

## Graphing the Parabola

For each of the following parabolas state:

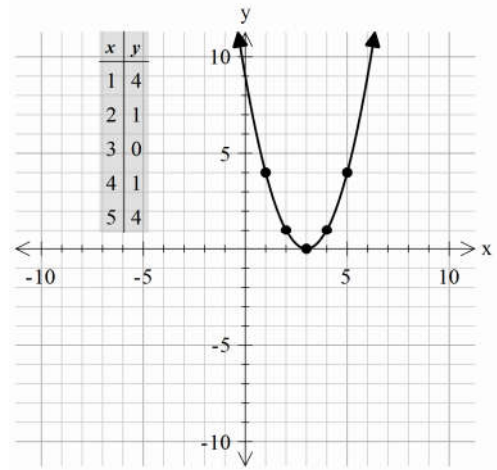
- the value of  $a$ ,  $h$ , and  $k$
- the vertex
- the equation of the axis of symmetry
- the direction of opening
- the range
- the optimal value

and then graph the parabola clearly labelling 5 points.

- $y = (x - 3)^2$
- $y = x^2 - 4$
- $y = (x + 2)^2 - 3$
- $y = (x - 2)^2 + 4$
- $y = 2(x - 1)^2 + 2$
- $y = \frac{1}{2}(x - 3)^2 + 1$
- $y = -(x + 3)^2 + 5$
- $y = -2x^2 + 5$
- $y = \frac{1}{2}(x - 2)^2$
- $y = -\frac{1}{2}(x + 4) + 3$
- $y = 3x^2 - 5$
- $y = -x^2 + 3$
- $y = 2(x + 3)^2$
- $y = -\frac{1}{2}(x - 3)^2$
- $y = -(x - 2)^2 + 4$
- $y = \frac{1}{3}(x - 2)^2 - 9$

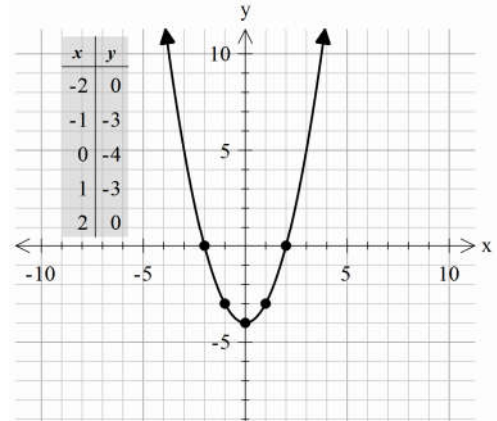
1.  $y = (x - 3)^2$

- a)  $a=1, h=3, k=0$
- b)  $(3, 0)$
- c)  $x = 3$
- d) up
- e)  $\{y \in R \mid y \geq 0\}$
- f) minimum value is 0



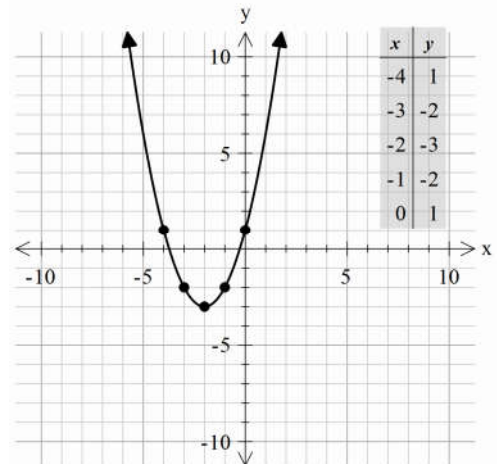
2.  $y = x^2 - 4$

- a)  $a=1, h=0, k=-4$
- b)  $(0, -4)$
- c)  $x = 0$
- d) up
- e)  $\{y \in R \mid y \geq -4\}$
- f) minimum value is -4



