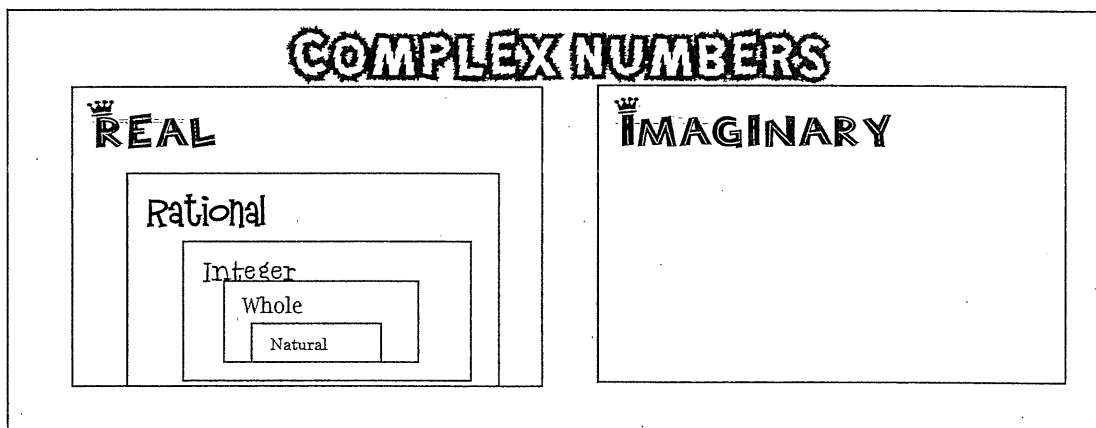


Essential Question: What is a complex number?

How do we add and subtract complex numbers?

Previously when we learned about radicals, we talked about how the square root of a negative number will not give us a real value. But, there are more numbers than just *REAL* numbers! The square root of a negative number is an _____ number.



A **complex number** is a number in the form _____, where bi is the *imaginary* part and a is the *real* part. i is equal to _____ and i^2 is _____.

Examples: Solve the following radicals.

1. $\sqrt{-9}$

2. $\sqrt{-100}$

3. $10\sqrt{-36x^5}$

4. $\sqrt{-12}$

When we are adding and subtracting imaginary numbers, we can think of i like we do variables. For example, $2i + 3i = 5i$. Also similar to variables, we cannot simplify the addition of real and imaginary numbers together. For example, $2 + 3i = 2 + 3i$. **We must combine like terms!**

Examples: Solve the following complex expressions.

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

6. $(18 + 5i) - 3(9 + 15i)$

7. $(9 - 6i) - (12 + 2i)$

8. $(8 - 3i) + (2 + 5i)$

9. $(5 + 2\sqrt{-16}) + (2 + 3\sqrt{-9})$

10. $(1 - 3\sqrt{-20}) - (7 + 2\sqrt{-45})$

Homework: Adding and Subtracting Complex Numbers

Simplify:

1. $\sqrt{-144}$

2. $2 + \sqrt{-25}$

3. $6 - \sqrt{-12}$

4. $-4 + \sqrt{-49}$

5. $(3 - 2\sqrt{-18}) - (2 + 3\sqrt{-8})$

6. $(4 - 3\sqrt{-12}) - (8 + \sqrt{-27})$

$$7. (27 + 13i) + (16 - 8i)$$

$$8. (9i - 2) - (6 + 18i)$$

$$9. (5 - 4i) - 2(7 - 20i)$$

$$10. (12 + 4i) + (17 + 29i)$$

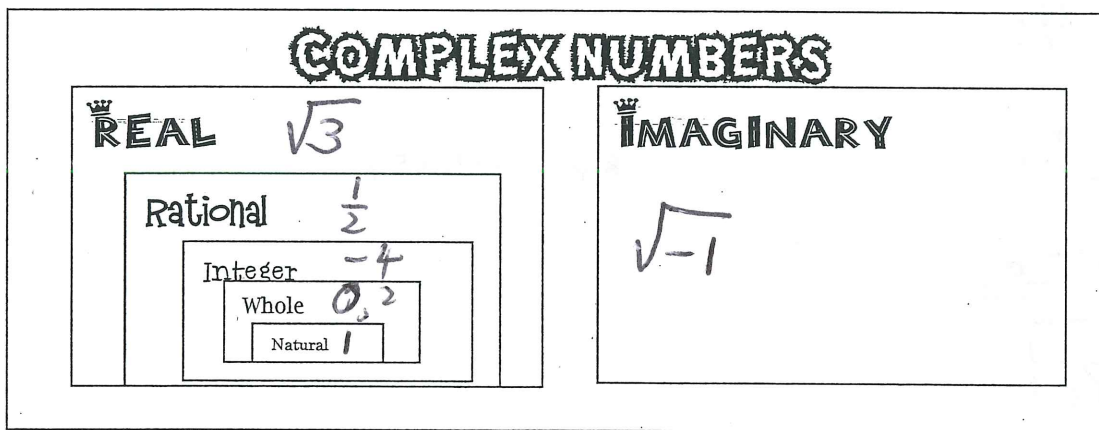
$$11. (6i + 28) - 3(7 - 3\sqrt{-36})$$

$$12. 4(6 - 2\sqrt{-100}) - (16 + 10i)$$

Essential Question: What is a complex number?

How do we add and subtract complex numbers?

Previously when we learned about radicals, we talked about how the square root of a negative number will not give us a real value. But, there are more numbers than just *REAL* numbers! The square root of a negative number is an imaginary number.



A **complex number** is a number in the form $a+bi$, where bi is the *imaginary* part and a is the *real* part. i is equal to $\sqrt{-1}$ and i^2 is -1 .

Examples: Solve the following radicals.

1. $\sqrt{-9}$

$i\sqrt{9}$

$i \cdot 3$

$3i$

2. $\sqrt{-100}$

$i\sqrt{100}$

$i \cdot 10$

$10i$

3. $10\sqrt{-36x^5}$

$10 \cdot i \cdot \sqrt{36x^5}$

6

$10 \cdot i \cdot 6 \sqrt{x^5}$

$60i \sqrt{x^5}$

$60i \cdot x^2 \sqrt{x}$

4. $\sqrt{-12}$

$i\sqrt{12}$

$i \cdot 2\sqrt{3}$

$2i\sqrt{3}$

When we are adding and subtracting imaginary numbers, we can think of i like we do variables. For example, $2i + 3i = 5i$. Also similar to variables, we cannot simplify the addition of real and imaginary numbers together. For example, $2 + 3i = 2 + 3i$. **We must combine like terms!**

Examples: Solve the following complex expressions.

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

$$3 + \underline{6i} + 4 - \underline{2i}$$

$$7 + 4i$$

6. $(18 + 5i) - 3(9 + 15i)$

7. $(9 - 6i) - (12 + 2i)$

$$9 - \underline{6i} - 12 - \underline{2i}$$

$$\boxed{-3 - 8i}$$

8. $(8 - 3i) + (2 + 5i)$

9. $(5 + 2\sqrt{-16}) + (2 + 3\sqrt{-9})$

$$5 + 2\sqrt{-16} + 2 + 3\sqrt{-9}$$

$$\begin{array}{ccc} \downarrow & & \downarrow \\ 2i\sqrt{16} & & 3i\sqrt{9} \\ 2i(4) & & 3i(3) \end{array}$$

$$\underline{5} + \underline{8i} + \underline{2} + \underline{9i}$$

$$7 + 17i$$

10. $(1 - 3\sqrt{-20}) - (7 + 2\sqrt{-45})$

$$1 - 3\sqrt{-20} - 7 - 2\sqrt{-45}$$

$$1 - 3i\sqrt{20} - 7 - 2i\sqrt{45}$$

$$1 - \underline{3i(2\sqrt{5})} - 7 - \underline{2i(3\sqrt{5})}$$

$$\underline{1} - \underline{6i\sqrt{5}} - \underline{7} - \underline{6i\sqrt{5}}$$

$$-6 - 12i\sqrt{5}$$

Homework: Adding and Subtracting Complex Numbers

Simplify:

1. $\sqrt{-144}$

2. $2 + \sqrt{-25}$

3. $6 - \sqrt{-12}$

4. $-4 + \sqrt{-49}$

$$6 - i\sqrt{12}$$

$$6 - i(2\sqrt{3})$$

$$6 - 2i\sqrt{3}$$

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10. $(12 + 4i) + (17 + 29i)$

11. $(6i + 28) - 3(7 - 3\sqrt{-36})$

12. $4(6 - 2\sqrt{-100}) - (16 + 10i)$