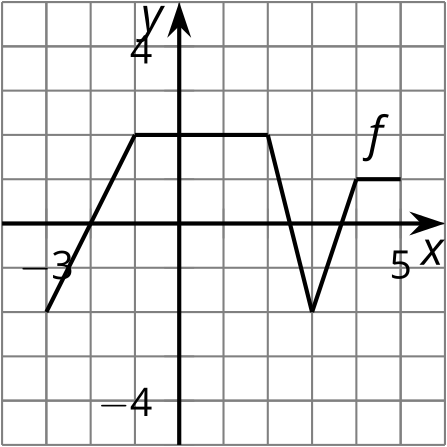
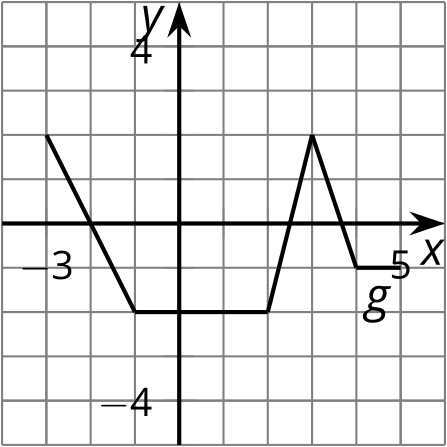
## Lesson 4: Reflecting Functions

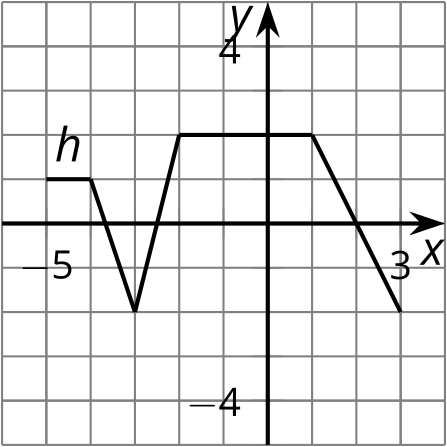
* Let’s reflect some graphs.

### 4.1: Notice and Wonder: Reflections

What do you notice? What do you wonder?