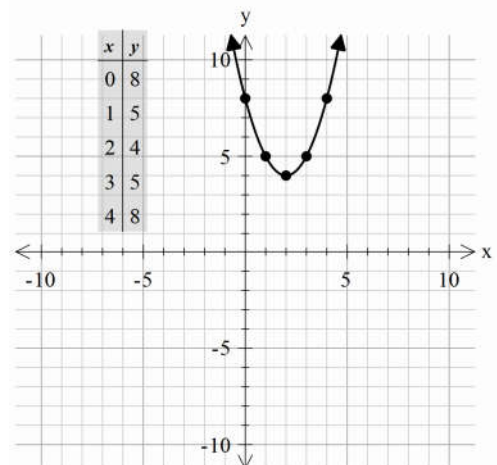
3.  $y = (x + 2)^2 - 3$

- a)  $a = 1, h = -2, k = -3$
- b)  $(-2, -3)$
- c)  $x = -2$
- d) up
- e)  $\{y \in R \mid y \geq -3\}$
- f) the minimum value is -3



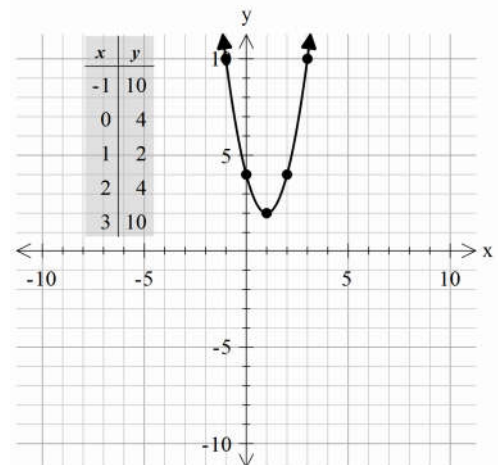
4.  $y = (x - 2)^2 + 4$

- a.  $a = 1, h = 2, k = 4$
- b.  $(2, 4)$
- c.  $x = 2$
- d. up
- e.  $\{y \in R \mid y \geq 4\}$
- f. the minimum value is 4



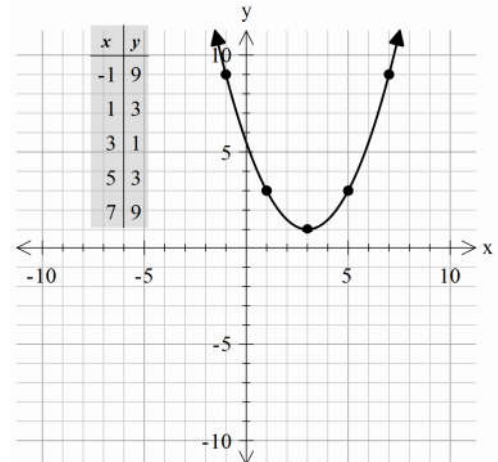
5.  $y = 2(x - 1)^2 + 2$

- a.  $a = 2, h = 1, k = 2$
- b.  $(1, 2)$
- c.  $x = 1$
- d. up
- e.  $\{y \in R \mid y \geq 2\}$
- f. the minimum value is 2



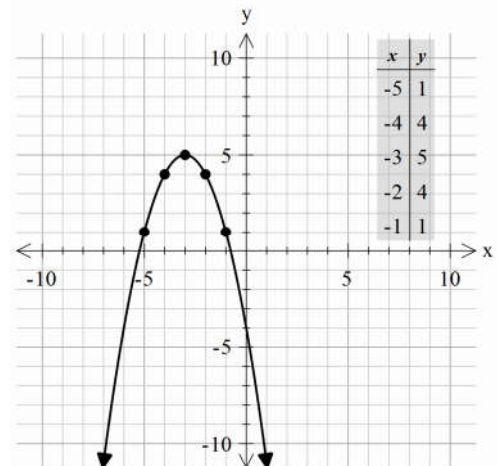
6.  $y = \frac{1}{2}(x - 3)^2 + 1$

- a.  $a = \frac{1}{2}, h = 3, k = 1$
- b.  $(3, 1)$
- c.  $x = 3$
- d. up
- e.  $\{y \in R \mid y \geq 1\}$
- f. the minimum value is 1



