Name: _____ Date: _____

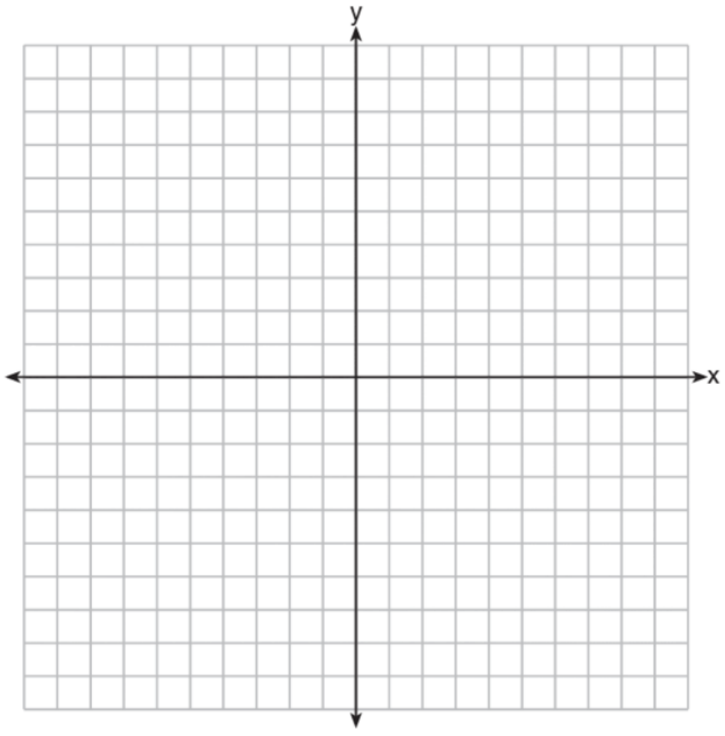
Notes: The Complex Plane

Do Now: 1) Simplify the following expression in $a + bi$ form.

$$\frac{1-i}{2+i} + \frac{1+i}{1-2i}$$

2) Graph and label each of the following points.

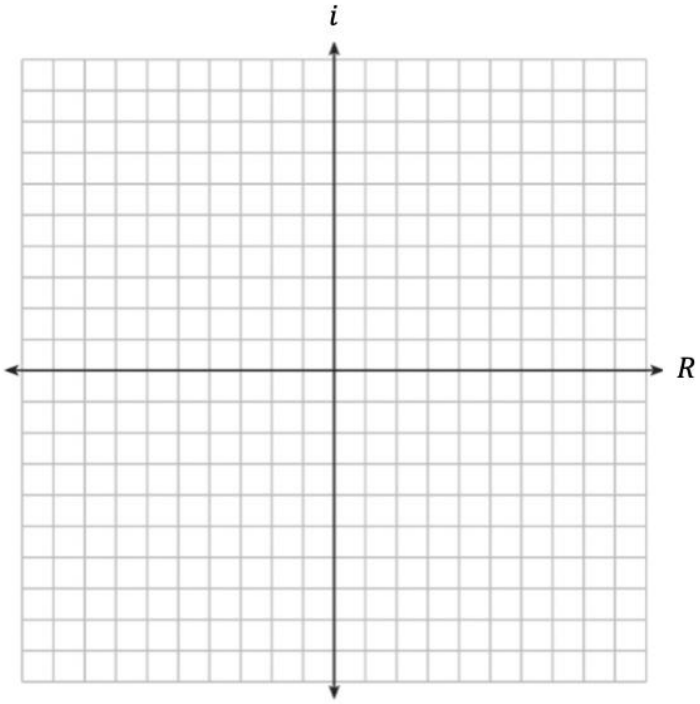
A: $(0,5)$ B: $(-1,7)$ C: $(-5,-9)$ D: $(7,0)$



What Should I Be Able to Do?

- I can graph complex numbers on a complex plane.

The Complex Plane:



What do you notice is different about the complex plane than a coordinate plane?

Graph each complex number on the complex plane.

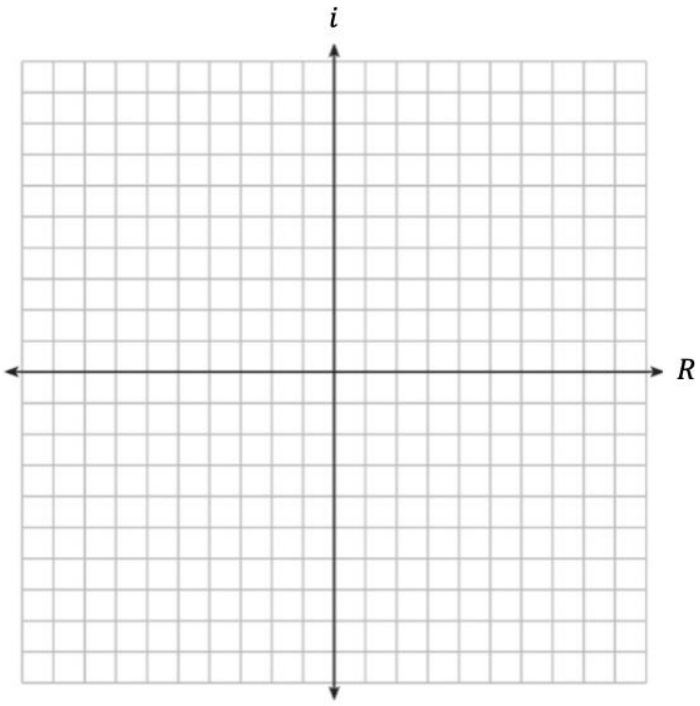
$z_1 = 1 + 5i$ $z_2 = -2 + 3i$ $z_3 = 4 - 9i$ $z_4 = -7 - i$ $z_5 = 10i$

Success Criteria

- I can graph complex numbers on a complex plane.

