

Lesson 31: Quadratic Functions and Their Graphs

Use the equation of the parabola in standard form $y = a(x - h)^2 + k$ to determine the coordinates of the vertex and the equation of the axis of symmetry.

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

- A) vertex = $(-4, -1)$; Axis of Symmetry: $x = 4$
- B) vertex = $(-4, 1)$; Axis of Symmetry: $x = -4$
- C) vertex = $(4, 1)$; Axis of Symmetry: $x = 4$
- D) vertex = $(4, -1)$; Axis of Symmetry: $x = -4$

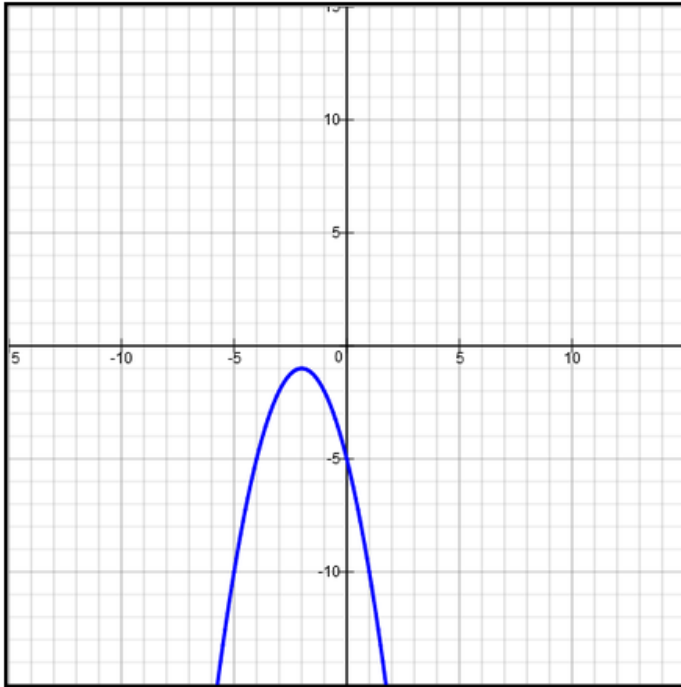
2) $y = (x + 2)^2 - 4$

- A) vertex = $(2, 4)$; Axis of Symmetry: $x = -2$
- B) vertex = $(-2, -4)$; Axis of Symmetry: $x = -2$
- C) vertex = $(-2, 4)$; Axis of Symmetry: $x = 2$
- D) vertex = $(2, -4)$; Axis of Symmetry: $x = 2$

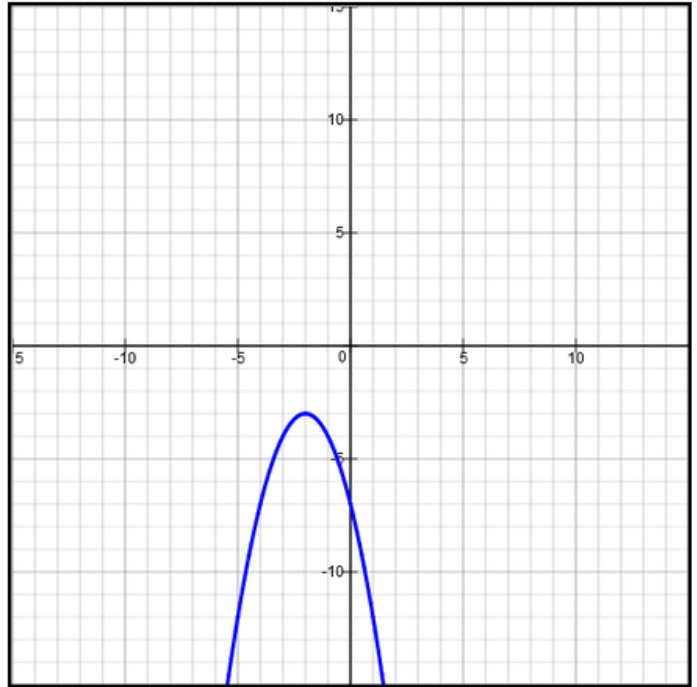
Graph the parabola.

