## Lesson 7: Using Factors and Zeros

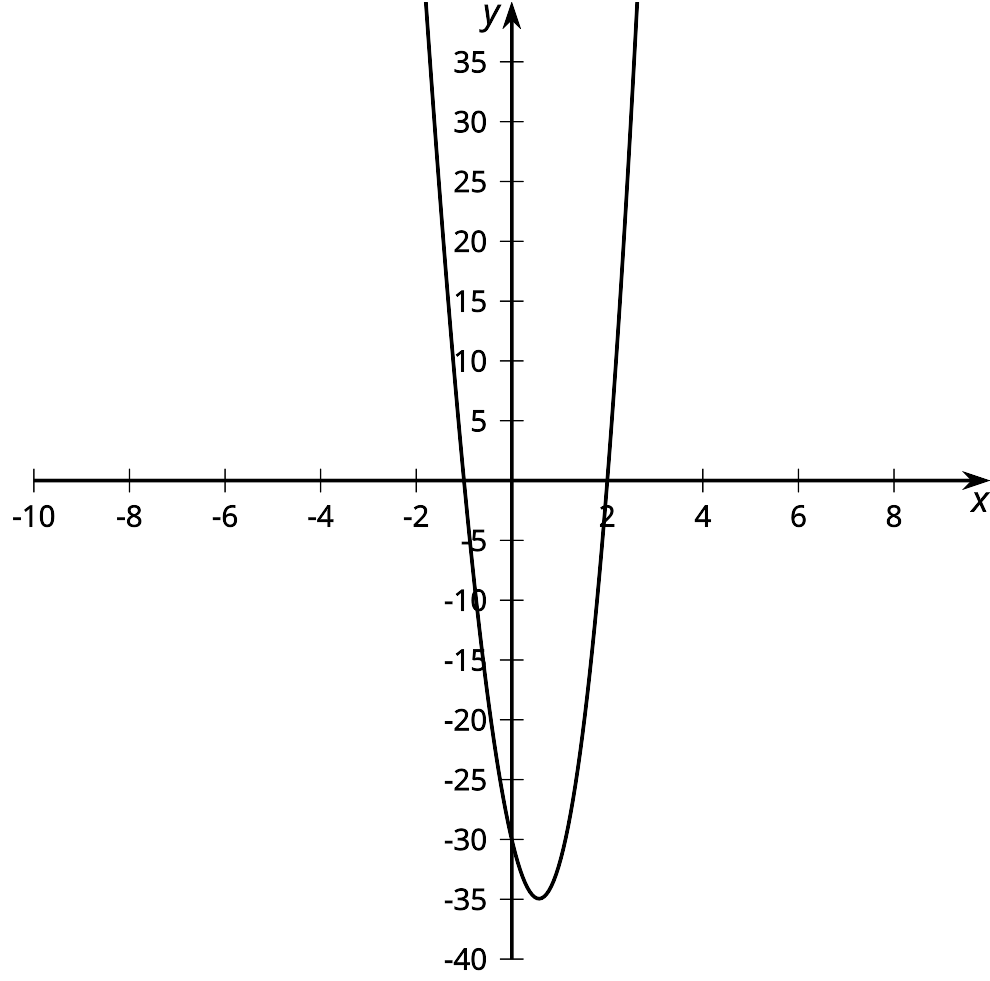
### 7.1: More Than Factors

and are both polynomial functions of where  and .

1. How are the two functions alike? How are they different?
2. If a graphing window of and shows all intercepts of a graph of , what graphing window would show all intercepts of ?

### 7.2: Choosing Windows

Mai graphs the function given by and sees this graph.



She says, “This graph looks like a parabola, so it must be a quadratic.”

1. Is Mai correct? Use graphing technology to check.
2. Explain how you could select a viewing window before graphing an expression like that would show the main features of a graph.
3. Using your explanation, what viewing window would you choose for graphing ?

#### Are you ready for more?

Select some different windows for graphing the function . What is challenging about graphing this function?

### 7.3: What’s the Equation?

Write a possible equation for a polynomial whose graph has the following horizontal intercepts. Check your equation using graphing technology.

