5.1 Characteristics of Parabolas Solutions

Determine the vertex, the axis of symmetry, and the graph of each equation

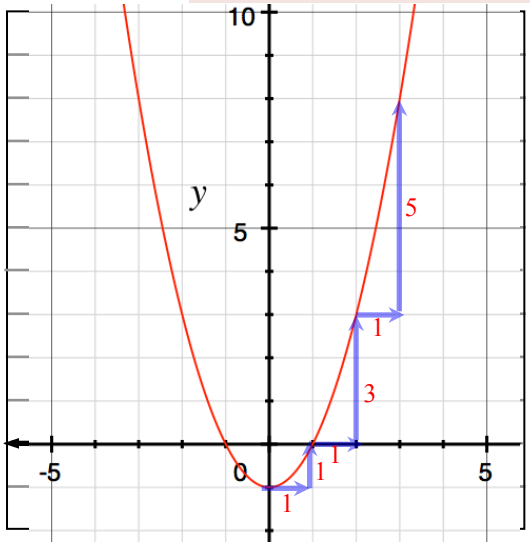
1. $y = x^2 - 1 = (x - 0)^2 - 1$

vertex: $(0, -1)$

axis: $x = 0$

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

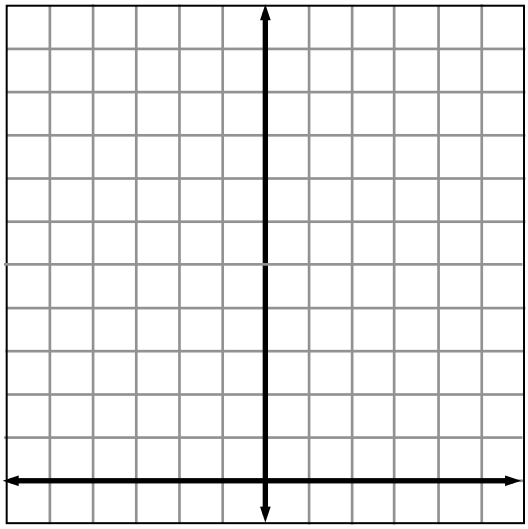
Vertex: (h, k) Axis: $x = h$



2. $y = x^2 + 2$

vertex:

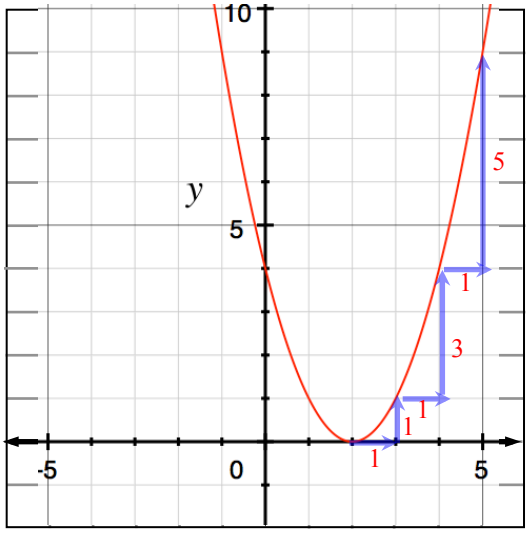
axis:



3. $y = (x - 2)^2 = (x - 2)^2 + 0$

vertex: $(2, 0)$

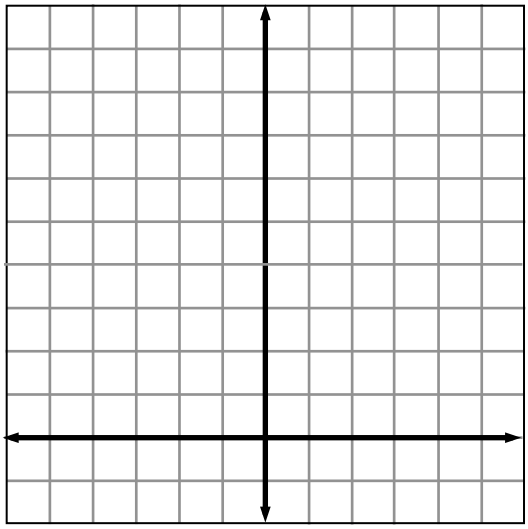
axis: $x = 2$

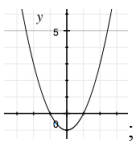
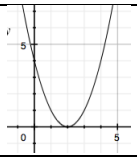


4. $y = (x - 1)^2$

vertex:

axis:



