Warm up – Solve by Taking Roots

1. $\dfrac{1}{4}(x-6)^2 = 8$

$$6 \pm 4\sqrt{2}$$

2. $6x^2 - 2 = -23$

$$\pm \dfrac{i\sqrt{14}}{2}$$

Solving by the Quadratic Formula

Quadratic Formula

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

$$ax^2 + bx + c = 0$$

How to Solve Quadratics Using the Quadratic Formula

$$ax^2 + bx + c = 0$$

1) Write the equation in standard form - $ax^2 + bx + c = 0$.
2) Identify **a, b, c**, and **b² – 4ac** *(discriminant)*.
3) Substitute these values into the formula.:

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

4) Simplify.

Question #1
Use the quadratic formula to find the zeros.

$$x^2 - 5x = -6$$

$$x^2 - 5x + 6 = 0$$

$a = 1$

b = -5

c = 6

b²-4ac = (-5)² -4(1)(6)

=1

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

$$x = \frac{-(-5) \pm \sqrt{1}}{2(1)}$$

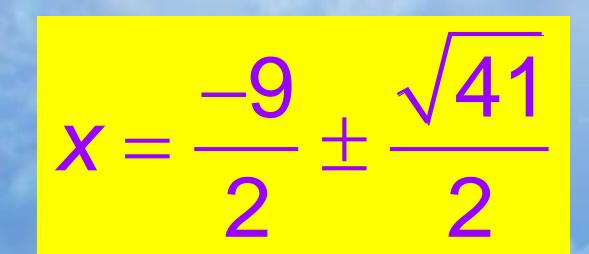$$x = \frac{5 \pm 1}{2}$$

$$x = \frac{5 + 1}{2} = 3$$

$$x = \frac{5-1}{2} = 2$$

$$x = 2 \ and \ x = 3$$

Question #1
Use the quadratic formula to find the y-intercepts.

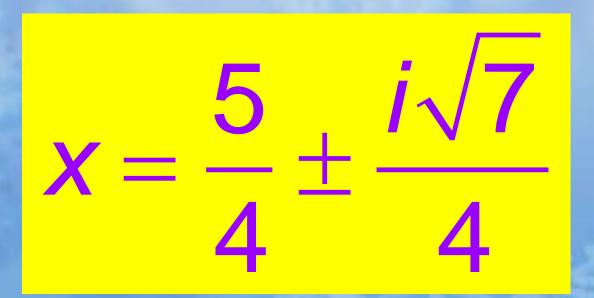$$f(x) = x^2 - 6x + 3$$

$$x = 3 \pm \sqrt{6}$$

Question #2
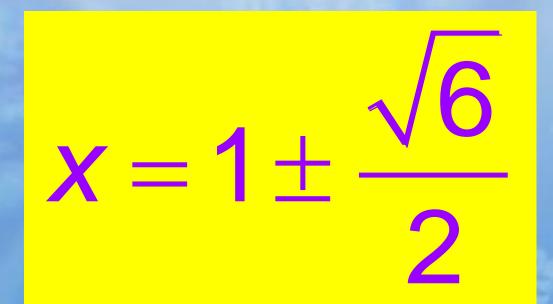**Use the quadratic formula to find the solutions.**

$$f(x) = x^2 + 9x + 10$$

$$x = \frac{-9}{2} \pm \frac{\sqrt{41}}{2}$$

Question #3
Use the quadratic formula to find the zeros.

$$2x^2 + 4 = 5x$$

$$x = \frac{5}{4} \pm \frac{i\sqrt{7}}{4}$$

Question #4
Use the quadratic formula to find the x-intercepts.

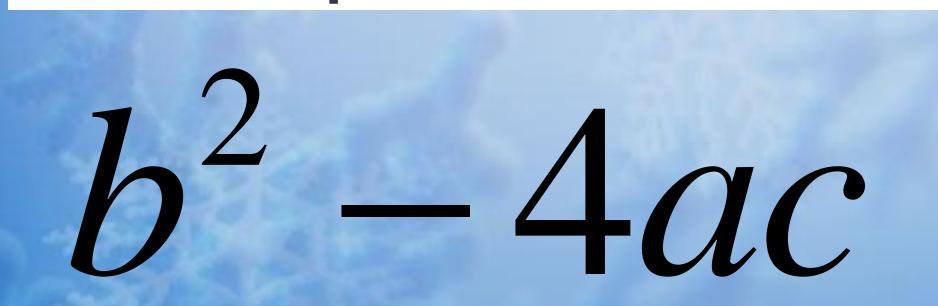$$2x^2 - 4x = 1$$

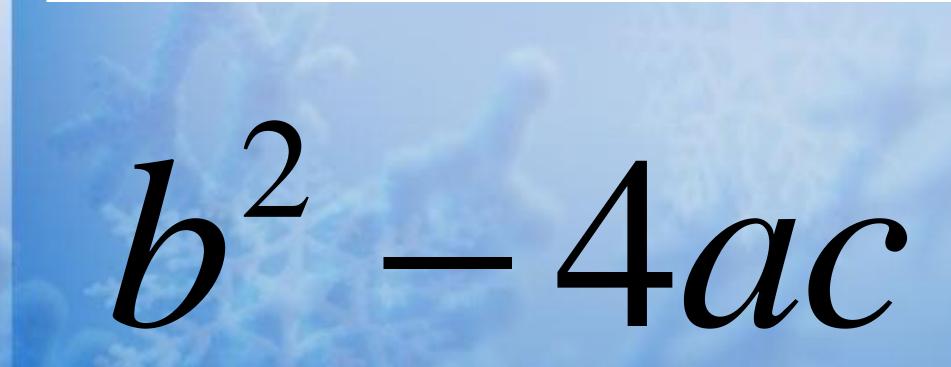$$x = 1 \pm \frac{\sqrt{6}}{2}$$

The Discriminant

$$b^2 - 4ac$$

The Discriminant tells how many & what type of solutions the quadratic has.

$$b^2 - 4ac$$

Put the quadratic in standard form first!

$$b^2 - 4ac$$

$$b^2 - 4ac$$

⭐ If the discriminant is **POSITIVE**, then you will have **2 real roots.**

⭐ If the discriminant is **ZERO**, then you will have **1 real root.**

⭐ If the discriminant is **NEGATIVE**, then you will have **2 imaginary roots.**

Determine the number & types of roots.
Example: 1

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

$$b^2 - 4ac = (-3)^2 - 4(1)(4)$$

$$= 9 - 16$$

$$= -7$$

2 Imaginary Roots

Determine the number & type of roots.

Example: 2

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

$$b^2 - 4ac = (-4)^2 - 4(1)(4)$$

$$= 16 - 16$$

$$= 0$$

1 Real Root

Determine the number & type of roots.
Example: 3

$$x^2 - 5x + 4 = 0$$

$$b^2 - 4ac = (-5)^2 - 4(1)(4)$$

$$= 25 - 16$$

$$= 9$$

2 Real Roots