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

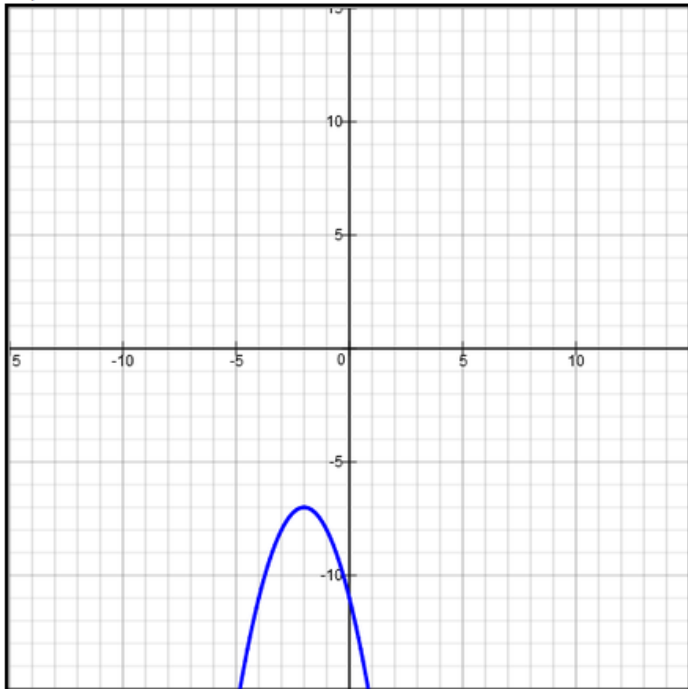
A)



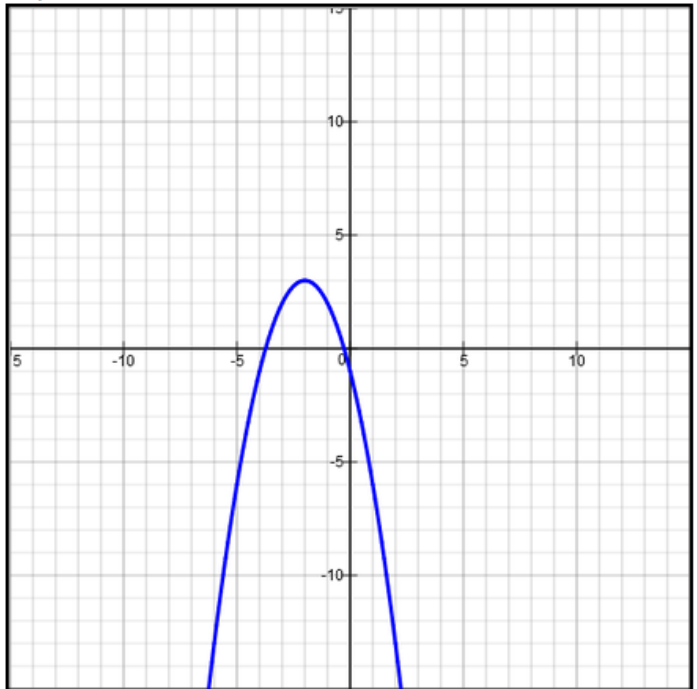
B)



C)



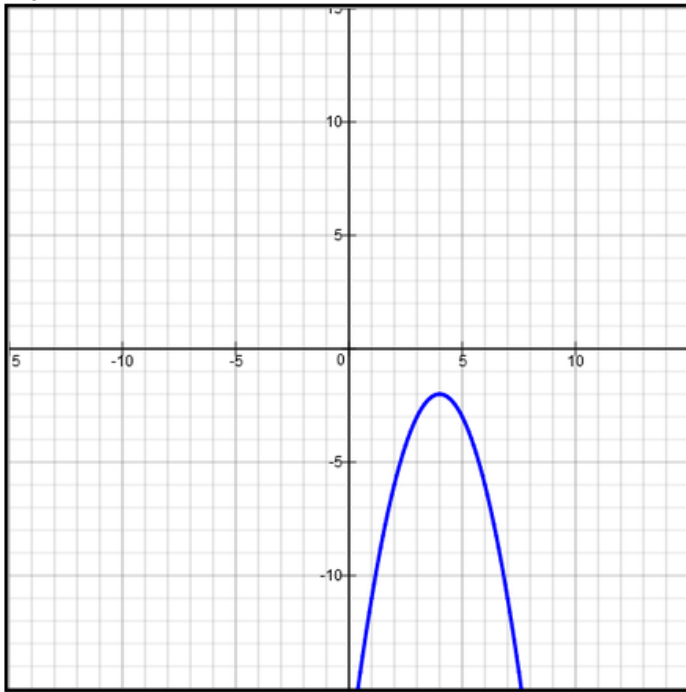
D)



