

Name: _____

Date: _____

Notes: Imaginary Numbers

Do Now: Simplify each expression.

1) $\sqrt{64}$

2) $\sqrt{24}$

3) $\sqrt{-81}$

4)

Using complete sentences, explain why you cannot simplify $\sqrt{-25}$ into a real number.

What Should I Be Able to Do?

- I can define the imaginary unit i .
- I can explain why $i = \sqrt{-1}$.
- I can simplify principal square roots.
- I can simplify i raised to any integer power.
- I can simplify one step expressions involving imaginary numbers.

Imaginary Unit i : The imaginary unit i is defined to be

$$i = \sqrt{-1} \text{ and } i^2 = -1$$

How do we use i ?

Simplify the following radicals.

1) $\sqrt{-4}$

2) $\sqrt{-32}$

Why is $i = \sqrt{-1}$?

Simplify the following radicals.

1) $\sqrt{-196}$

2) $\sqrt{-192}$

3) $-5\sqrt{-27}$

Find i^0 . Then find the value of the subsequent powers of i (i^1 and i^2 are already found) by rewriting each using factors of that you know the value of.

$$i^0 =$$

$$i^1 = i$$

$$i^5 =$$

$$i^9 =$$

$$i^2 = -1$$

$$i^6 =$$

$$i^{10} =$$

$$i^3 =$$

$$i^7 =$$

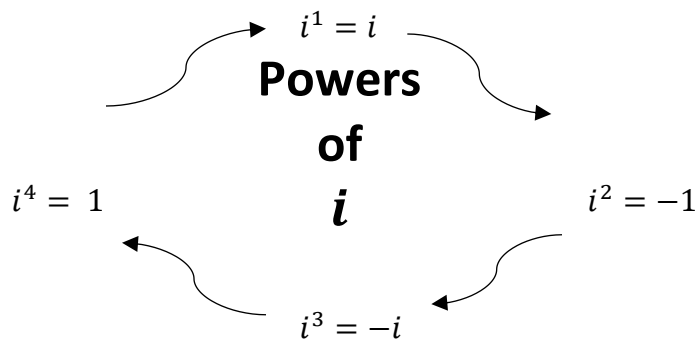
$$i^{11} =$$

$$i^4 =$$

$$i^8 =$$

$$i^{12} =$$

Do you notice a pattern here? Explain the pattern as best as you can.



Medium Funny Joke:
Why is i the most annoying
opponent to lose to?

Completely simplify the following powers of i .

1) i^{21}

2) i^{30}

3) i^{39}

4) i^{184}

Checkpoint:

Completely simplify the following powers of i .

a) i^{10}

b) i^{43}

c) i^{15}

d) i^{22}

e) i^{100}

f) i^{81}

g) i^{66}

h) i^{371}

k) $i^{1,720}$

1) Find the sum of $7i^2$ and $15i^{15}$.

2) Find the difference of $7i^2$ and $15i^{15}$.

3) Find the product of $7i^2$ and $15i^{15}$.

4) Simplify $(i^{25})^{47}$

Success Criteria

- I can define the imaginary unit i .

- I can explain why $i = \sqrt{-1}$.

- I can simplify principal square roots.

Completely simplify the following radicals.

1) $\sqrt{-252}$

2) $\sqrt{-2916}$

3) $-3\sqrt{-245}$

- I can simplify i raised to any integer power.

Completely simplify the following powers of i .

1) i^{35}

2) i^{45}

3) i^{392}

4) $i^{12,906}$

- I can simplify one step expressions involving imaginary numbers.

Completely simplify the following expressions.

1) $i^{31} + i^{73}$

2) $(i^{30})(i^7)$

3) $2i^{21} - 2i^2$

4) $(i^{19})^{20}$

5) $-3i + 12i^{97}$

6) $48i^{100} - 24i^{50}$

Name: _____

Date: _____

Classwork: Imaginary Numbers

Completely simplify the following radicals.

1) $\sqrt{-772}$

2) $-4\sqrt{-961x^8y^9z}$

3) $2xy\sqrt{-800x^{16}y^{19}}$

Completely simplify the following powers of i .

4) i^{441}

5) i^{820}

6) $i^{8,943,277}$

7) $i^{345,973,495}$

Completely simplify the following expressions.

8) $14\sqrt{-8} + 16i^3$

9) $-5i^{65}(9i^{102})$

10) $-i^{31} - 2i^{41} - 8i^{109} + 10i^2$

11) $i(i)$

12) $(i - 9i)^2$

13) $(3i - 7i^3)(10i - 5i^{19})$

14) Simplify i^{4a} where a is a positive integer.

Explain how you arrived at your answer.

15) Express $xi^8 - yi^6$ in simplest form.

16) Determine the value of n in simplest form:

$$i^{13} + i^{18} + i^{31} + n = 0$$

17)

Mrs. Donahue made up a game to help her class learn about imaginary numbers. The winner will be the student whose expression is equivalent to $-i$. Which expression will win the game?

1) i^{46} 2) i^{47} 3) i^{48} 4) i^{49}

18)

What is the greatest possible integral value of x for which $\sqrt{x-5}$ is an imaginary number?

1) 5 2) 6 3) 3 4) 4