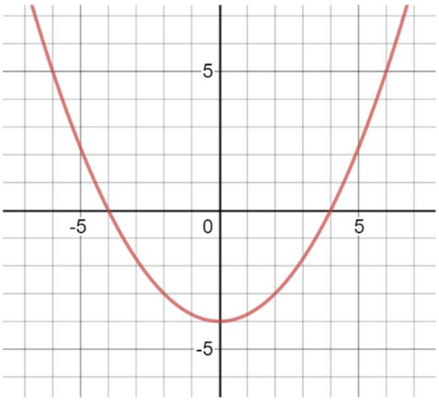
# Units 3 & 4 Final Review – Quadratic Functions and Quadratic Equations

Vertex form: $y = a(x - p)^2 + q$ Standard form: $y = ax^2 + bx + c$

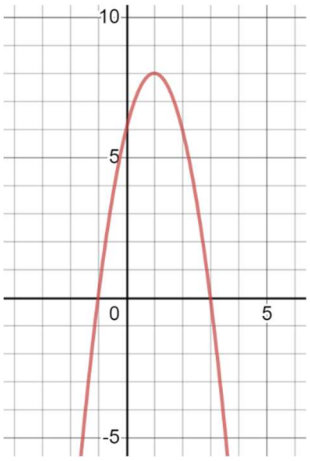
Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1. State the characteristics of each parabola. (coordinates of the vertex, equation of the axis of symmetry, y-intercept, x-intercepts, domain, range, maximum or minimum value).

a)




b)




2. Write the function in vertex form for the parabolas in #1.

3. Write an equation (in vertex form) for a parabola with a vertex at (-3, 5) passing through the point (2, -45).

4. Determine the vertex of each quadratic function.

a) $y = x^2 - 4x - 12$ b) $y = -2x^2 - 8x - 5$

c) $y = x^2 - 8x + 14$ d) $y = -2x^2 + 12x - 20$

5. Rewrite each quadratic in standard form.

a) $y = (x - 1)^2 + 3$ b) $y = (x + 3)^2 - 11$

c) $y = 3(x - 2)^2 + 4$ d) $y = -4(x + 1)^2 - 3$

6. The sum of two numbers is 60. Find the numbers if their product is a maximum.

7. Solve each quadratic equation. Express your answer as an exact value and, if possible, express your answer as an approximate value to two decimal places.

a) $x^2 + 3x - 28 = 0$ b) $4x^2 - 3x = 0$ c) $2x^2 = 27 - 15x$

d) $2x^2 + 5x = 3$ e) $16x^2 - 49 = 0$ f) $12x^2 - 27 = 0$

g) $5x^2 - 67 = 18$ h) $(x - 2)^2 = 81$ i) $25x^2 + 4 = 23$

j) $2x^2 + x - 4 = 0$ k) $10x^2 - 7x - 1 = 0$

8. Find the discriminant and the nature of the roots for the following quadratic equations.

a) $2x^2 - 4x = -2$

b) $-3x^2 = x + 9$

9. The area of a board is 270 cm$^2$, and the length is 17 cm greater than the width. Write a quadratic equation to represent the situation and solve it to find the dimensions of the board.

10. A springboard diver's height, in metres, above the water, is given by the equation $h(t) = -5t^2 + 8t + 4$, where $h$ is the height in metres, and $t$ is the time in seconds. When does the diver hit the water?