

Name: _____ Date: _____

Solving Quadratic Equations Using the Quadratic Formula

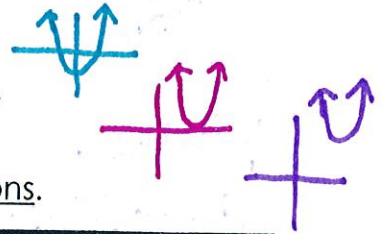
UNIT QUESTION: How are real life scenarios represented by quadratic functions?

Today's Question: When is it useful to solve quadratic functions by the quadratic formula? MMC9-12.A.REI.4b

The Discriminant

$$b^2 - 4ac$$

- ⊙ Tells you how many solutions and equation will have.
 - If the answer is positive, then you will have 2 real solutions.
 - If the answer is zero, then you will have 1 real solution.
 - If the answer is negative, then you will have no real solutions.



Determine the number of roots, solutions, zeros, x intercepts

1. $x^2 - 3x + 4 = 0$ $b^2 - 4ac$ $(-3)^2 - 4(1)(4) = -7$ NRS	2. $x^2 - 4x + 4 = 0$ $b^2 - 4ac$ $(-4)^2 - 4(1)(4) = 0$ 1R	3. $x^2 - 5x + 4 = 0$ $b^2 - 4ac$ $(-5)^2 - 4(1)(4) = 9$ 2R
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Determine the number of x-intercepts. $(x, 0) y = 0$

4. $x^2 - 4x + 3 = 0$ $b^2 - 4ac$ $(-4)^2 - 4(1)(3) = 4$ 2R	5. $x^2 + 2x + 3 = 0$ $b^2 - 4ac$ $(2)^2 - 4(1)(3) = -8$ NRS
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Solve each equation.

6. $x^2 - 25 = 0$ 1) SQRT $\sqrt{x^2} = \sqrt{25}$ $x = 5 \quad x = -5$	2) FACTOR $(x-5)(x+5) = 0$ $x = 5 \quad x = -5$	7. $x^2 + 9x + 14 = 0$ FACTOR $(x+7)(x+2) = 0$ $x = -7 \quad x = -2$
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The Quadratic Formula

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

Solve each equation.

8. $x^2 + 9x + 14 = 0$

$b^2 - 4ac$
 $(9)^2 - 4(1)(14)$
 25
2R

$$x = \frac{-9 \pm \sqrt{25}}{2(1)}$$

$\frac{-9 + 5}{2} = \frac{-4}{2} = -2$

$\frac{-9 - 5}{2} = \frac{-14}{2} = -7$

Solve each equation using the quadratic formula.

9. $x^2 - 4x + 3 = 0$

$$b^2 - 4ac$$

$$(-4)^2 - 4(1)(3)$$

$$4$$

$$2R$$

$$x = \frac{4 \pm \sqrt{4}}{2(1)}$$

$$\begin{aligned} & \frac{4+2}{2} = \frac{6}{2} = 3 \\ & \frac{4-2}{2} = \frac{2}{2} = 1 \end{aligned}$$

10. $2x^2 + x - 10 = 0$

$$b^2 - 4ac$$

$$(1)^2 - 4(2)(-10)$$

$$81$$

$$2R$$

$$x = \frac{-1 \pm \sqrt{81}}{2(2)}$$

$$\begin{aligned} & \frac{-1+9}{4} = \frac{8}{4} = 2 \\ & \frac{-1-9}{4} = \frac{-10}{4} = -\frac{5}{2} \end{aligned}$$

11. $-x^2 + 3x + 4 = 0$

$$b^2 - 4ac$$

$$(3)^2 - 4(-1)(4)$$

$$25$$

$$2R$$

$$x = \frac{-3 \pm \sqrt{25}}{2(-1)}$$

$$\begin{aligned} & \frac{-3+5}{-2} = -1 \\ & \frac{-3-5}{-2} = 4 \end{aligned}$$

12. $2x^2 - 3x = 8$

$$2x^2 - 3x - 8 = 0$$

$$b^2 - 4ac$$

$$(-3)^2 - 4(2)(-8)$$

$$73$$

$$2R$$

$$x = \frac{3 \pm \sqrt{73}}{2(2)}$$

$$\begin{aligned} & \frac{3 + \sqrt{73}}{4} \\ & \frac{3 - \sqrt{73}}{4} \end{aligned}$$

Rocket Problem

13. A rocket is shot upward with an initial velocity of 125 feet per second from a platform 3 feet above the ground. Use the model $h = -16t^2 + vt + s$ to find how long it will take the rocket to hit the ground.