1. and
2. , and
3. , and
4. , , and

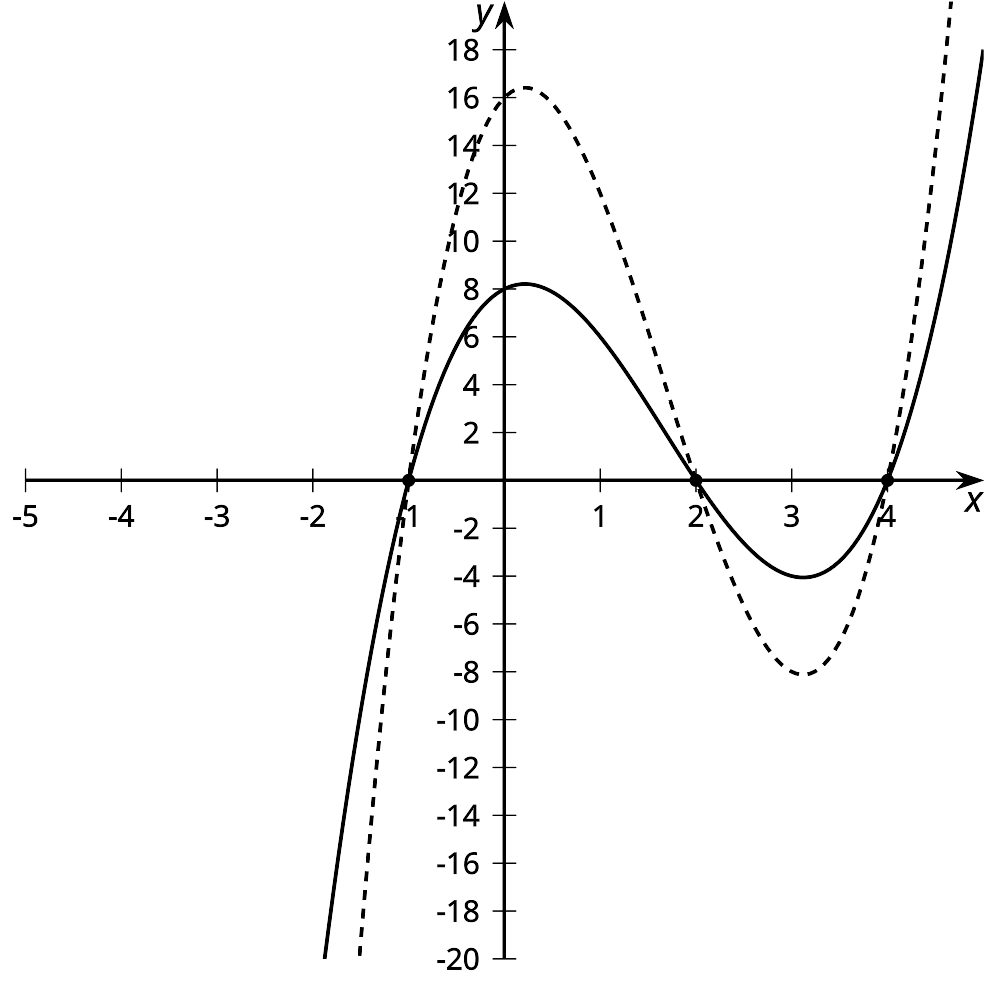
### Lesson 7 Summary

We can use the zeros of a polynomial function to figure out what an expression for the polynomial might be.

Let’s say we want a polynomial function that satisfies when is -1, 2, or 4. We know that one way to write a polynomial expression is as a product of linear factors. We could write a possible expression for by multiplying together a factor that is zero when , a factor that is zero when , and a factor that is zero when . Can you think of what these three factors could be?

It turns out that there are many possible expressions for . Using linear factors, one possibility is . Another possibility is , since the 2 (or any other rational number) does not change what values of make the function equal to zero.

To check that these expressions match what we know about , we can test the three values -1, 2, and 4 to make sure that is 0 for those values. Alternatively, we can graph both possible versions of  and see that the graphs intercept the horizontal axis at -1, 2, and 4, as shown here.





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