

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. <math>(x+6)(x+1)</math></p> <p style="text-align: center;"><math>x \qquad 1</math></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"><math>x</math></div> <div style="border: 1px solid black; width: 100px; height: 100px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; top: 0; right: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; right: 0; width: 50%; height: 50%;"></div> </div> <div style="margin-left: 5px;"><math>6</math></div> </div> | <p>2. <math>(x+9)(x+5)</math></p> <p style="text-align: center;"><math>x \qquad 5</math></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"><math>x</math></div> <div style="border: 1px solid black; width: 100px; height: 100px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; top: 0; right: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; right: 0; width: 50%; height: 50%;"></div> </div> <div style="margin-left: 5px;"><math>9</math></div> </div> | <p>3. <math>(x+3)(x+3)</math></p> <p style="text-align: center;"><math>x \qquad 3</math></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"><math>x</math></div> <div style="border: 1px solid black; width: 100px; height: 100px; position: relative;"> <div style="position: absolute; top: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; top: 0; right: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; left: 0; width: 50%; height: 50%;"></div> <div style="position: absolute; bottom: 0; right: 0; width: 50%; height: 50%;"></div> </div> <div style="margin-left: 5px;"><math>3</math></div> </div> |
| <p>4. Factor the quadratic. Then solve.</p> $x^2 - 8x = -12$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>5. Factor the quadratic. Then solve.</p> $x^2 - 5x = -6$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>6. Factor the quadratic. Then solve.</p> $x^2 - 12x + 27 = 0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>7. Factor the quadratic. Then solve.</p> $x^2 + 5x = -6$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>8. Factor the quadratic. Then solve.</p> $x^2 - 2x = 63$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>9. Factor the quadratic. Then solve.</p> $x^2 - x = 0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>10. Solve using square roots.</p> $(x-8)^2 = 36$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>11. Solve using square roots.</p> $(x-2)^2 = 25$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>12. Solve using square roots.</p> $(x-3)^2 = 36$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**13. Solve by completing the square.**

$$x^2 - 6x - 40 = 0$$

**14. Solve by completing the square.**

$$x^2 - 4x - 32 = 0$$

**15. Solve by completing the square.**

$$x^2 - 14x + 45 = 0$$

**16. Solve using the quadratic formula.**

$$x^2 - 6x + 6 = 0$$

**17. Solve using the quadratic formula.**

$$x^2 + 2x - 5 = 0$$

**18. Solve using the quadratic formula.**

$$x^2 - 5x - 4 = 0$$

**19. Identify: Vertex, Axis of Symmetry, x-intercepts.**

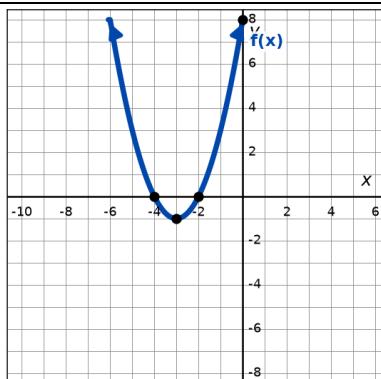
$$f(x) = -x^2 + 12x - 35$$

**20. Identify: Vertex, Axis of Symmetry, x-intercepts.**

$$f(x) = x^2 - 4x - 12$$

**21. Identify: Vertex, Axis of Symmetry, x-intercepts.**

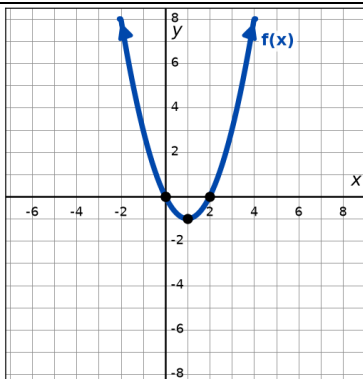
$$f(x) = x^2 + 2x - 35$$



22.

What is the vertex?

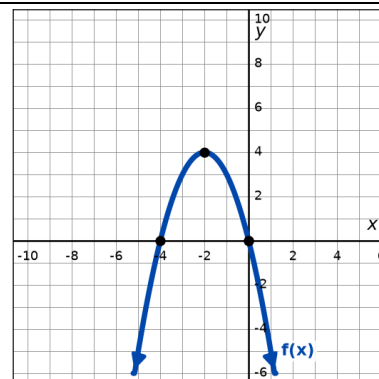
What are the zeros?



23.

What is the vertex?

