

The graph of  $ax^2$ The graph of  
 $a(x - h)^2$ The graph of  
 $a(x - h)^2 + k$ 

## 11-6

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# Overview

11-6

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## Graphing quadratic functions

The graph of  $ax^2$

The graph of

$a(x - h)^2$

The graph of

$a(x - h)^2 + k$

## Graphing quadratic functions

The graph of  $ax^2$

The graph of  $a(x - h)^2$

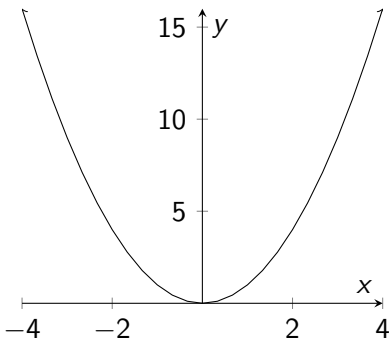
The graph of  $a(x - h)^2 + k$

Graphing quadratic  
functionsThe graph of  $ax^2$ 

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**Figure:** The vertex is the "turning point" at  $(0,0)$ . The *axis of symmetry* goes through this point. Notice that the vertex is the minimum value of the graph.

Graphing quadratic  
functions**The graph of  $ax^2$** 

The graph of

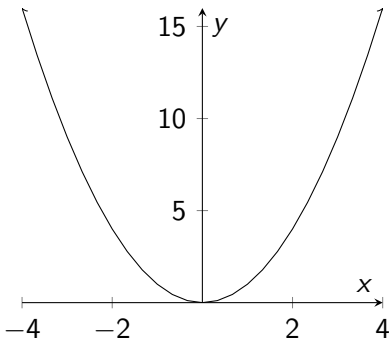
$$a(x - h)^2$$

The graph of

$$a(x - h)^2 + k$$

The graph of  $ax^2$  always has a vertex at  $(0, 0)$ .

## Example

Graph  $\frac{1}{2}x^2$  and  $2x^2$ .Graphing quadratic  
functionsThe graph of  $ax^2$ 

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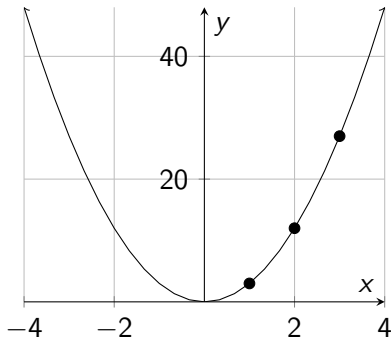
 $a(x - h)^2 + k$ 

## Example

Graph  $-\frac{1}{2}x^2$ .

## Example

Find the equation of the graph.



**Figure:** The points pictured are (1, 3), (2, 12), and (3, 27).

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## Example (You do it)

Find the equation of the graph.

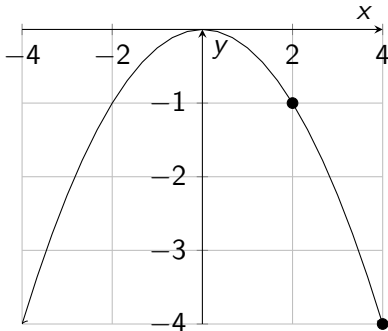


Figure: The points pictured are  $(2, -1)$  and  $(4, -4)$ .

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## Remark

If  $a > 0$ , the parabola points up. If  $a < 0$ , the parabola points down.

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## Example

Graph  $f(x) = -2(x + 4)^2$ .

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## Remark

If  $h > 0$ , the parabola is shifted  $h$  units to the left. If  $h < 0$ , the parabola is shifted  $h$  units to the right.

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## Example

Graph  $f(x) = (x - 3)^2 - 5$ .

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## Remark

If  $k > 0$ , the parabola is shifted  $k$  units up. If  $k < 0$ , the parabola is shifted  $k$  units down.

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## Example

Graph  $f(x) = \frac{1}{2}(x - 3)^2 + 6$ .

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## Remark

The graph of  $a(x - h)^2 + k$  has a vertex at  $(h, k)$ .

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## Example (You try)

Graph  $f(x) = -2(x + 3)^2 + 5$ .



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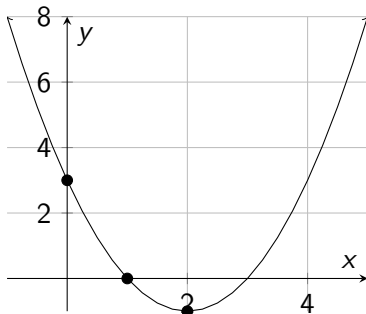
 $a(x - h)^2 + k$ 

## Example (You try)

Find the equation of the parabola with a vertex at  $(2, 3)$  and is stretched vertically by a factor of 5.

### Example (You try)

Find the equation of the parabola.



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**Figure:** The points pictured are  $(2, -1)$ ,  $(1, 0)$ , and  $(0, 3)$ .

## Example (You try)

Find the equation of the parabola.

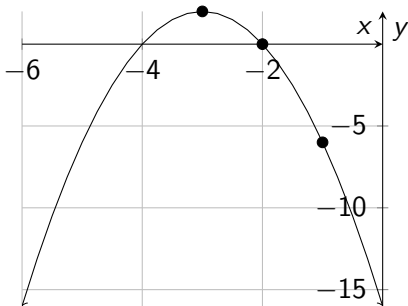


Figure: The points pictured are  $(-3, 2)$ ,  $(-2, 0)$ , and  $(-1, -6)$ .

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