Algebra 2 Name _____

5-2b Polynomials, Linear Factors & Zeros Date _____ **A#5**

Goal: (a) To analyze the factored form of a polynomial
(b) To write a polynomial function from its zeros

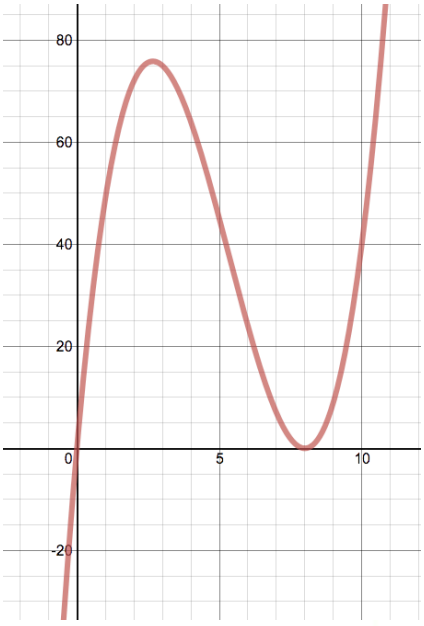
Review:

1. What is a cubic polynomial with zeros -4, 4, and 6?	2. Factor each polynomial. a. $x^3 - 81x$ b. $x^3 + 9x^2 + 18x$

Multiplicity: the number of times a factor appears in factored form of a polynomial function.

Example 1: Find the zeros of the function $y = x(x-8)^2$. State the multiplicity of multiple zeros. How does the graph behave at each zero?

Zero	Multiplicity	Behavior



take note

Key Concept How Multiple Zeros Affect a Graph

If a is a zero of multiplicity n in the polynomial function $y = P(x)$, then the behavior of the graph at the x-intercept a will be close to linear if $n = 1$, close to quadratic if $n = 2$, close to cubic if $n = 3$, and so on.

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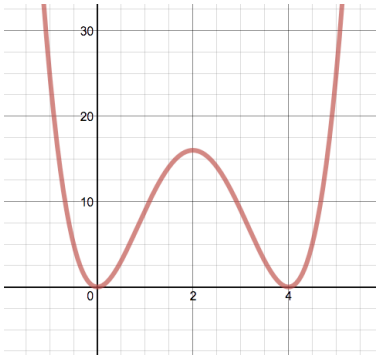
Example 2: Find the zeros of the function $y = x^4 - 8x^3 + 16x^2$. State the multiplicity of multiple zeros. How does the graph behave at each zero?



Review Graphing:

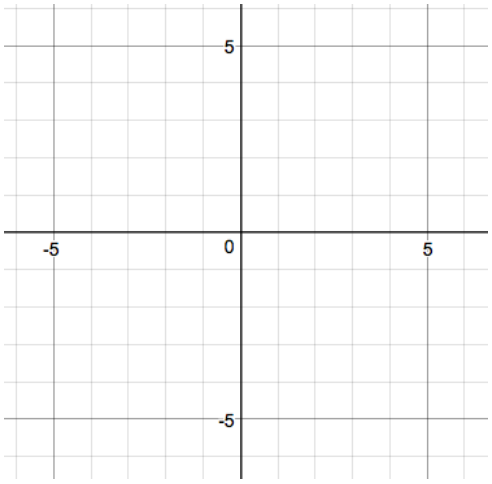
Graph the function $y = x(x-2)^2(x+1)$

Graphing requires three things

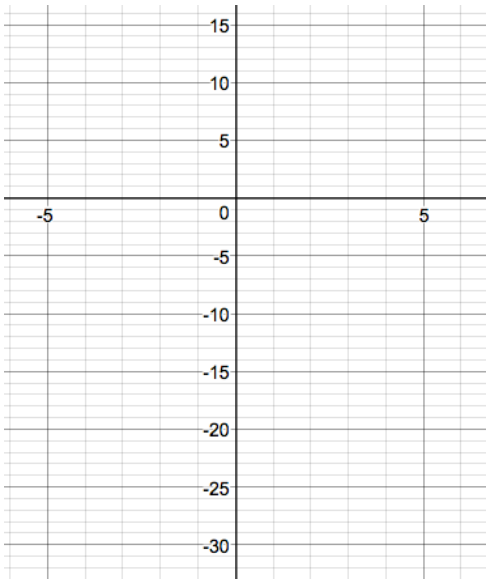
a. The zeros and multiplicity:

b. End behavior:

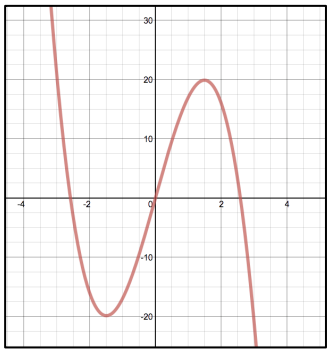
c. Additional Points:



Try It! Graph the function $y = (x-3)(x+1)^3$.



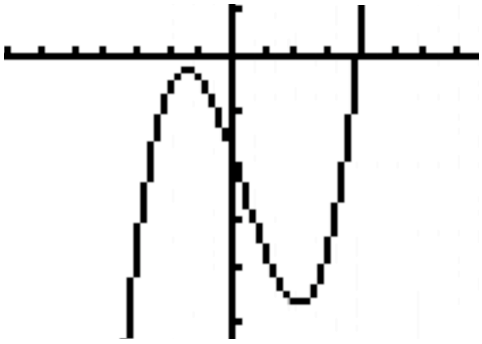
Relative Maximum and Relative Minimum
The highest mountain in the United States is Denali (formerly, Mt McKinley) in Alaska at 20,310 ft. The lowest point in the US is in Death Valley in CA at 282 below sea level. The highest mountain in the world is Mt Everest at 29,029 ft. The lowest exposed land point in the world is near the Dead Sea in Israel at 1,350 ft below sea level. In the same way, we might look at a graph and wonder where the maximum/minimum *for a particular region* are.



Example: Use a graphing calculator to find the relative maximum(s) and relative minimum(s) of $y = x^3 - x^2 - 9x - 9$
Scan the QR at the right to watch the video.

Relative Max:

Relative Min:



Practice: Use a graphing calculator to find the relative maximum(s) and relative minimum(s) of $y = x^4 + x^3 - 3x^2 - 5x - 2$.

Relative Max: Relative Min:

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Using Relative Maximum: A rectangular box has a square base. The combined length of a side of the square base, and the height is 20 in. Let x be the length of a side of the base of the box.

a. Write a polynomial function in factored form modeling the volume V of the box.

b. What is the maximum possible volume of the box?

Step 1: Define Variable

Step 2: Determine length, width and height

Step 3: Model the volume

Step 4: Graph and use Maximum