

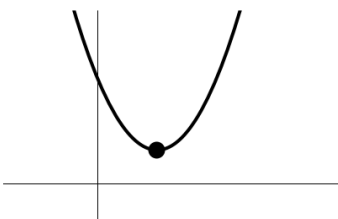
LESSON 18: The Discriminant

- Quadratic formula for the solution of a quadratic equation in standard form

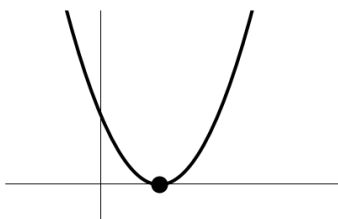
$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \quad \text{OR} \quad x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

- The discriminant: $b^2 - 4ac = 0$
- Three scenarios for x-intercepts of parabola
- No x-intercepts: no real solution to equation $ax^2 + bx + c = 0$
 - One x-intercept: One solution to equation $ax^2 + bx + c = 0$
 - Two x-intercepts: Two solution to equation $ax^2 + bx + c = 0$
 - Rational Solutions
 - Irrational Solutions
- Classification of solutions of quadratic equation using discriminant

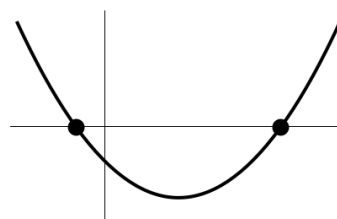
UPWARD FACING PARABOLA



Upward facing parabola
with NO x-intercept

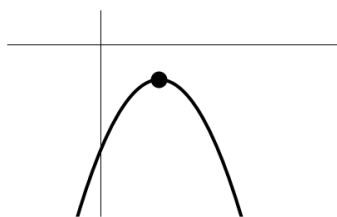


Upward facing parabola
with ONE x-intercept

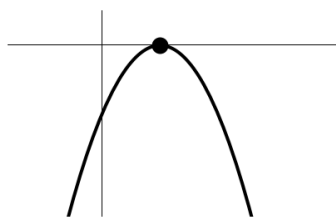


Upward facing parabola
with TWO x-intercept

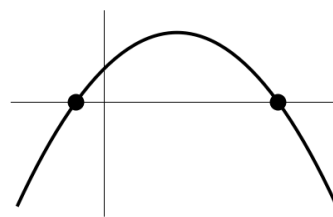
DOWNWARD FACING PARABOLA



Downward facing parabola
with NO x-intercept



Downward facing parabola
with ONE x-intercept



Downward facing parabola
with TWO x-intercept

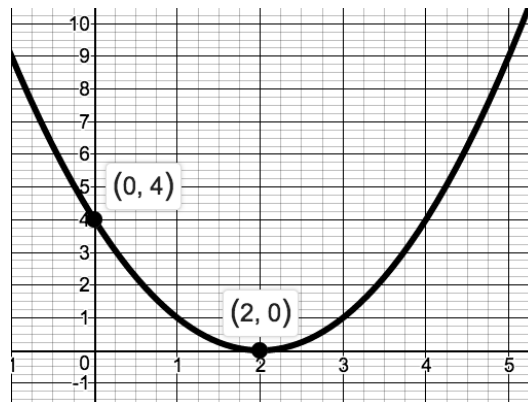
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- 1A. Solve the quadratic equation below using the quadratic formula. Be sure to specifically identify the discriminant of the quadratic formula.

$$x^2 = 4x - 4$$

Consider the graph of the quadratic function $y_1 = x^2 - 4x + 4$ given below.



- 1B. How many x-intercepts does the quadratic function $y_1 = x^2 - 4x + 4$ have?

- 1C. Look at the discriminant from part 1A and the quadratic formula, why does your answer to 1B make sense?

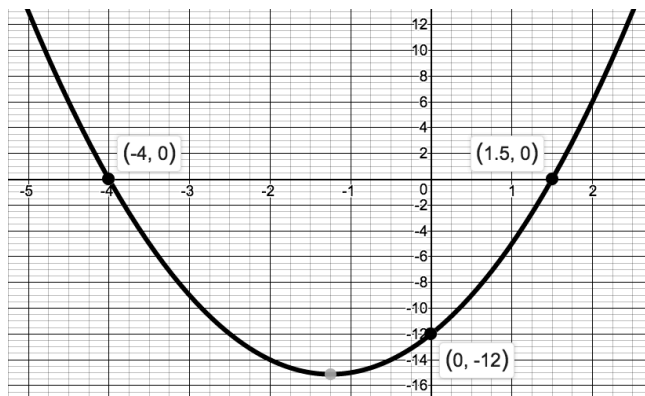
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- 2A. Solve the quadratic equation below using the quadratic formula. Be sure to specifically identify the discriminant of the quadratic formula.

$$2p^2 = 12 - 5p$$

Consider the graph of the quadratic function $y_1 = 2x^2 + 5x - 12$ given below.



- 2B. How many x-intercepts does the quadratic function $y_1 = 2x^2 + 5x - 12$ have?

- 2C. Look at the discriminant from part 2A and the quadratic formula. Why does your answer to 2B make sense?

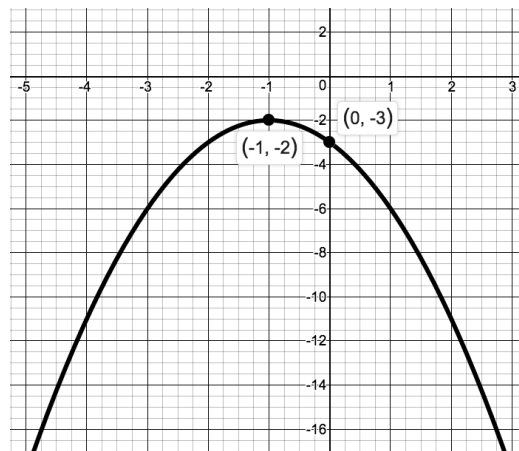
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3. Solve the quadratic equation below using the quadratic formula. Be sure to specifically identify the discriminant of the quadratic formula.

$$-t^2 = 2t + 3$$

Consider the graph of the quadratic function $y_1 = -x^2 - 2x - 3$ given below.



- 3B. How many x-intercepts does the quadratic function $y_1 = -x^2 - 2x - 3$ have?

- 3C. Look at the discriminant from part 2A and the quadratic formula. Why does your answer to 2B make sense?