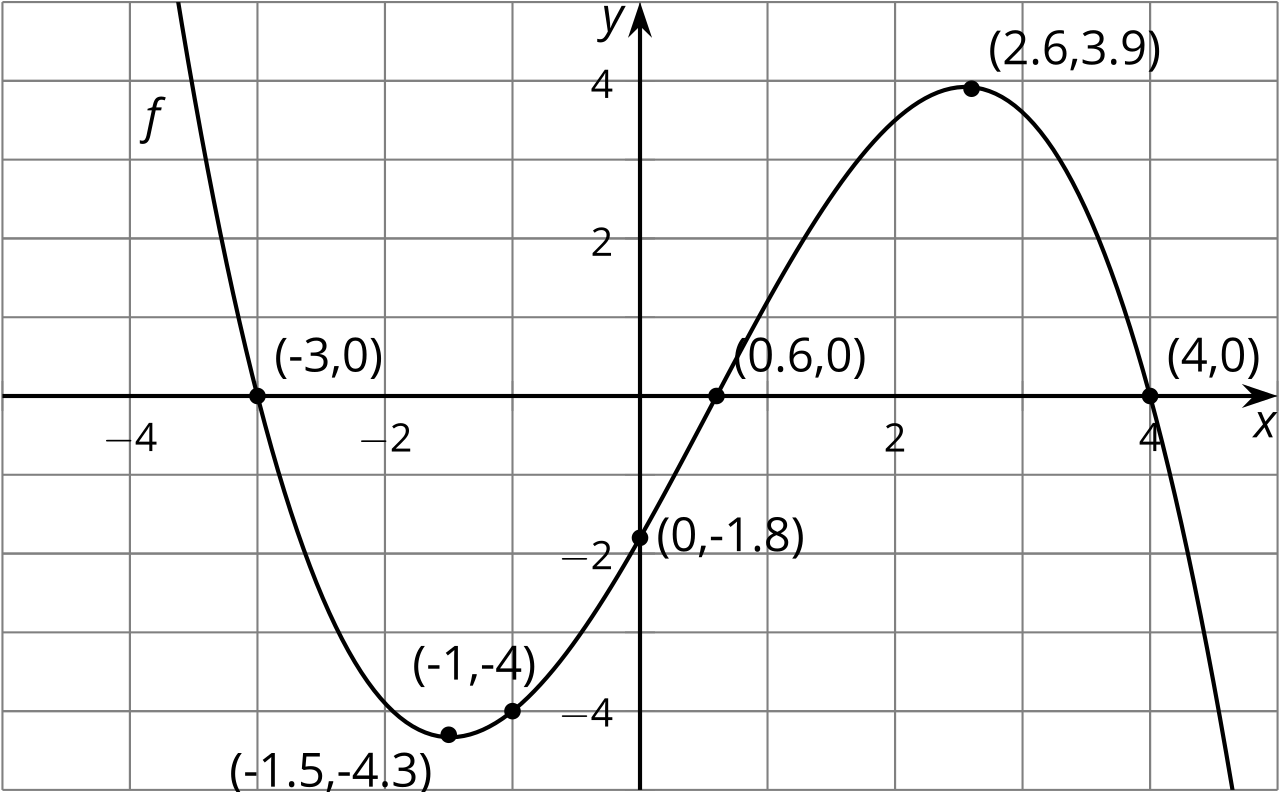






### 4.2: Reflecting Across

Here is the graph of function and a table of values.