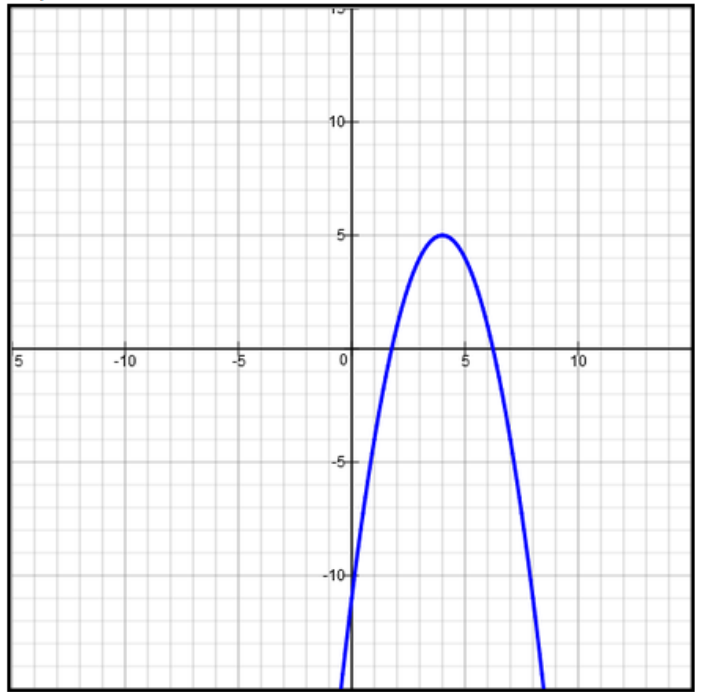
Graph the parabola.

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

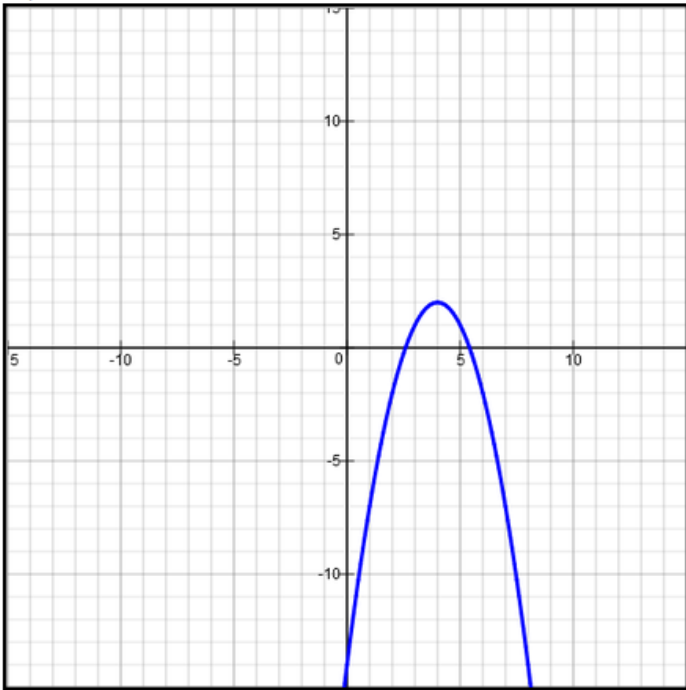
A)



