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NOTES: Section 4.6 – Perform Operations with Complex Numbers

Goals: #1 - I can solve equations that have both real and imaginary solutions (by finding square roots).

#2 - I can add, subtract, multiply, and divide complex numbers.

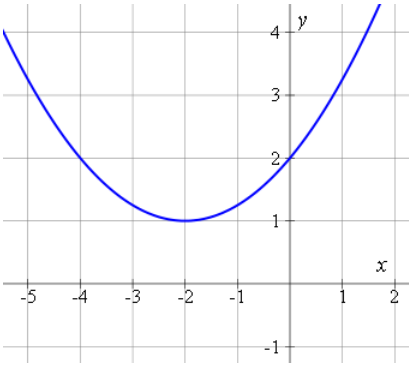
#3 - I can use the properties of exponents to write a complex number in standard form.

Homework: Lesson 4.6 Worksheet

Exploration #1:

1. Solve $2x^2 + 11 = -37$

2. Look at the graph below.



   a. What are the x-intercepts?

Notes:

Not all quadratic equations have _____ solutions.

Mathematicians created a system of numbers using _____,

defined as _____.

The Square Root of a _____:

- If r is a positive real number, then _____. **Example:** _____
- By the above property, it follows that _____. **Example:** _____

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Example #1: Solve the following quadratic equations.

1. $2x^2 + 11 = -37$
2. $5x^2 + 33 = 3$

You practice: Solve the following quadratic equations.

3. $3x^2 - 7 = -31$
4. $x^2 + 11 = 3$

Notes:

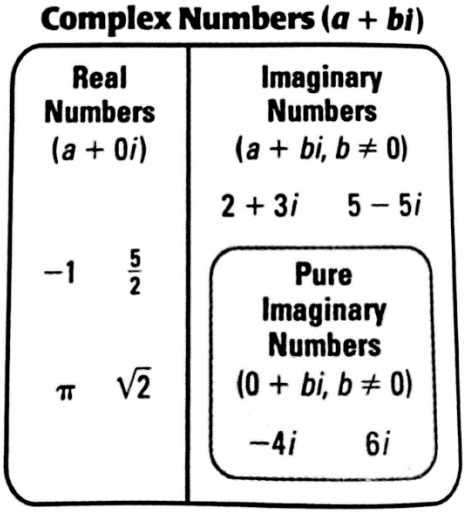
A _____ is a number _____

where _____ and _____ are _____.

If $b \neq 0$, then _____ is an _____.

Standard Form:

Examples:



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Notes:

To add or subtract two complex numbers, _____ their

_____ and their _____ separately.

Example #2: Write the expression as a complex number in standard form.

1. $(8 - i) + (5 + 4i)$
2. $(7 - 6i) - (3 - 6i)$

You practice: Write the expression as a complex number in standard form.

3. $(9 - i) + (-6 + 7i)$
4. $10 - (6 + 7i) + 4i$

Notes:

To multiply two complex numbers, use the _____ or _____

Just as you do when multiplying real numbers or algebraic expressions.

Example #3: Write the expression as a complex number in standard form.

1. $4i(-6 + i)$
2. $(9 - 2i)(-4 + 7i)$

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You practice: Write the expression as a complex number in standard form.

3. $i(9-i)$

4. $(3+i)(5-i)$

Notes:

Two complex numbers of the form _____ and _____ are called _____.

The product of _____ is always a real number.

Example:

We use this to _____ complex numbers.

Example #4: Write the expression as a complex number in standard form.

1. $\frac{7+5i}{1-4i}$

2. $\frac{5}{1+i}$

You practice: Write the expression as a complex number in standard form.

3. $\frac{5+2i}{3-2i}$

4. $\frac{7i}{8+i}$

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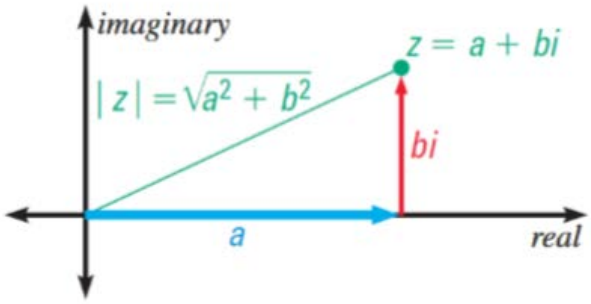
Notes:

The _____ of a complex number _____,

denoted _____ is a nonnegative real number defined as _____.

This is the _____ between z

and the _____ in the complex plane.



Example #5: Find the absolute value of the complex number.

1. $-4 + 3i$
2. $-3i$

You practice: Write the expression as a complex number in standard form.

3. $-3 - 4i$
4. $2 + 5i$

Notes:

We can raise the _____ to different powers to notice a pattern.

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-
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Example #6: Using the properties of exponents, write the complex number in standard form.

1. $-2 + i^2$

2. $1 - 5i^7$

You practice: Write the expression as a complex number in standard form.

3. $2 - i^8$

4. $5 + i^3$

CHALLENGE: What would i^{39} be? What about i^{101}