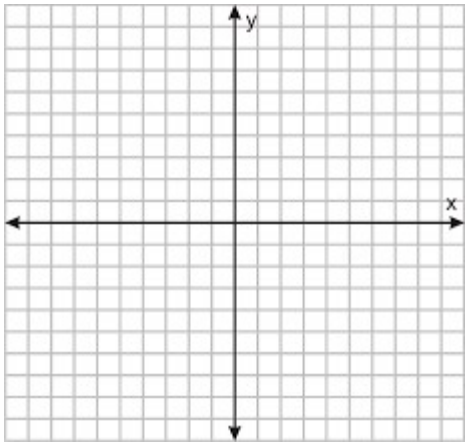
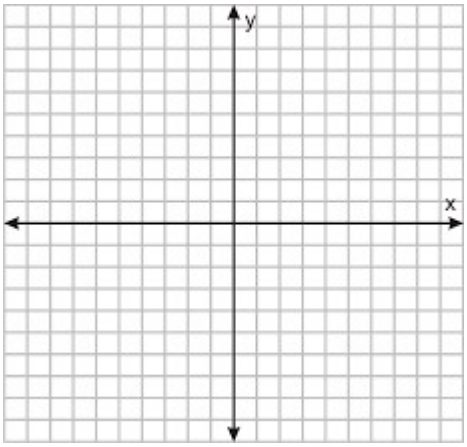
From Zero to Hero Name:_____

How are the features of a graph related to the equation of a polynomial function? Let's investigate! Use desmos.com to graph each of the polynomials below.

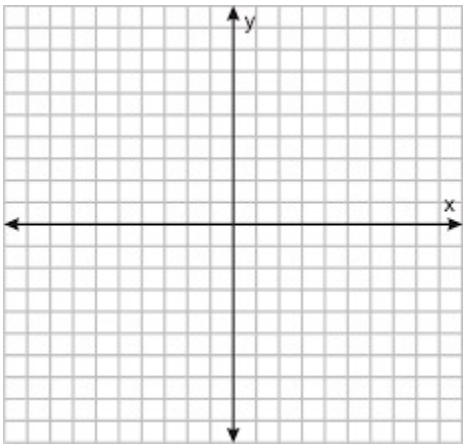
1. Graph $f(x) = (x + 3)(x - 2)$ on the coordinate plane and identify the following:
   a. X-intercept(s):
   b. Y-intercept:
   c. How many times does the curve change directions?
   d. How are the factors related to the x-intercepts?



2. Graph $g(x) = (x - 2)(x - 2)(x + 2)$ on the coordinate plane and identify the following:
   a. X-intercept(s):
   b. Y-intercept:
   c. How many times does the curve change directions?
   d. What is different about the behavior of the graph at $x = 2$ and at $x = -2$? Why do you think this happens?



3. Graph $f(x) = (x - 2)^3(x + 4)$ on the coordinate plane and identify the following:
   a. X-intercept(s):
   b. Y-intercept:
   c. How many times does the curve change directions?
   d. What do you notice about the behavior around the x-intercepts?



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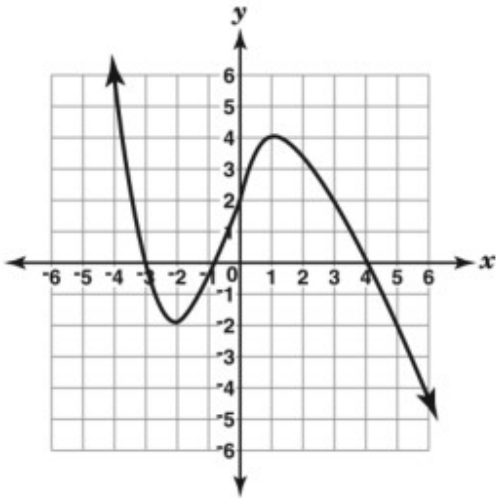
Lesson 2.2 Day 1—Polynomials in the Short Run

Important Ideas:

Check Your Understanding

1. Given the polynomial to the right, which of the following could be the factored form of the function:



   a. $f(x) = (x-3)(x-1)(x+4)$

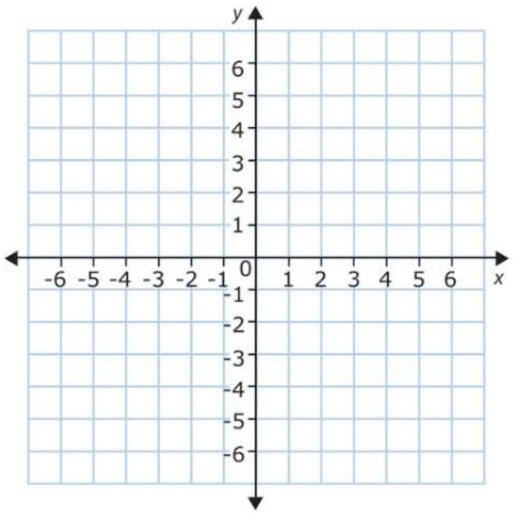
   b. $f(x) = (x+3)(x+1)(x-4)$

   c. $f(x) = \frac{1}{6}(x-3)(x-1)(x+4)$

   d. $f(x) = -\frac{1}{6}(x+3)(x+1)(x-4)$

2. Write an equation of a polynomial in factored form with zeros at 3, -2, and 1.

3. Sketch the graph of a polynomial with zeros at -1, 2 (with a multiplicity of 2), and 4 and a y-intercept at -5.



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