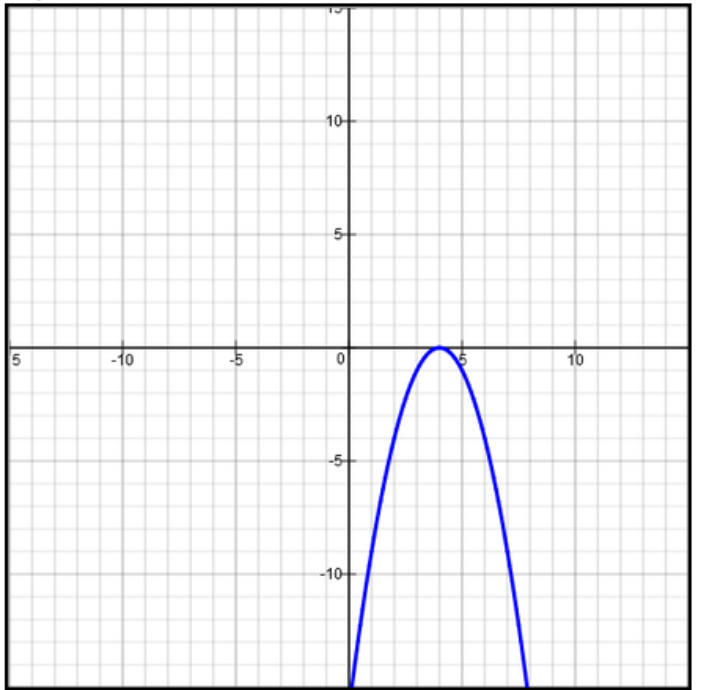
B)



C)



D)



Identify the vertex, axis of symmetry, and intercepts for the graph of the function.

5) $y = x^2 + 4x + 3$

- A) vertex = $(2, 1)$; Axis of Symmetry: $x = 2$; x -intercepts: -1 and -3;
- B) vertex = $(2, -1)$; Axis of Symmetry: $x = 2$; x -intercepts: -1 and 3;
- C) vertex = $(-2, -1)$; Axis of Symmetry: $x = -2$; x -intercepts: -1 and -3;
- D) vertex = $(-2, -1)$; Axis of Symmetry: $x = -2$; x -intercepts: 1 and 3;

Identify the vertex, axis of symmetry, and intercepts for the graph of the function.

6) $y = x^2 + 4x - 5$

- A) vertex = $(2, 9)$; Axis of Symmetry: $x = 2$; x -intercepts: -1 and -5;
- B) vertex = $(-2, -9)$; Axis of Symmetry: $x = -2$; x -intercepts: 1 and -5;
- C) vertex = $(2, -9)$; Axis of Symmetry: $x = 2$; x -intercepts: 1 and 5;
- D) vertex = $(-2, 9)$; Axis of Symmetry: $x = -2$; x -intercepts: 1 and -5;

Identify the vertex, axis of symmetry, and intercepts for the graph of the function.

7) $y = -x^2 + 3x + 3$

A) vertex = $\left(-\frac{3}{2}, -\frac{21}{4}\right)$; Axis of Symmetry: $x = -\frac{3}{2}$; x-intercepts: $\frac{3+\sqrt{21}}{2}$ and $\frac{3-\sqrt{21}}{2}$;

B) vertex = $\left(\frac{3}{2}, \frac{21}{4}\right)$; Axis of Symmetry: $x = \frac{3}{2}$; x-intercepts: $\frac{3+\sqrt{21}}{2}$ and $\frac{3-\sqrt{21}}{2}$;

C) vertex = $\left(-\frac{3}{2}, \frac{21}{4}\right)$; Axis of Symmetry: $x = -\frac{3}{2}$; x-intercepts: $\frac{1+\sqrt{21}}{2}$ and $\frac{1-\sqrt{21}}{2}$;

D) vertex = $\left(\frac{3}{2}, -\frac{21}{4}\right)$; Axis of Symmetry: $x = \frac{3}{2}$; x-intercepts: $\frac{1+\sqrt{21}}{2}$ and $\frac{1-\sqrt{21}}{2}$;

Identify the vertex, axis of symmetry, and intercepts for the graph of the function.

