

1.5 Solving Quadratic Equations – Part 2: Solve Using the Q.F.

MCR3U

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Part 1: DO IT NOW!

a) Do you remember the quadratic formula?

b) Use the quadratic formula to find the x-intercepts of:

$$0 = 2x^2 + 7x - 4$$

Don't forget that to solve a quadratic, it must be set equal to zero because at an x-intercept, the y-coordinate will be zero.

Part 2: Discriminant Review

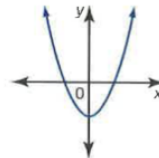
Do all parabolas have two x-intercepts?

What are the three different scenarios?

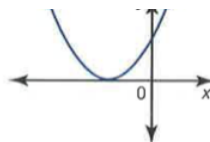
The way to determine how many x-intercepts a parabola might have is by evaluating the $b^2 - 4ac$ part of the quadratic formula (called the "**discriminant**")

Discriminant: the value under the square root

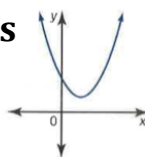
If $b^2 - 4ac > 0$, there are two solutions



If $b^2 - 4ac = 0$, there is one solution



If $b^2 - 4ac < 0$, there are no solutions



Part 3: Solve a Quadratic with 2 Roots

Objective: Determine the roots of a quadratic using the quadratic formula and leave as EXACT answers

Exact answer: as a radical or fraction. Exact answers do not have decimals.

Example 1: Find the exact solutions of $3x^2 - 10x + 5 = 0$

Example 2: Find the exact solutions of $-2x^2 + 8x - 5 = 0$

Part 4: Solving a Quadratic with 1 Root

Note: when a quadratic only has 1 solution, the x-intercept is also the vertex

Example 3: Find the exact roots of $4x^2 + 24x + 36 = 0$

Part 5: Solving Quadratics with 0 Roots

2 Scenarios causing 0 roots:

- i) vertex is above the x-axis and opens up
- ii) vertex is below the x-axis and opens down

Example 4: Find the x-intercepts of $8x^2 - 11x + 5 = 0$

Part 6: Use the Discriminant to Determine the Number of Roots

Example 5: For each of the following quadratics, use the discriminant to state the number of roots it will have.

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

b) $3x^2 - 7x + 5 = 0$

c) $-4x^2 + 12x - 9 = 0$

Part 7: Application

Example 6: A ball is thrown and the equation below model it's path:

$$h = -0.25d^2 + 2d + 1.5$$

' h ' is the height in meters above the ground and ' d ' is the horizontal distance in meters from the person who threw the ball.

a) At what height was the ball thrown from?

b) How far has the ball travelled horizontally when it lands on the ground?