

1. Find the vertex form of the quadratic function $f(x) = x^2 - 4x + 5$

$$f(x) - 5 + 4 = x^2 - 4x + 4$$

$$f(x) - 1 = (x - 2)^2$$

$$f(x) = (x - 2)^2 + 1$$

2. Find the vertex form of the quadratic function $f(x) = x^2 - 6x + 4$

$$f(x) - 4 + 9 = x^2 - 6x + 9$$

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

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

Use $f(x) = (x - 2)^2 - 2$ to answer questions 3-9:

3. Find the coordinates of the vertex.
Is the vertex a maximum or minimum?

$$(2, -2)$$

$$a > 0 \rightarrow \text{min}$$

5. Find the equation of the axis of symmetry.

$$x = 2$$

6. Find the domain and range.

$$D: (-\infty, \infty) \quad R: [-2, \infty)$$

7. Find the intervals over which f is increasing or decreasing. \rightarrow **x-values!**

$$\text{Incr: } (2, \infty) \quad \text{Decr: } (-\infty, 2)$$

8. Find the x-intercept(s). \rightarrow **y=0**

$$0 = (x - 2)^2 - 2$$

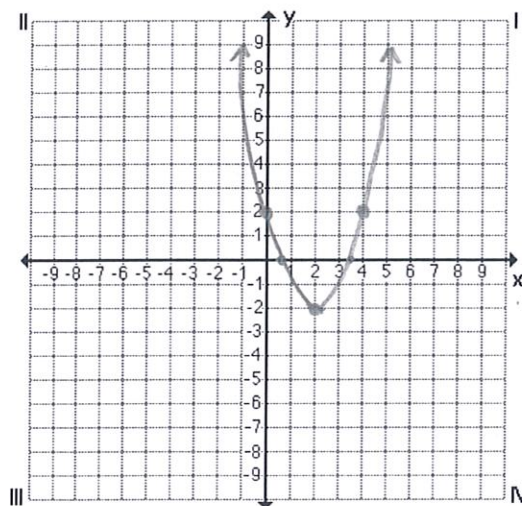
$$\sqrt{2} = \sqrt{(x - 2)^2}$$

$$\pm\sqrt{2} = x - 2$$

$$2 \pm \sqrt{2} = x$$

$$0.59, 3.41 \approx x$$

4. Sketch the graph.



9. Find the y-intercept. \rightarrow **x=0**

$$y = (0 - 2)^2 - 2$$

$$y = 4 - 2$$

$$y = 2$$

Use $f(x) = -x^2 - 2x$ to answer questions 10-16:

10. Find the coordinates of the vertex.
Is the vertex a maximum or minimum?

$$x = \frac{-b}{2a} = \frac{2}{2(-1)} = -1 \quad v: (-1, 1)$$

$$f(-1) = -(-1)^2 - 2(-1) \quad a < 0 \rightarrow \text{min} \\ = -1 + 2 = 1$$

12. Find the equation of the axis of symmetry.

$$x = -1$$

13. Find the domain and range.

$$D: (-\infty, \infty) \quad R: (-\infty, 1]$$

14. Find the intervals over which f is increasing or decreasing.

$$\text{Incr: } (-\infty, -1) \quad \text{Decr: } (-1, \infty)$$

15. Find the x -intercept(s).

$$0 = -x^2 - 2x$$

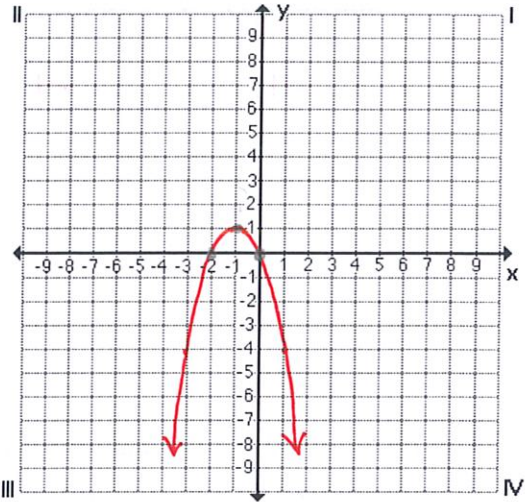
$$0 = -x(x+2)$$

$$x = 0 \quad x = -2$$

16. Find the y -intercept.

$$y = 0^2 - 2(0)$$

$$y = 0$$



17. A sandbag is dropped off a high-altitude balloon at an altitude of 10,000ft. When will the sandbag hit the ground?

$$h(t) = h_0 - 16t^2$$

$$0 = 10,000 - 16t^2$$

$$-10,000 = -16t^2$$

$$\sqrt{\frac{-10,000}{-16}} = \sqrt{t^2}$$

$$25 \text{ sec} = t$$

18. A cliff diver hits the water 2.5 seconds after diving off the cliff. How high is the cliff?

$$h(t) = h_0 - 16t^2$$

$$0 = h_0 - 16(2.5)^2$$

$$0 = h_0 - 100$$

$$100 \text{ ft} = h_0$$