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

A) vertex = $\left(\frac{5}{2}, \frac{29}{4}\right)$; Axis of Symmetry: $x = \frac{5}{2}$; x-intercepts: $\frac{5+\sqrt{29}}{2}$ and $\frac{5-\sqrt{29}}{2}$;

B) vertex = $\left(-\frac{5}{2}, -\frac{29}{4}\right)$; Axis of Symmetry: $x = -\frac{5}{2}$; x-intercepts: $\frac{1+\sqrt{29}}{2}$ and $\frac{1-\sqrt{29}}{2}$;

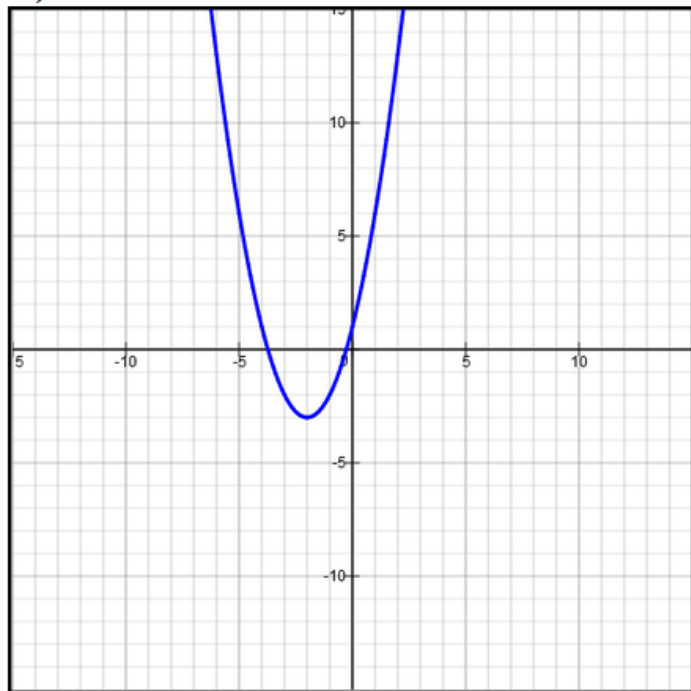
C) vertex = $\left(-\frac{5}{2}, \frac{29}{4}\right)$; Axis of Symmetry: $x = -\frac{5}{2}$; x-intercepts: $\frac{5+\sqrt{29}}{2}$ and $\frac{5-\sqrt{29}}{2}$;

D) vertex = $\left(\frac{5}{2}, -\frac{29}{4}\right)$; Axis of Symmetry: $x = \frac{5}{2}$; x-intercepts: $\frac{1+\sqrt{29}}{2}$ and $\frac{1-\sqrt{29}}{2}$;

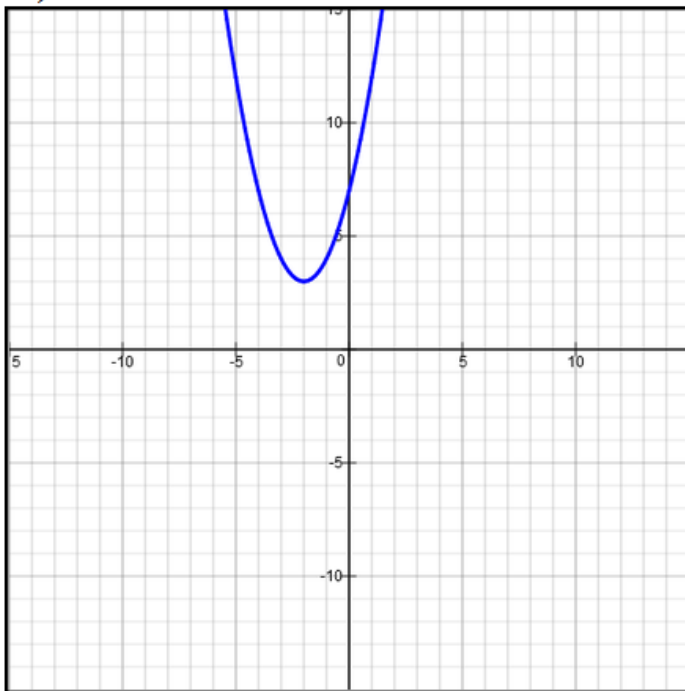
Graph the function.

