Lesson 16: 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:

$x + 4$

$(x + 4)^2$

$\text{-}(x + 4)^2$

$\text{-}(x + 4)^2 + 5$

16.2: Four Functions

1. Complete the table of values for each function.
   $f(x) = (x - 4)^2$

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

   $g(x) = \text{-}(x - 4)^2$

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 $j(x) = \text{-}(x - 4)^2 + 5$. Make predictions about the graph of each function using the questions here. If you get stuck, try creating a tables of values.
    a. What are the coordinates of the vertex of the graph 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

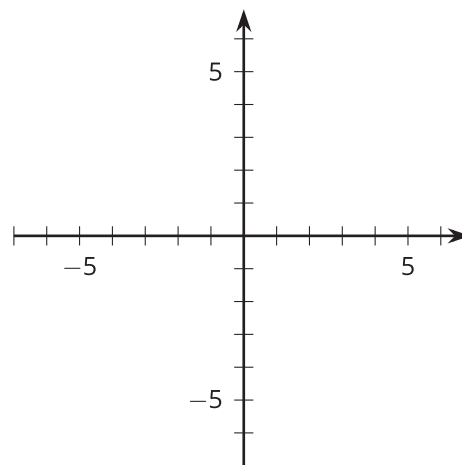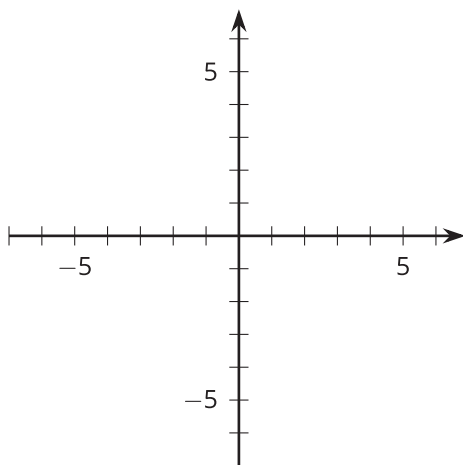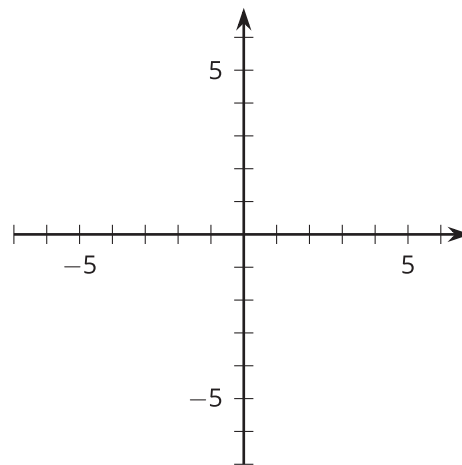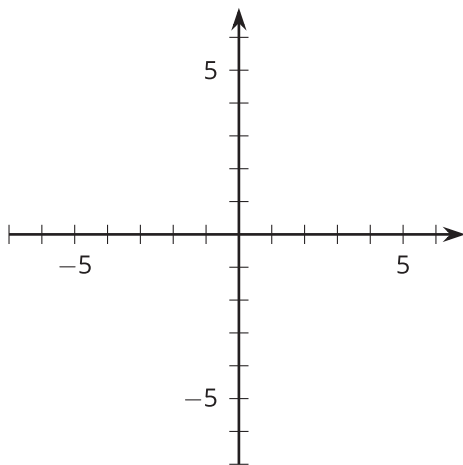Here are some tables of values that represent quadratic functions.

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. $\text{-}3(x - 4)^2 + 1$

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

   d. $\text{-}3x^2 + 1$