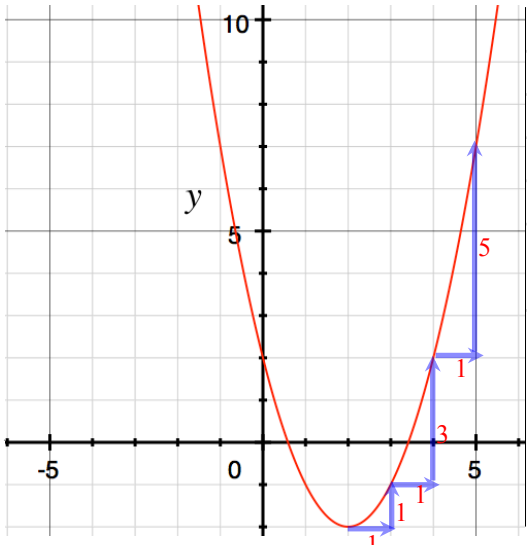
Answers: **1.** $(0, -1)$, $x = 0$,  ; **3.** $(2, 0)$, $x = 2$, 

Determine the vertex, the axis of symmetry, and the graph of each equation

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

vertex: $(2, -2)$

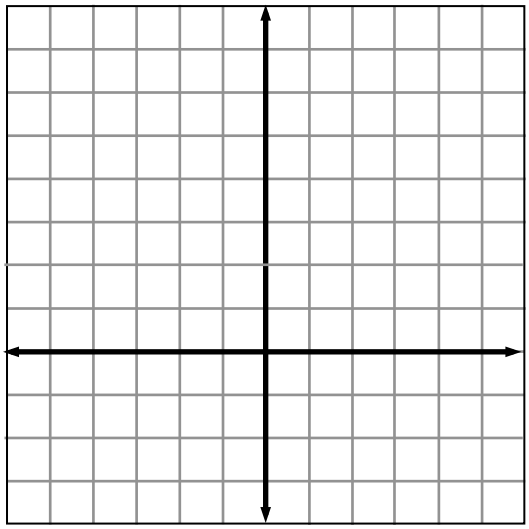
axis: $x = 2$



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

vertex:

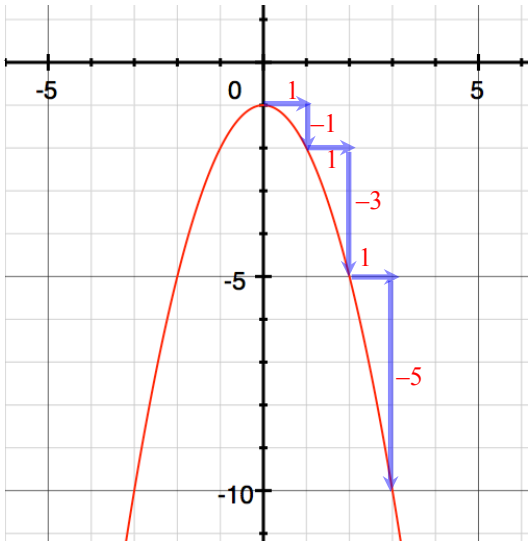
axis:



7. $y = -x^2 - 1 = -(x - 0)^2 - 1$

vertex: $(0, -1)$

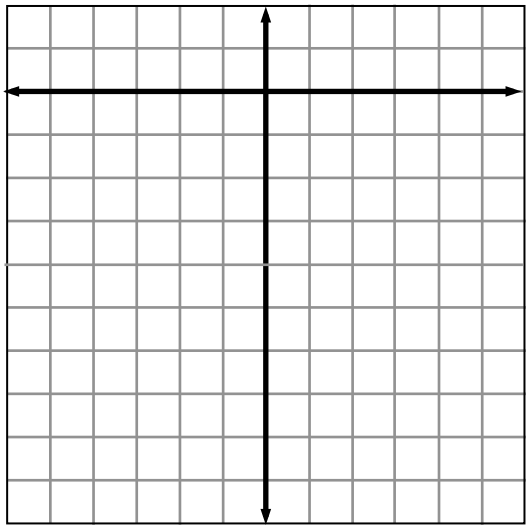
axis: $x = 0$

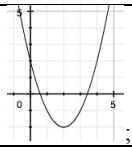
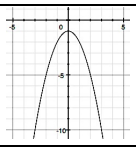


8. $y = -x^2 + 2$

vertex:

axis:



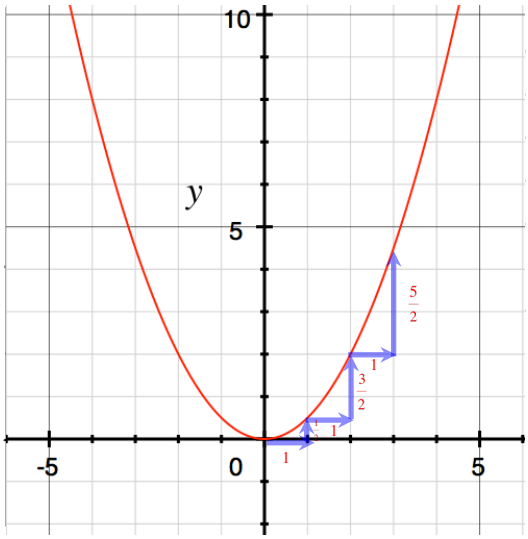
Answers: **5.** $(2, -2)$, $x = 2$,  ; **7.** $(0, -1)$, $x = 0$, 

Solve and graph the solution set.

9. $y = \frac{1}{2}x^2 = = \frac{1}{2}(x - 0)^2 + 0$

vertex: (0, 0)

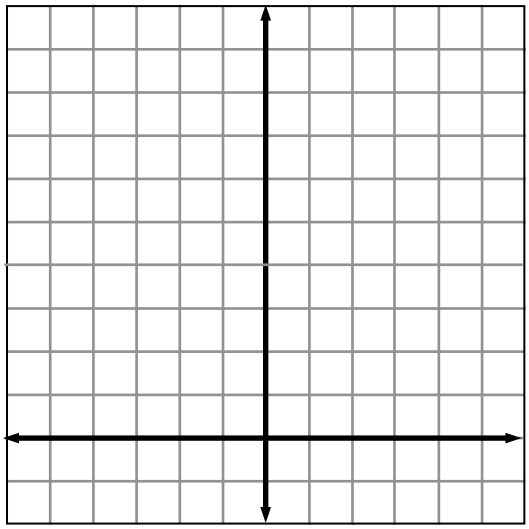
axis: $x = 0$



10. $y = \frac{1}{4}x^2$

vertex:

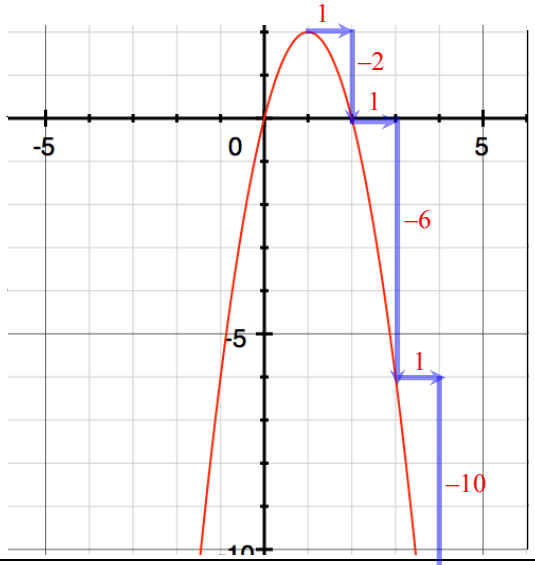
axis:



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

vertex: (1, 2)

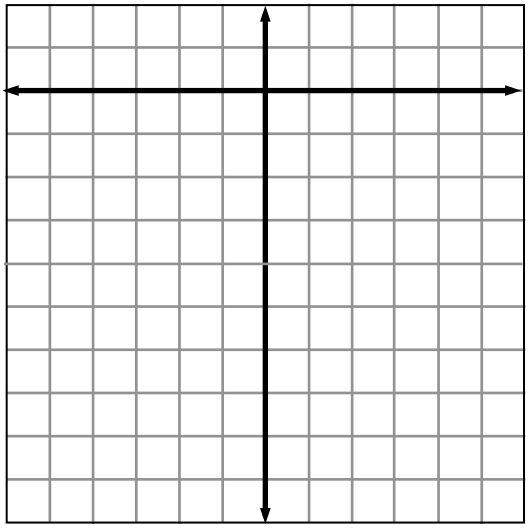
axis: $x = 1$

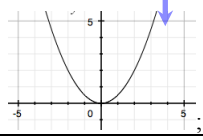
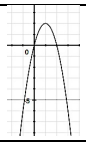


12. $y = -2(x + 1)^2 + 1$

vertex:

axis:



Answers: **9**. (0, 0), $x = 0$,  ; **11**. (1, 2), $x = 1$, 

Write each equation in the form $y = a(x - h)^2 + k$ by completing the square. Then graph the parabola.