9) $f(x) = x^2 + 4x + 3$

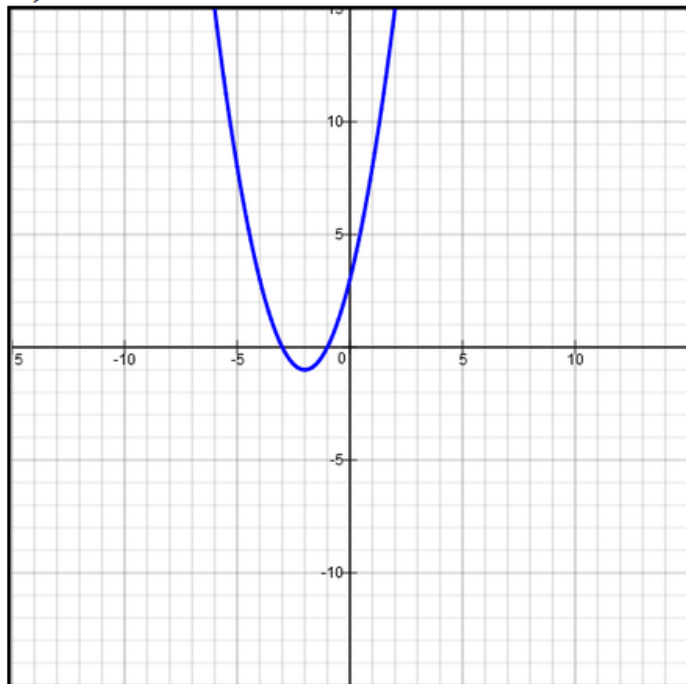
A)



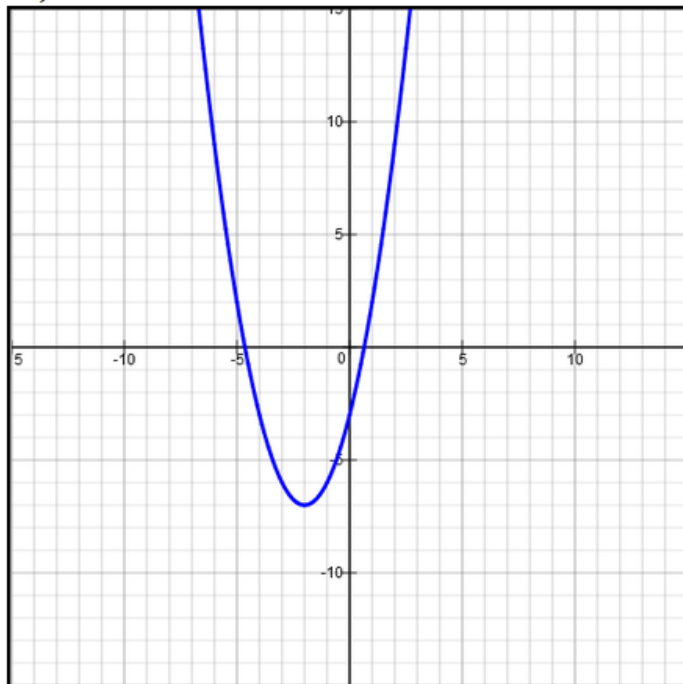
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C)



