



# 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:
- What are the coordinates of the vertex of each graph? How can you tell?
  - Does the graph of function  $f$  open up or down? How can you tell?
  - 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.
- What are the coordinates of the vertex of the graphs of  $h$  and  $j$ ?
  - 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.

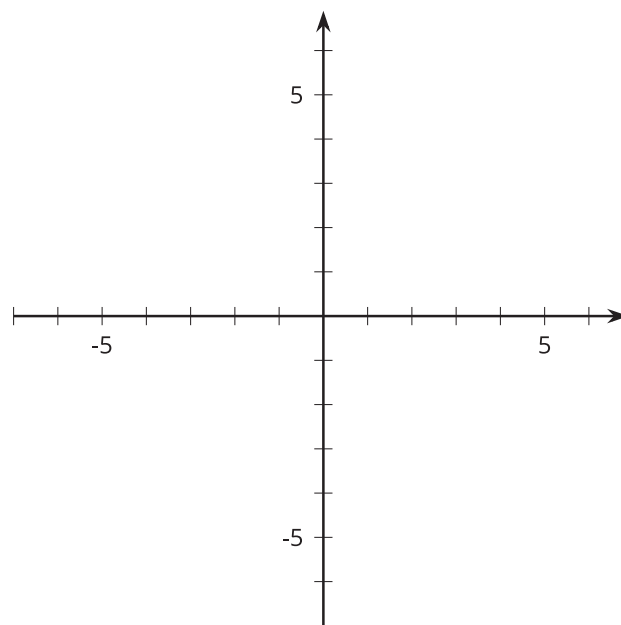
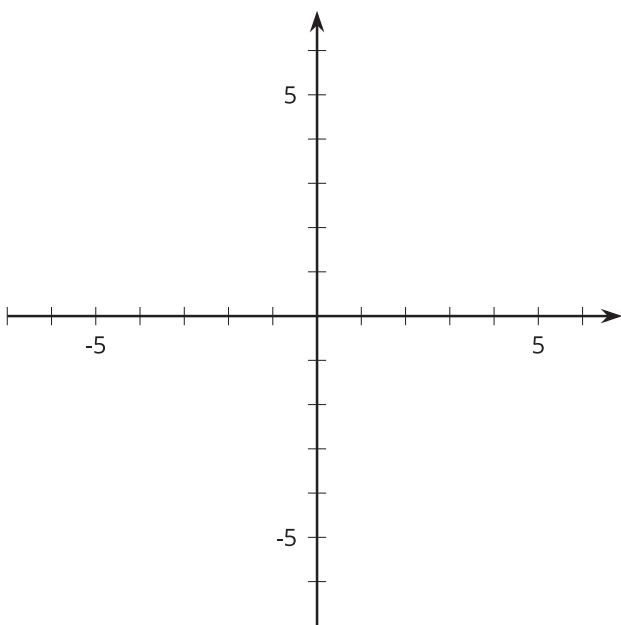
$x$	2	3	4	5	6	7	8
$t(x)$	-11	-2	1	-2	-11	-26	-47

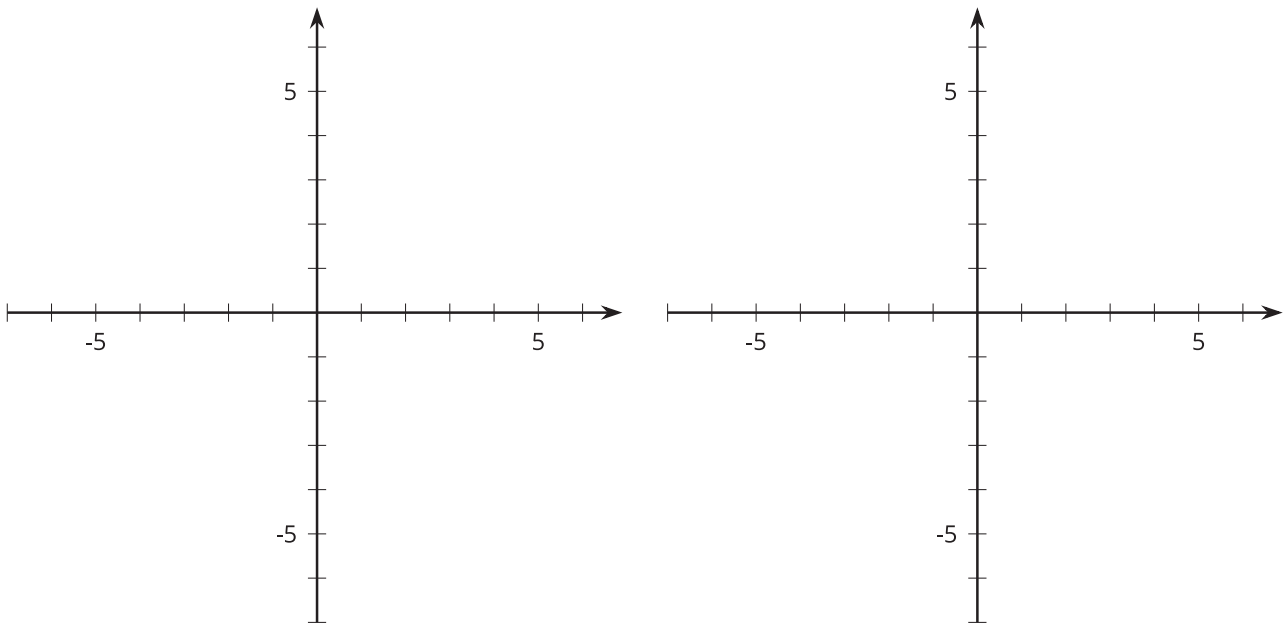
$x$	-2	-1	0	1	2	3	4
$u(x)$	13	4	1	4	13	28	49

$x$	-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.  $-3x^2 + 1$