

The Quadratic Formula:

$$\begin{array}{l} \text{Standard Form of a Parabola: } ax^2 + bx + c = 0 \\ \text{Quadratic Formula: } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \end{array}$$

☆The \pm means we have to solve the QF twice (1) + (2) -.

☆While the factoring and square root methods work with some quadratics but not all, this formula will ALWAYS work!

Quadratic Formula Review

$$y = 2x^2 - 11x + 12$$

$$a = 2 \quad b = -11 \quad c = 12$$

$$0 = 2x^2 - 11x + 12$$

$$X = \frac{-(-11) \pm \sqrt{(-11)^2 - 4(2)(12)}}{2(2)}$$

$$X = \frac{11 + 5}{4} = 4$$

$$X = \frac{11 \pm \sqrt{25}}{4}$$

$$(4, 0)$$

$$X = \frac{11 - 5}{4} = \frac{3}{2}$$

$$\left(\frac{3}{2}, 0\right)$$

Applications of Quadratics

A water balloon is launched into the air so that its height, in meters, after t seconds is modeled by the equation

$h(t) = -4.9t^2 + 27t + 2.4$. When will the water balloon hit the ground?

$0 =$ ground height

$$0 = -4.9t^2 + 27t + 2.4$$

$$a = -4.9 \quad b = 27 \quad c = 2.4$$

$(5.6, 0)$

$$t = \frac{-27 \pm \sqrt{(27)^2 - 4(-4.9)(2.4)}}{2(-4.9)}$$

~~$t = 0.087$~~



$$t = \frac{-27 \pm \sqrt{776.04}}{-9.8}$$

$t = 5.60$

A water balloon is launched into the air so that its height, in meters, after t seconds is modeled by the equation

$$h(t) = -4.9t^2 + 27t + 2.4$$

What is the maximum height?

$$h(t) = -4.9t^2 + 27t + 2.4$$

$$(2.7, 39.59)$$

$$(2.55, 39.39)$$



A bird is carrying a berry while flying. The berry is dropped and can be modeled by the equation

$$y = -16t^2 + 60t + 12$$

What time will the berry hit the ground?



$$0 = -16t^2 + 60t + 12$$

$$a = -16 \quad b = 60 \quad c = 12$$

$$(0.25, 0)$$

$$X = \frac{-60 \pm \sqrt{(60)^2 - 4(-16)(12)}}{2(-16)}$$

$$X = 0.25$$

$$\cancel{X = -5.25}$$

$$X = \frac{-60 \pm \sqrt{4368}}{24}$$

What method should I use to solve?

Square Root Method

Factoring

Quadratic Formula

3. $7(x - 3)^2 = 35$

4. $4x^2 = 36$

5. $x^2 = 81$

10. $121 = x^2$

11. $(x + 2)^2 - 6 = 11$

2. $x^2 + 7x + 12 = 0$

9. $x^2 - 3x - 28 = 0$

1. $13 = x^2 + 4x - 9$

6. $13 = x^2 + 9x + 38$

7. $3x^2 - 5x - 17 = x - 4$

8. $14 - 6x - x^2 = 8$

12. $5x^2 - 7x + 13 = 10$