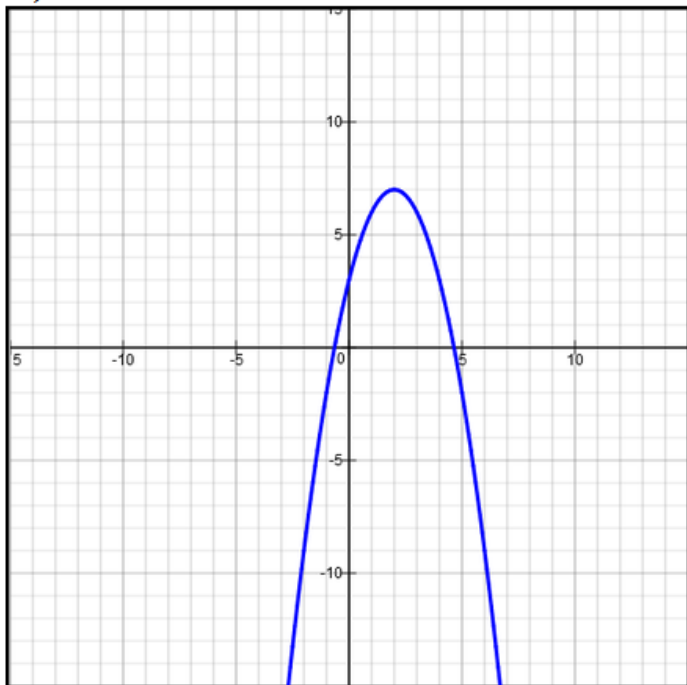
D)



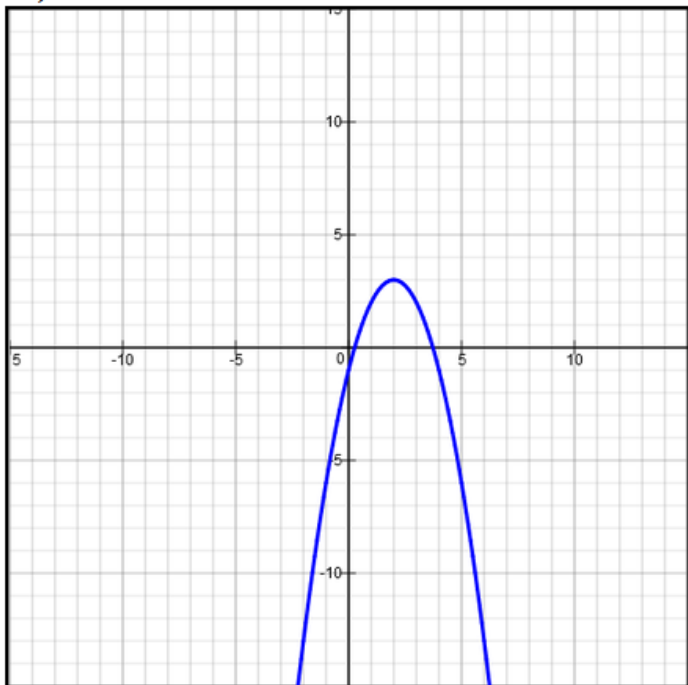
Graph the function.

$$10) f(x) = -x^2 + 4x - 3$$

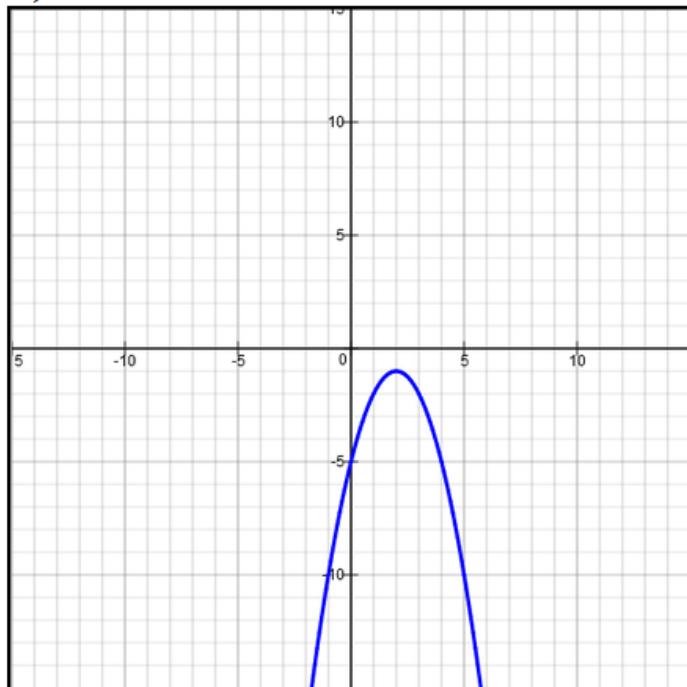
A)



B)



C)



D)