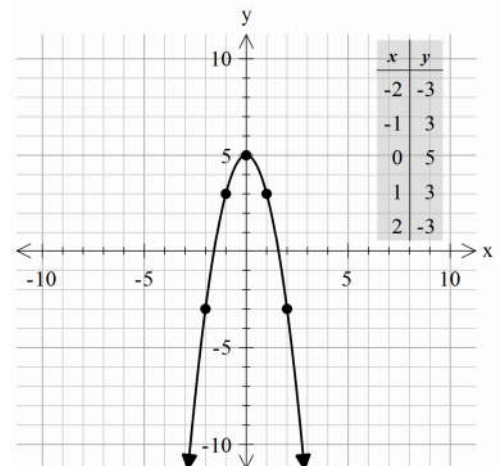
7.  $y = -(x + 3)^2 + 5$

- a.  $a = -1, h = -3, k = 5$
- b.  $(-3, 5)$
- c.  $x = -3$
- d. down
- e.  $\{y \in R \mid y \leq 5\}$
- f. the maximum value is 5

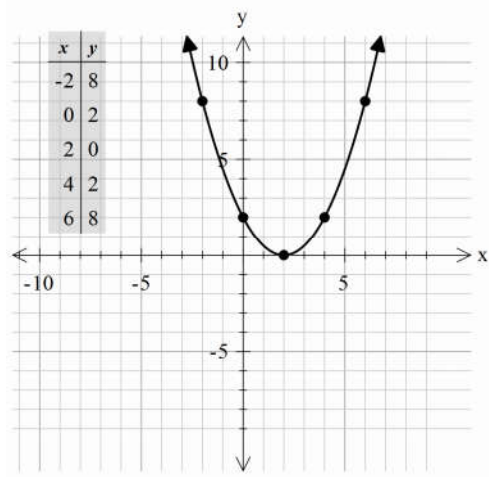


8.  $y = -2x^2 + 5$

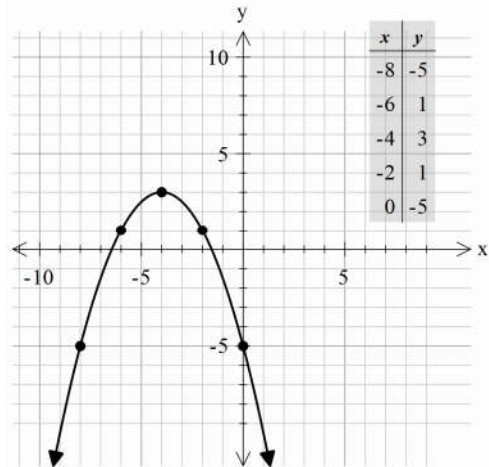
- a.  $a = -2, h = 0, k = 5$
- b.  $(0, 5)$
- c.  $x = 0$
- d. down
- e.  $\{y \in R \mid y \leq 5\}$
- f. the maximum value is 5



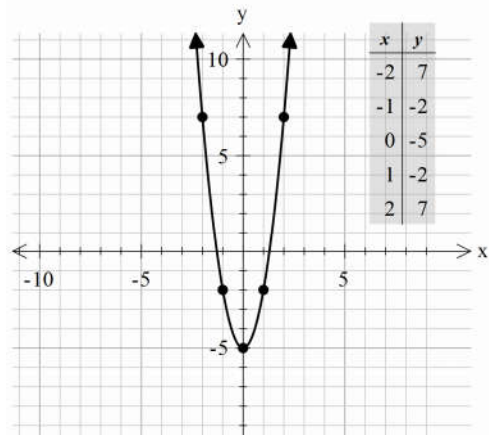
9.  $y = \frac{1}{2}(x - 2)^2$
- $a = \frac{1}{2}, h = 2, k = 0$
  - $(2, 0)$
  - $x = 2$
  - up
  - $\{y \in \mathbb{R} \mid y \geq 0\}$
  - the minimum value is 0



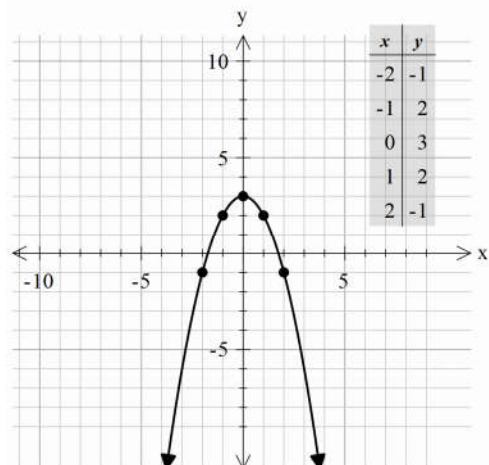
10.  $y = -\frac{1}{2}(x + 4) + 3$
- $a = -\frac{1}{2}, h = -4, k = 3$
  - $(-4, 3)$
  - $x = -4$
  - down
  - $\{y \in \mathbb{R} \mid y \leq 3\}$
  - the maximum value is 3