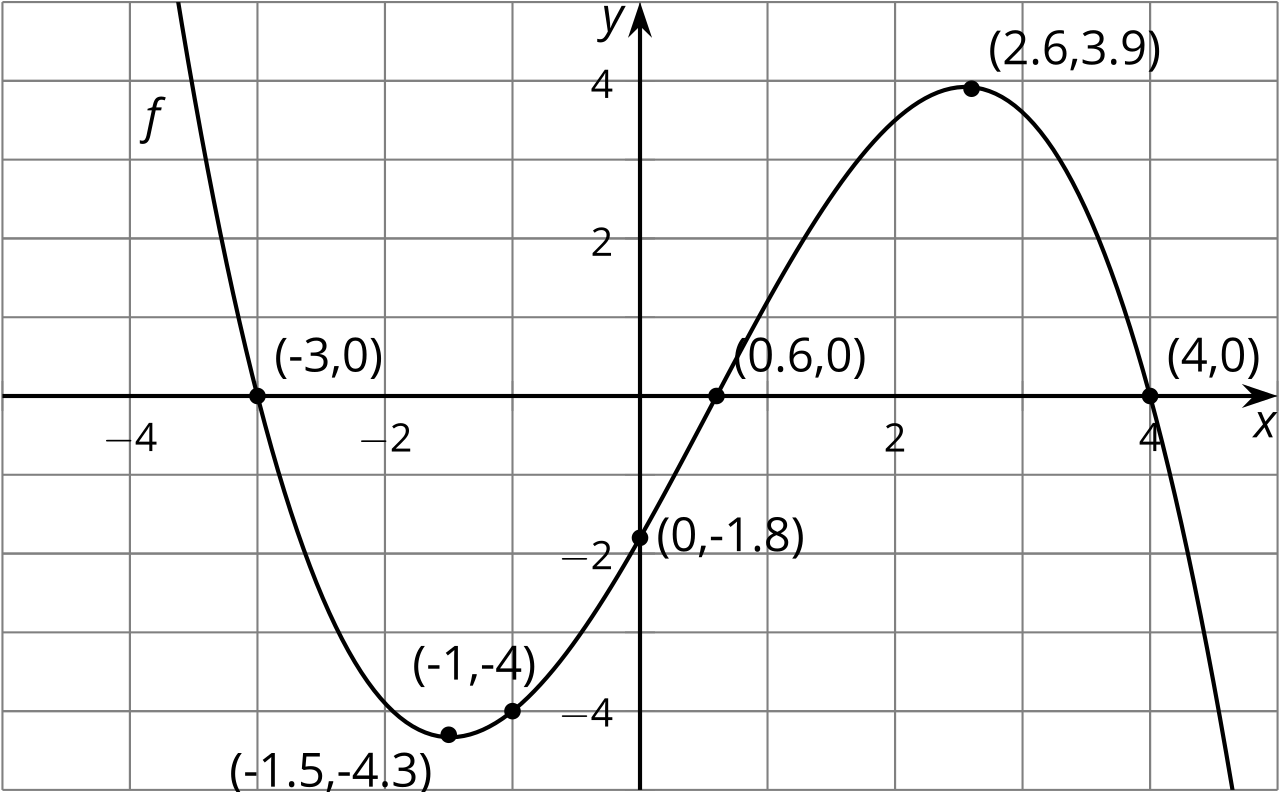


|  |  |  |
| --- | --- | --- |
| -3 | 0 |  |
| -1.5 | -4.3 |  |
| -1 | -4 |  |
| 0 | -1.8 |  |
| 0.6 | 0 |  |
| 2.6 | 3.9 |  |
| 4 | 0 |  |

1. Let be the function defined by . Complete the table.
2. Sketch the graph of on the same axes as the graph of but in a different color.
3. Describe how to transform the graph of into the graph of . Explain how the equation produces this transformation.

### 4.3: Reflecting Across a Different Way

Here is another copy of the graph of from the earlier activity. This time, let be the function defined by .



1. Use the definition of to find . Does your answer agree with your prediction?
2. What does your prediction tell you about ? Does your answer agree with the definition of ?
3. Complete the tables. The values for  will not be the same for the two tables.

|  |  |
| --- | --- |
| * -3 | * 0 |
| * -1.5 | * -4.3 |
| * -1 | * -4 |
| * 0 | * -1.8 |
| * 0.6 | * 0 |
| * 2.6 | * 3.9 |
| * 4 | * 0 |

|  |  |
| --- | --- |
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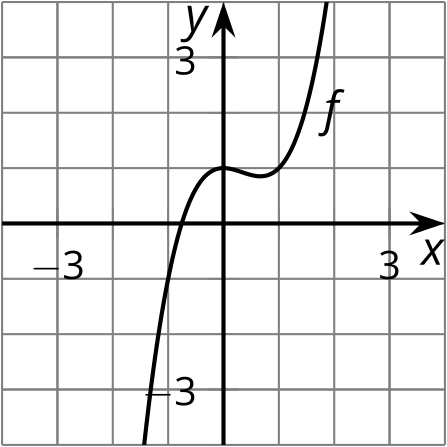
1. Sketch the graph of on the same axes as the graph of but in a different color.
2. Describe what happened to the graph of to transform it into the graph of . Explain how the equation produces this transformation.

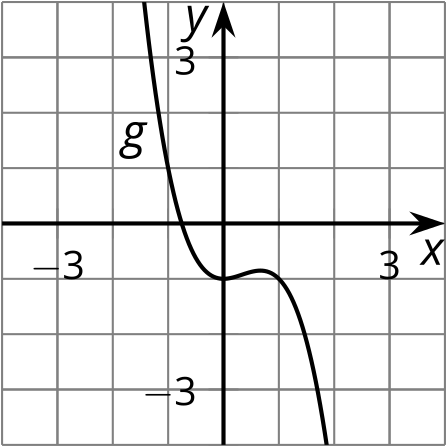
#### Are you ready for more?

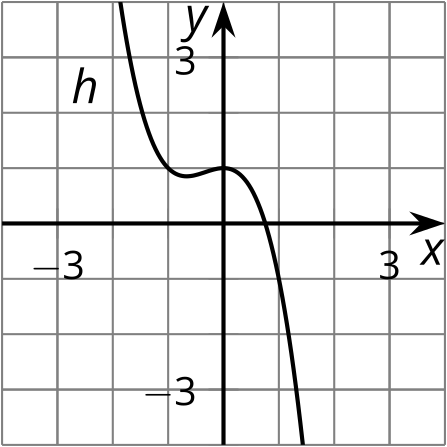
1. Describe how the graph of relates to the graph of defined in the earlier activity.
2. Write an equation relating and .

### Lesson 4 Summary

Here are graphs of the functions , , and , where and . How do these equations match the transformation we see from to and from to ?







Considering first the equation , we know that for the same input , the value of will be the opposite of the value of . For example, since , we know that . We can see this relationship in the graphs where is the reflection of across the -axis.

Looking at , this equation tells us that the two functions have the same output for opposite inputs. For example, 1 and -1 are opposites, so (and is also true!). We can see this relationship in the graphs where is the reflection of across the -axis.



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