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Connecting Factors and Zeros

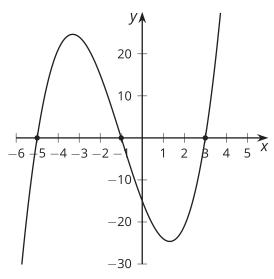
Let's investigate polynomials written in factored form.



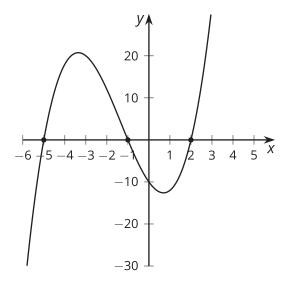
Notice and Wonder: Factored Form

What do you notice? What do you wonder?

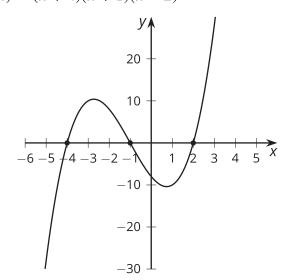
$$f(x) = (x+5)(x+1)(x-3)$$



$$g(x) = (x+5)(x+1)(x-2)$$



$$h(x) = (x+4)(x+1)(x-2)$$





Find all values of *x* that make the equation true.

1.
$$(x+4)(x+2)(x-1) = 0$$

2.
$$(x+4)(x+2)(x-1)(x-3) = 0$$

3.
$$(x+4)^2(x+2)^2 = 0$$

4.
$$-2(x-4)(x-2)(x+1)(x+3) = 0$$

5.
$$(2x + 8)(7x - 3)(x - 10) = 0$$

6.
$$x^2 + 3x - 4 = 0$$

7.
$$x(3-x)(x-1)(x+0.75) = 0$$

8.
$$(x^2 - 4)(x + 9) = 0$$

Are you ready for more?

1. Write an equation that is true when x is equal to -5, 4, or 0 and for no other values of x.

2. Write an equation that is true when x is equal to -5, 4, or 0 and for no other values of x, and where one side of the equation is a 4th-degree polynomial.



Card Sort: Factors, Intercepts, and Graphs

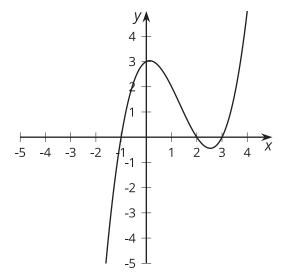
Your teacher will give you a set of cards. Take turns with your partner to match each equation to either a graph or a description of a graph.

- 1. For each match that you find, explain to your partner how you know it's a match.
- 2. For each match that your partner finds, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement.

Lesson 5 Summary

When a polynomial is written in factored form, we can identify several facts about it.

For example, the factored form of the polynomial shown in the graph is P(x) = 0.5(x-3)(x-2)(x+1).



The graph has x-intercepts at x = 3, 2, and -1. Each of these x-values makes one of the factors in the expression 0.5(x-3)(x-2)(x+1) equal to 0, and so makes the equation P(x)=0 true. The numbers 3, 2, and -1 are known as the zeros of the function.

When a polynomial is not written in factored form, identifying the zeros from the expression for the polynomial can be more challenging. We'll learn how to do that in future lessons.

