Complex Numbers
Springboard 8.1
Warm-up

1. Simplify

$a)\ \sqrt{54}$

$b)\sqrt{72}$

$c)\ \sqrt{48}$

$d)\sqrt{68}$

2. Solve using the quadratic formula.

$x^2 - 7x + 10 = 0$

Complex Numbers

What do you think of when you hear of “Complex Numbers?” Take a minute, talk with your partner and be ready to share what they say.

Complex Numbers

The **Imaginary** unit, **i**, is defined as $\sqrt{-1}$.

A **complex number** is a number that can be written as a+b*i,* where **a** and **b** are real numbers.

Some examples:
2-3i
i
4+2i

Reducing Radicals
Examples:

$\sqrt{-1} = i$

$\sqrt{-10} = \left(\sqrt{10}\right)\left(\sqrt{-1}\right) = \sqrt{10}\, i$

$\sqrt{-25} = (\sqrt{25})\left(\sqrt{-1}\right) = (5)\left(\sqrt{-1}\right) = 5i$

$\sqrt{-12} = \sqrt{12}\sqrt{-1} = \left(\sqrt{4}\right)\left(\sqrt{3}\right)(i) = 2i\sqrt{3}$

We Try:

$\sqrt{-48} =$

$\sqrt{-50} =$

$\sqrt{-72} =$

You Try in your notebooks:

Odd Talks, Even writes

$1)\ \sqrt{-100}$ =

Even Talks, Odd writes

$2)\ \sqrt{-36}$ =

Odd Talks, Even writes

3) $\sqrt{-128}$ =

Rewrite

1) $5\sqrt{-16}$ =

2) $7 + 2\sqrt{-75} =$

We Try:

Rewrite

1) $6\sqrt{-49}$

2) $10 - 2\sqrt{-20}$

You Try:

1) $-5 - 4\sqrt{-12}$

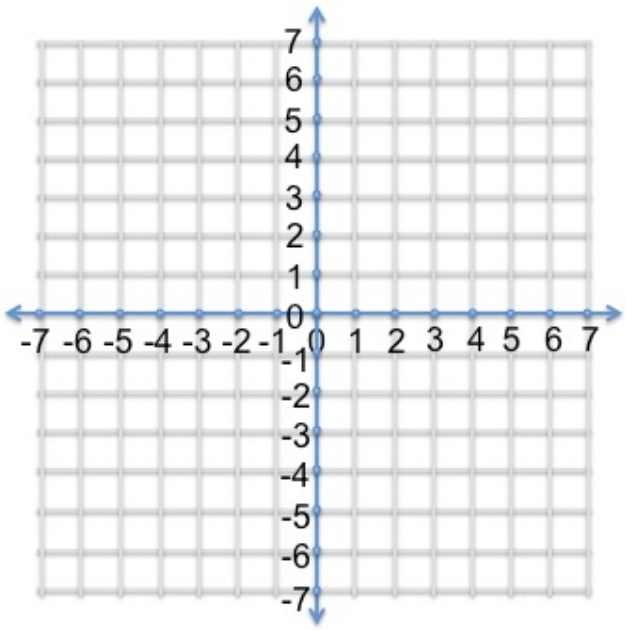
2) $3 + 5\sqrt{-13}$

3) $-10 + 4\sqrt{-24}$

Finding the roots

$x^2 + 4 = 0$

Sketch what this graph should look like.



What are the solutions to the graph?

Find the roots/zeroes

$x^2 + 4 = 0$

The solutions are complex numbers!

We Try:

Find the roots/zeroes.

$x^2 + 25 = 0$

Find the roots/zeroes.

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

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

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

$$x = \frac{2 \pm \sqrt{4 - 16}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{-12}}{2}$$

$$x = \frac{2 \pm 2i\sqrt{3}}{2}$$

$$x = 1 \pm i\sqrt{3}$$