11.  $y = 3x^2 - 5$
- $a = 3, h = 0, k = -5$
  - $(0, -5)$
  - $x = 0$
  - up
  - $\{y \in \mathbb{R} \mid y \geq -5\}$
  - the minimum value is -5

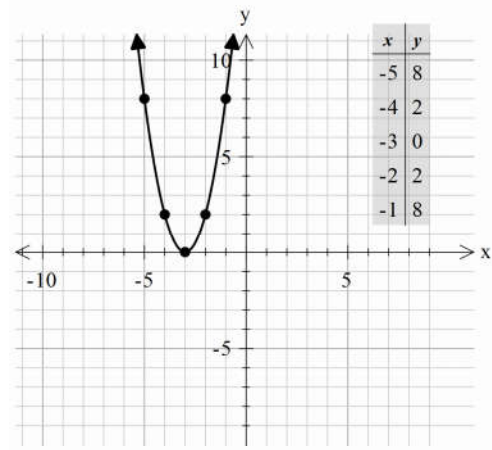


12.  $y = -x^2 + 3$
- $a = -1, h = 0, k = 3$
  - $(0, 3)$
  - $x = 0$
  - down
  - $\{y \in \mathbb{R} \mid y \leq 3\}$
  - the maximum value is 3



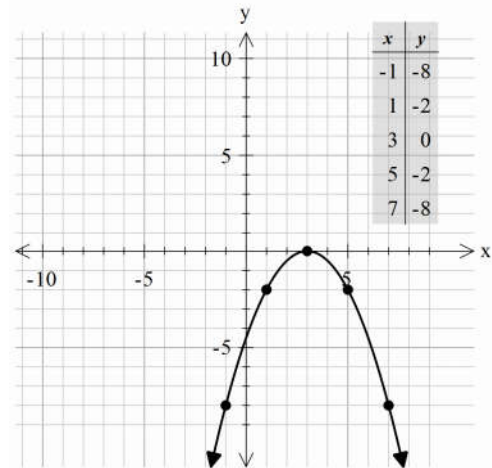
13.  $y = 2(x + 3)^2$

- a.  $a = 2, h = -3, k = 0$
- b.  $(-3, 0)$
- c.  $x = -3$
- d. up
- e.  $\{y \in R \mid y \geq 0\}$
- f. the minimum value is 0



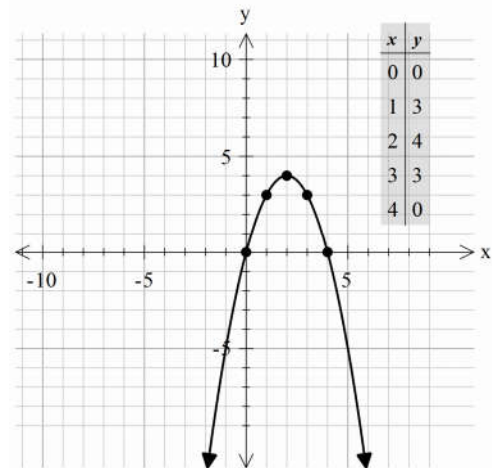
14.  $y = -\frac{1}{2}(x - 3)^2$

- a.  $a = -\frac{1}{2}, h = 3, k = 0$
- b.  $(3, 0)$
- c.  $x = 3$
- d. down
- e.  $\{y \in R \mid y \leq 0\}$
- f. the maximum value is 0



15.  $y = -(x - 2)^2 + 4$

- a.  $a = -1, h = 2, k = 4$
- b.  $(2, 4)$
- c.  $x = 2$
- d. down
- e.  $\{y \in R \mid y \leq 4\}$
- f. the maximum value is 4



16.  $y = \frac{1}{3}(x - 2)^2 - 9$

- a.  $a = \frac{1}{3}, h = 2, k = -9$
- b.  $(2, -9)$
- c.  $x = 2$
- d. up
- e.  $\{y \in R \mid y \geq -9\}$
- f. minimum value is -9

