

## August 8, 2019

1. Grab the notes from the table
2. Take out HW and Calendar
3. Begin Warm-up
4. Go over HW & Warm-up
5. Summary of Yesterday's Notes
6. Notes on Operations w/Complex #'s



Shantira Jackson  
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Person: Would you like to eat 6 string cheeses in a row?

Me: Naw.

Person: We deep fried em and there will be tomato sauce.

Me: Oh, ok, yes.

4/18/17, 10:46 PM

**Topic:** Operations w/Complex Numbers

**Name:** \_\_\_\_\_

**What am I learning today?**

**Warm-Up:** Simplify the following:

1.  $\sqrt{45}$   $\sqrt{9 \cdot 5} = 3\sqrt{5}$

2.  $-3\sqrt{1000}$   $-3\sqrt{100 \cdot 10} = -30\sqrt{10}$

3.  $\sqrt{60n^8}$   $\sqrt{4 \cdot 15 \cdot n^4 \cdot n^4} = 2n^4\sqrt{15}$

4.  $\sqrt{81x^3y^6}$   $9\sqrt{x^3y^6} = 9xy^3\sqrt{x}$

$-3 \cdot 5 \cdot 2\sqrt{5} \cdot 2 = -30\sqrt{10}$

**Vocabulary**  
Imaginary Number

A number that is expressed in terms of the square root of a **negative** number. It's denoted using the letter "i".

$i$   $i$

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

$\sqrt{-4} = \sqrt{-1 \cdot 4} = \sqrt{-1} \cdot \sqrt{4} = i \cdot 2 = 2i$

$\sqrt{-7} = \sqrt{-1 \cdot 7} = \sqrt{-1} \cdot \sqrt{7} = i \cdot \sqrt{7} = i\sqrt{7}$

$\sqrt{-28} = \sqrt{-1 \cdot 28} = \sqrt{-1} \cdot \sqrt{4 \cdot 7} = i \cdot 2\sqrt{7} = 2i\sqrt{7}$

**Examples**  
Simplify

$\sqrt{-16} = 4i$   $\sqrt{-99} = 3i\sqrt{11}$   $\sqrt{-24x^7} = 2x^3i\sqrt{6x}$

$i\sqrt{16} = i \cdot 4$   $i\sqrt{99} = i \cdot 3\sqrt{11}$   $i\sqrt{24x^7} = i \cdot \sqrt{4 \cdot 6 \cdot x^6 \cdot x} = 2i\sqrt{6x}$

**Extension**  
Powers of i

$i^1 = i$   
 $i^2 = i \cdot i = \sqrt{-1} \cdot \sqrt{-1} = -1$   
 $i^3 = i^2 \cdot i = -1 \cdot i = -i$   
 $i^4 = i^3 \cdot i = -i \cdot i = -i^2 = -(-1) = 1$   
 $i^5 = i^4 \cdot i = 1 \cdot i = i$

Divide the decimal by 4, the decimal will tell which one it corresponds to:

$.25 = i^2 = -1$  ie:  $i^{27} = i^3 = -i$

$.50 = i^4 = 1$   $\frac{27}{4} = 6.75$

$.75 = i^3 = -i$   $.75 = i^3$

$.00 = i^4 = 1$  so,  $i^{27} = i^3$

**Examples**  
Simplify

1.  $i^{16} = 1$  2.  $i^{38} = -1$  3.  $i^{43} = -i$  4.  $i^{157} = i$

$\frac{16}{4} = 4 \rightarrow 1$   $\frac{38}{4} = 9.5 \rightarrow -1$   $\frac{43}{4} = 10.75 \rightarrow -i$   $\frac{157}{4} = 39.25 \rightarrow i$

**Topic:** Operations w/Complex Numbers

**Date:** \_\_\_\_\_

**Vocabulary**  
Complex Number  
(STANDARD FORM)

A complex number in standard form is a number of the form:  $a+bi$ .

a = real #                      b = imaginary #

**Operations w/Complex #'s**  
Addition & Subtraction

**STEPS:** When **adding** and **subtracting** complex numbers  
1. Distribute any + or - value(s) into the parentheses  
2. Drop the parentheses  
3. Combine like terms

**Examples**  
Add/Subtract

**PEMDAS**

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

2.  $(7 - 5i) - (1 - 5i)$   
 $7 - 5i - 1 + 5i$   
 $6 + 0i$

3.  $2i - (3 + i) + (2 - 3i)$   
 $2i - 3 - i + 2 - 3i$   
 $-1 - 2i$

**Operations w/Complex #'s**  
Multiplication

**STEPS:** When **multiplying** complex numbers:  
1. Distribute either using distributive property or FOIL (if possible)  
2. Combine like terms  
3. Replace any  $i^2$  terms with "-1", then simplify further.

**Examples**  
Add/Subtract

1.  $5i(-2 + i)$   
 $-10i + 5i^2$   
 $-10i + 5(-1)$   
 $-10i - 5$   
 $-5 - 10i$

2.  $-i(3 + i)$

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

4.  $(2 + 3i)(-6 - 2i)$

**Summary**  
Summarize the lesson in your own words