

Imaginary / Complex Solutions for Quadratics

Graph: $y = x^2 + 1$

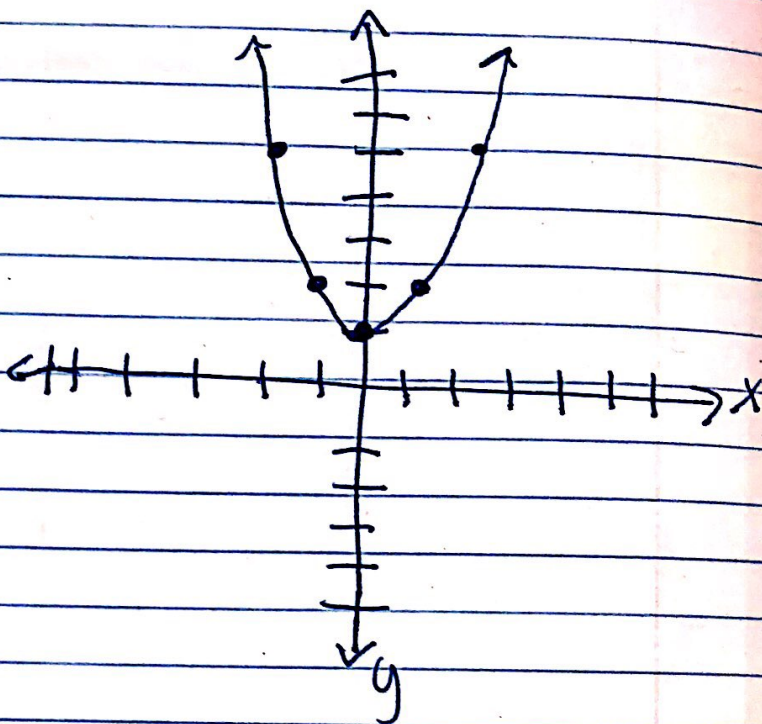


Table:

x	y
-2	5
-1	2
0	1
1	2
2	5

What are our solutions??

No solution?!? (lets take another look)

Let's Try the Quadratic Formula!

$$a = 1 \quad b = 0 \quad c = 1$$

$$x = \frac{0 \pm \sqrt{0^2 - 4(1)(1)}}{2(1)} = \frac{\pm \sqrt{-4}}{2} = \frac{\pm 2\sqrt{-1}}{2}$$

$i = \sqrt{-1}$ where "i" is called an imaginary number.

$$\frac{\pm 2i}{2} = \pm i \quad \boxed{x = i, -i}$$

Practice With Imaginary

You try- Imaginary Numbers

Simplify the following radicals:

1. $\sqrt{-36}$

$$\sqrt{36 \cdot -1}$$

$$\boxed{\pm 6i}$$

2. $\sqrt{-45}$

$$\pm 3i\sqrt{5}$$

3. $\sqrt{-17}$

$$\pm i\sqrt{17}$$

4. $\sqrt{-120}$

$$\pm 2i\sqrt{30}$$

Solve the following quadratics using any appropriate method.

1. $y = x^2 + 144$

$$0 = x^2 + 144$$

$$\sqrt{144} = \sqrt{x^2}$$

$$\sqrt{-1 \cdot 144} = x$$

$$\boxed{\pm 12i = x}$$

2. $y = x^2 - 2x + 6$

$$= \frac{2 \pm 2i\sqrt{5}}{2}$$

$$\boxed{x = 1 \pm i\sqrt{5}}$$

3. $y = -3x^2 + 5x - 9$

$$a = -3 \quad b = 5 \quad c = -9$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(-3)(-9)}}{2(-3)}$$

$$x = \frac{-5 \pm \sqrt{-83}}{-6}$$

$$\boxed{x = \frac{5 \pm i\sqrt{83}}{6}}$$

4. $y = x^2 + 30$

$$x = \pm i\sqrt{30}$$

5. $y = 5x^2 + 70$

$$x = \pm i\sqrt{14}$$

6. $y = x^2 + 5x + 10$

$$\boxed{x = \frac{-5 \pm i\sqrt{15}}{2}}$$