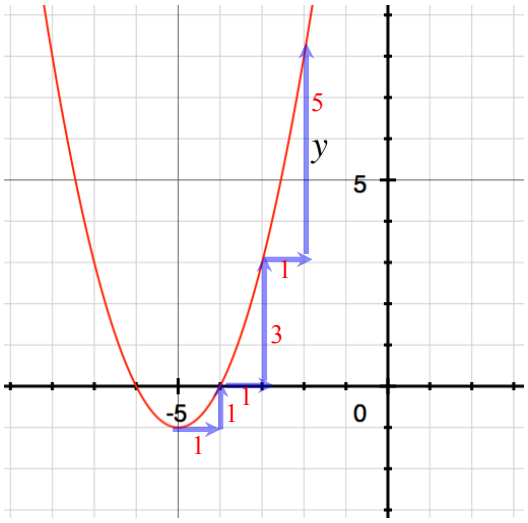
13. $y = x^2 + 10x + 24$

$y = x^2 + 10x + 25 - 25 + 24$

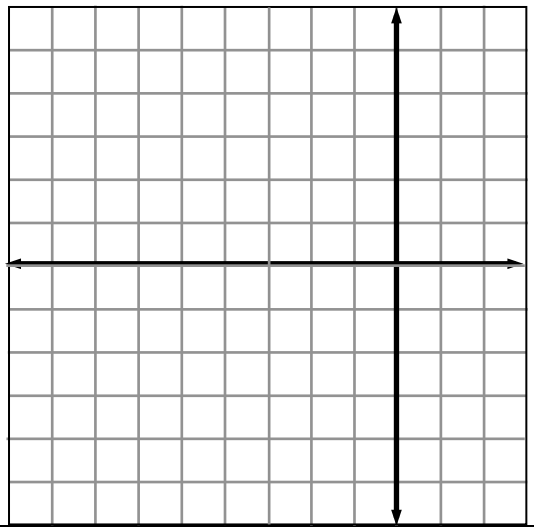
$y = (x + 5)^2 - 25 + 24$

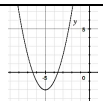
$y = (x + 5)^2 - 1$

Vertex: $(-5, -1)$



14. $y = x^2 + 8x + 10$





Answer: **13.** Vertex: $(-5, -1)$

Change the equation to the form $y = a(x - h)^2 + k$ by completing the square. Then graph the parabola.

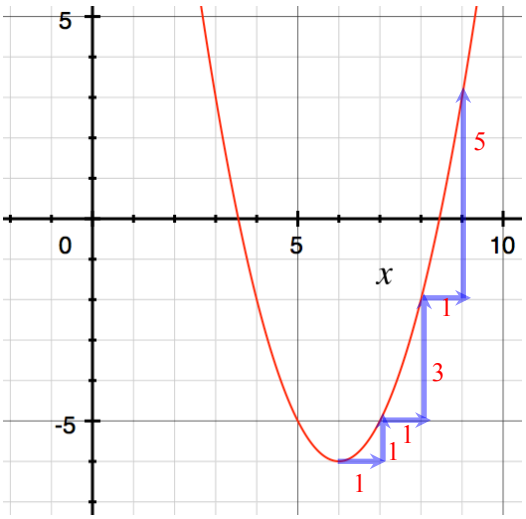
15. $y = x^2 - 12x + 30$

$y = x^2 - 12x + 36 - 36 + 30$

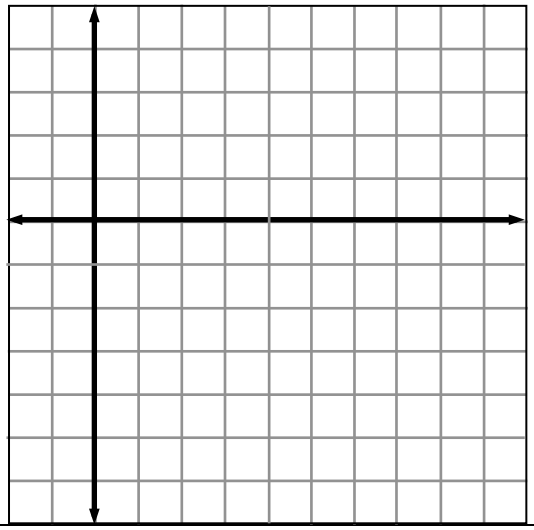
$y = (x - 6)^2 - 36 + 30$

$y = (x - 6)^2 - 6$

Vertex: $(6, -6)$



16. $y = x^2 - 4x - 1$



Answer: **15.** Vertex: $(6, -6)$,