Bell Work

Find the roots for each quadratic function. Show all work.

1. $f(x) = x^2 + 11x + 30$

2. $f(x) = 3x^2 - 8x + 5$

3. Change the function below to vertex form.

4. What is the vertex of the function below?

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

Solve this quadratic equation by completing the square.

$$x^2 + 6x + 10 = 0$$

$$x^2 + 6x + 9 = -10 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{-1}$$

$$\sqrt{-1} = i$$

$$x + 3 = \pm i$$

i is an <u>imaginary number</u>.

We can only imagine what is its value.

$$x = -3 \pm i$$

Simplify each imaginary number.

$$2\sqrt{-9} = 2\sqrt{9}\cdot\sqrt{-1} = 2(3)i = 6i$$

$$3\sqrt{-32} = 3\sqrt{16}\cdot\sqrt{2}\cdot\sqrt{-1} = 3(4)i = 12\sqrt{2}\,i$$

$$\frac{1}{4}\sqrt{-64} = \frac{1}{4}\sqrt{64}\cdot\sqrt{-1} = \frac{1}{4}(8)i = 2i$$

$$-7\sqrt{-27} = -7\sqrt{27}\cdot\sqrt{-1} = -7\sqrt{9}\cdot\sqrt{3}\cdot i = -7(3)\sqrt{3}\,i = -21\sqrt{3}\,i$$

Simplify each imaginary number.

$$6\sqrt{-200} = 6\sqrt{200}\,i = 6\sqrt{100}\sqrt{2}\,i = 6(10)\sqrt{2}\,i = 60\sqrt{2}\,i$$

$$-5\sqrt{-180} = -5\sqrt{36}\cdot\sqrt{5}\,i = -5(6)\sqrt{5}\,i = -30\sqrt{5}\,i$$

$$\frac{1}{2}\sqrt{-112} = \frac{1}{2}\sqrt{16}\cdot\sqrt{7}\,i = \frac{1}{2}(4)\sqrt{7}\,i = 2\sqrt{7}\,i$$

When we add a real number and an imaginary number, we get a <u>complex number</u>.

$3+2i$ $-5-i$ $-2-\sqrt{7}\,i$

$a+bi$

Real Imaginary

The real number is always in front of the imaginary number.

$1+\sqrt{7}\,i$ $1-\sqrt{7}\,i$

They are called complex conjugates.

The numbers are the same, but the imaginary parts have different signs.

Find the complex conjugate.

$-3-2i \Rightarrow -3+2i$

$6+4\sqrt{3}\,i \Rightarrow 6-4\sqrt{3}\,i$

$8-\sqrt{5}\,i \Rightarrow 8+\sqrt{5}\,i$

Assignment:

Imaginary and Complex Numbers Worksheet