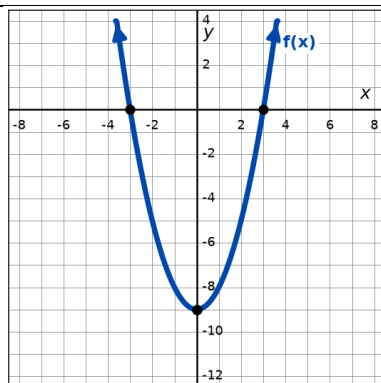
What are the zeros?



24.

What is the vertex?

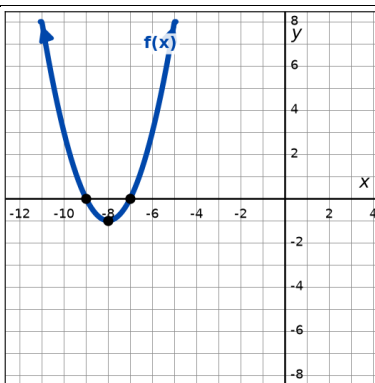
What are the zeros?



25.

What is the vertex?

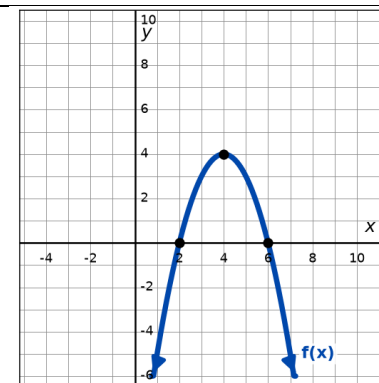
What are the zeros?



26.

What is the vertex?

What are the zeros?



27.

What is the vertex?

What are the zeros?

28. Casey fires a dart during a Nerf blaster battle in the backyard. The height of the dart, in feet, after  $t$  seconds is modeled by the equation below.

$$h(t) = -4t^2 + 16t + 20$$

Find the maximum height, the time of the maximum height, and when it hits the ground.

29. Alex has 20 feet of fencing to build a rectangular rabbit pen. The area is  $A(w) = w$

$(10 - w)$ , where  $w$  is the width.

What width gives the largest area, and what is that area?

30. Riley tests a catapult built for a physics project. The height of the launched ball, in feet, after  $t$  seconds is modeled by the equation below.

$$h(t) = -3t^2 + 6t + 24$$

Find the starting height and when it hits the ground.

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**Answer Key**

|                                                                   |                                                                      |                                                                        |
|-------------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. $x^2 + 7x + 6$                                                 | 2. $x^2 + 14x + 45$                                                  | 3. $x^2 + 6x + 9$                                                      |
| 4. $x = 2; x = 6$                                                 | 5. $x = 2; x = 3$                                                    | 6. $x = 3; x = 9$                                                      |
| 7. $x = -3; x = -2$                                               | 8. $x = -7; x = 9$                                                   | 9. $x = 0; x = 1$                                                      |
| 10. $x = 14; x = 2$                                               | 11. $x = 7; x = -3$                                                  | 12. $x = 9; x = -3$                                                    |
| 13. $x = 10; x = -4$                                              | 14. $x = 8; x = -4$                                                  | 15. $x = 9; x = 5$                                                     |
| 16. $x = 3 \pm \sqrt{3}$                                          | 17. $x = -1 \pm \sqrt{6}$                                            | 18. $x = (5 \pm \sqrt{41}) / 2$                                        |
| 19. Vertex (6, 1); Zeros (5, 0), (7, 0); Axis of Symmetry $x = 6$ | 20. Vertex (2, -16); Zeros (-2, 0), (6, 0); Axis of Symmetry $x = 2$ | 21. Vertex (-1, -36); Zeros (-7, 0), (5, 0); Axis of Symmetry $x = -1$ |
| 22. Vertex (-3, -1); Zeros (-4, 0), (-2, 0)                       | 23. Vertex (1, -1); Zeros (0, 0), (2, 0)                             | 24. Vertex (-2, 4); Zeros (-4, 0), (0, 0)                              |
| 25. Vertex (0, -9); Zeros (-3, 0), (3, 0)                         | 26. Vertex (-8, -1); Zeros (-9, 0), (-7, 0)                          | 27. Vertex (4, 4); Zeros (2, 0), (6, 0)                                |
| 28. Max height 36; time 2; hits the ground at $t = 5$             | 29. Width 5 feet; largest area 25 square feet                        | 30. Starting height 24 feet; hits the ground at $t = 4$                |