rewrite each polynomial in factored form.

a. $x^4 - x^3 - 6x^2$

b. $-3x^3 + 18x^2 - 27x$



Key Concepts Roots, Zeros, and x -intercepts



The following are equivalent statements about a real number b and a polynomial

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0.$$

- $x - b$ is a linear factor of the polynomial $P(x)$.
- b is a zero of the polynomial function $y = P(x)$.
- b is a root (or solution) of the polynomial equation $P(x) = 0$.
- b is an x -intercept of the graph of $y = P(x)$.

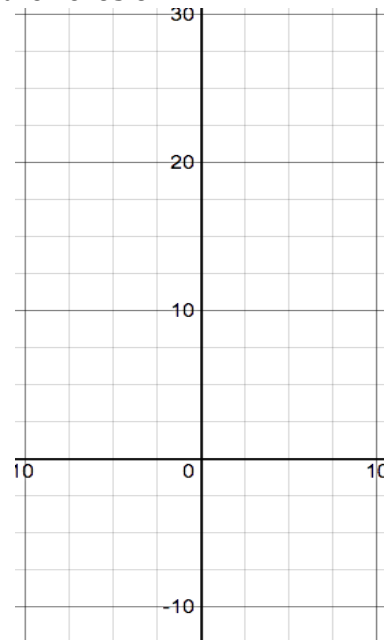
Summary: _____, _____, _____, _____ are pretty much synonymous and are derived from $x - b$, which is a _____.

III. Finding Zeros of a Polynomial Function: What are the zeros of

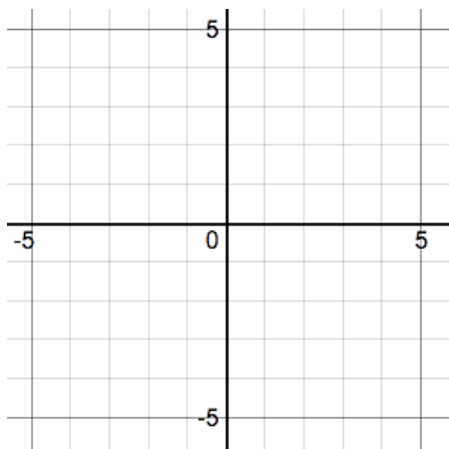
$y = x(x - 2)(x + 5)$? Graph the function.

a. Use _____ to find the zeros

- b. Graphing requires three things
- a. The zeros:
 - b. End behavior:
 - c. Additional Points:



Practice: What are the zeros of $y = (x - 1)(x + 1)(x - 3)$? Graph the function.



**Theorem Factor Theorem**

The expression $x - a$ is a factor of a polynomial if and only if the value a is a zero of the related polynomial function.

**IV. Writing a Polynomial from Its Zeros:**

Write a cubic function in standard form with the zeros -2, 2, 3.

Write a quartic polynomial function in standard form with zeros -2, -2, 2, and 3.

Graph both functions using a graphing calculator. Sketch them below. Then compare and contrast the two graphs.

