



Graphing from the Vertex Form

Let's use vertex form to reason about a graph.

16.1 Math Talk: When x Is -7

Evaluate each expression when x is -7, mentally.

- $x + 4$
- $(x + 4)^2$
- $-(x + 4)^2$
- $-(x + 4)^2 + 5$

16.2 Four Functions

- Complete the table of values for each function.

$$f(x) = (x - 4)^2$$

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|---|
| $f(x)$ | | | | | | | | |

$$g(x) = -(x - 4)^2$$

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------|---|---|---|---|---|---|---|---|
| $g(x)$ | | | | | | | | |



2. Use the completed tables to answer these questions:
- a. What are the coordinates of the vertex of each graph? How can you tell?
 - b. Does the graph of function f open up or down? How can you tell?
 - c. Does the graph of function g open up or down? How can you tell?
3. Suppose function h is defined by $h(x) = (x - 4)^2 + 5$ and function j is defined by $j(x) = -(x - 4)^2 + 5$. Make predictions about the graph of each function using the questions here. If you get stuck, try creating tables of values.
- a. What are the coordinates of the vertex of the graphs of h and j ?
 - b. Which way—up or down—does the graph of each function open? How do you know?



16.3 Four More Functions

Here are some tables of values that represent quadratic functions.

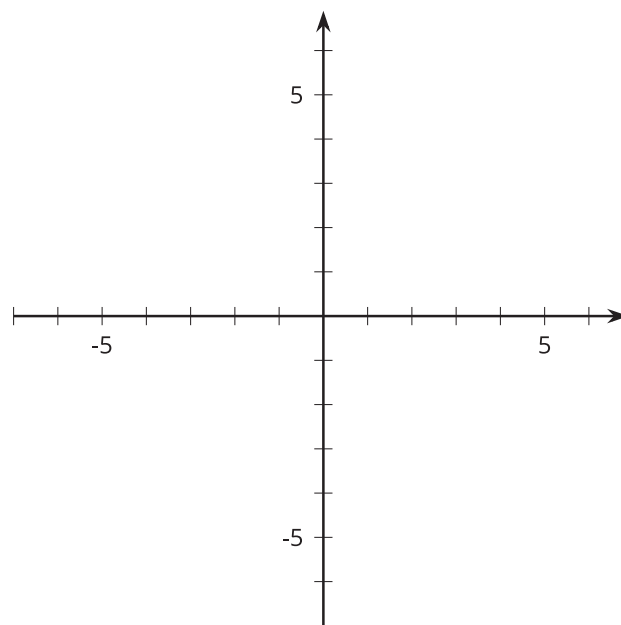
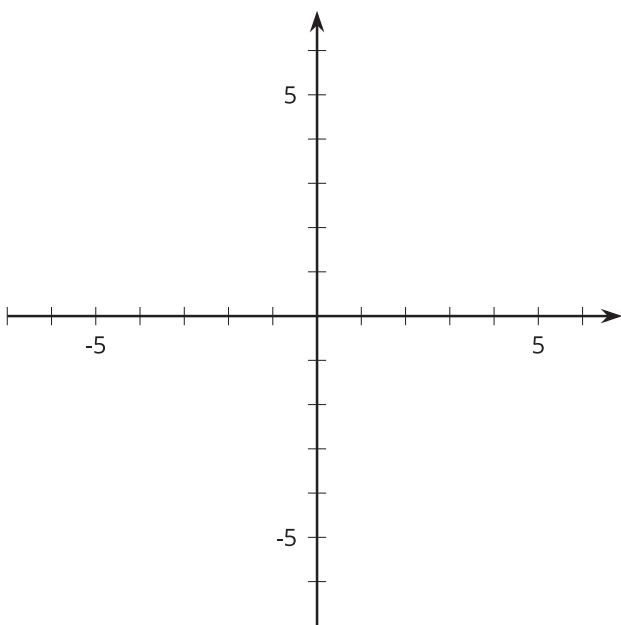
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|--------|-----|----|---|----|-----|-----|-----|
| x | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| $t(x)$ | -11 | -2 | 1 | -2 | -11 | -26 | -47 |

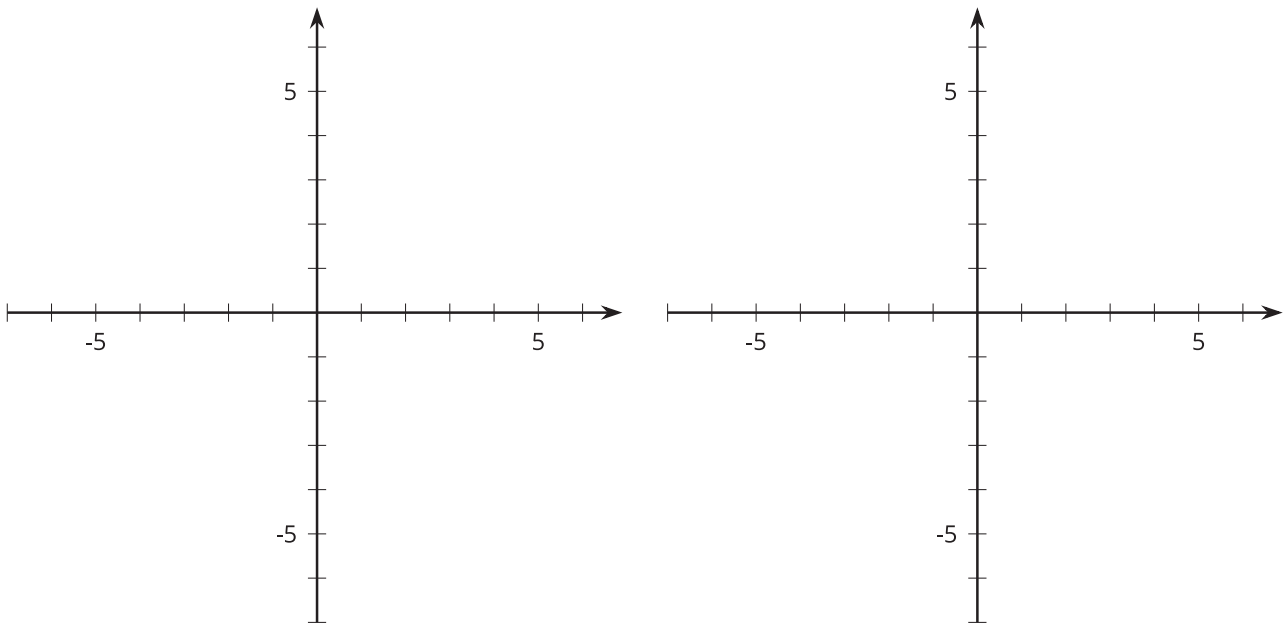
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|--------|----|----|---|---|----|----|----|
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| $u(x)$ | 13 | 4 | 1 | 4 | 13 | 28 | 49 |

| | | | | | | | |
|--------|----|----|----|----|---|---|---|
| x | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| $v(x)$ | 76 | 49 | 28 | 13 | 4 | 1 | 4 |

| | | | | | | | |
|--------|-----|-----|-----|----|---|----|-----|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| $w(x)$ | -47 | -26 | -11 | -2 | 1 | -2 | -11 |

1. Make a rough sketch of a graph of each function. Label the vertex of each graph with its coordinates.





2. Here are some expressions that define quadratic functions. Match each function t , u , v , and w with an expression that defines it.

- a. $3x^2 + 1$
- b. $-3(x - 4)^2 + 1$
- c. $3(x - 4)^2 + 1$
- d. $-3x^2 + 1$