1) Graph each complex number on the complex plane below.

$z_1 = -3 + 6i$ $z_2 = 2 - 3i$ $z_3 = 4$ $z_4 = -10 + 10i$ $z_5 = 7i$



2) Given a and b are positive real numbers, describe how you would plot $a - bi$ on a complex plane.

_____

_____

_____

_____

Name: _____ Date: _____

Classwork: The Complex Plane

1) Write $-\frac{1}{2}i^3\left(\sqrt{-9}-4\right)-3i^2$ in simplest $a+bi$.

2)

The expression $6-(3x-2i)^2$ is equivalent to

(1) $-9x^2+12xi+10$

(2) $9x^2-12xi+2$

(3) $-9x^2+10$

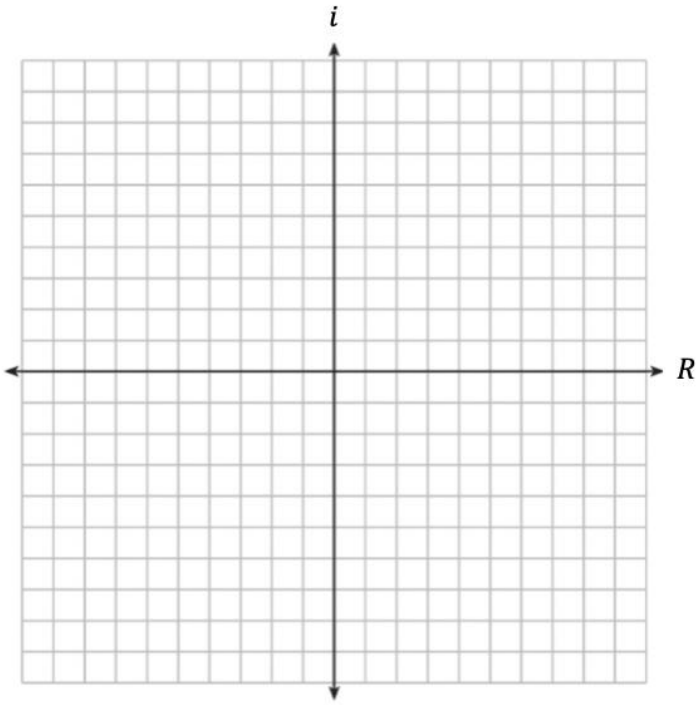
(4) $-9x^2+12xi-4i+6$

3) What is the product of the complex numbers $(2-6i^3)$ and $(-9+2i^{81})$?

4) What is the sum of the complex numbers $(12-3i^{49})$, $(-1-i^{1,028,253})$, and $(-11+i^4)$?

5) Graph each complex number on the complex plane below.

$z_1 = 2 - 9i$ $z_2 = 5 + 5i$ $z_3 = -1 + 7i$ $z_4 = -7 - i$ $z_5 = 3i$



6) Given n is a positive integer and i is the imaginary unit, $i^2 = -1$, such that $i^n = i$, which of the following statements about n must be true?

A. When n is divided by 4, the remainder is 0.
B. When n is divided by 4, the remainder is 1.
C. When n is divided by 4, the remainder is 2.
D. When n is divided by 4, the remainder is 3.
E. Cannot be determined from the given information.

7) What is the multiplicative inverse of $-5i$?

Simplify each of the following expressions in $a + bi$ form.

8) $\left(12 - \sqrt{-112}\right) - (45 + \sqrt{-28})$

9) $(x + 3i)^2 - (2x - 3i)^2$

10) $\frac{x+yi}{x-yi}$

11) $(2 - i)^{-3}$

12) Completely simplify the expression $(x - 4i)^3$.

13) What is the multiplicative inverse of $i - 2$?

14)

Expressed in simplest $a + bi$ form, $(7 - 3i) + (x - 2i)^2 - (4i + 2x^2)$ is

(1) $(3 - x^2) - (4x + 7)i$

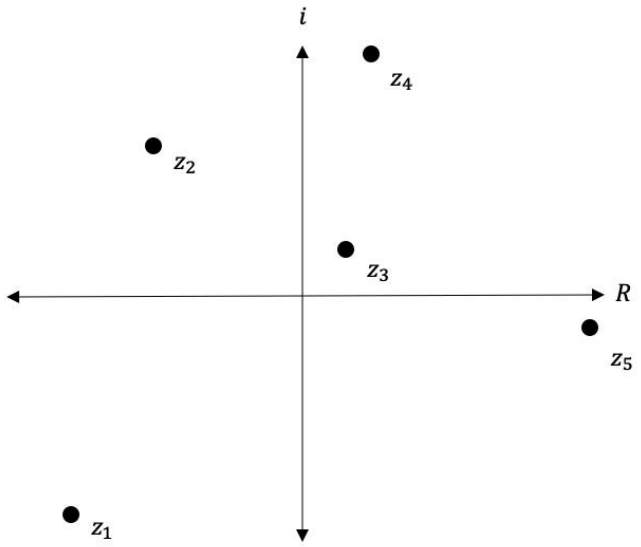
(2) $(3 + 3x^2) - (4x + 7)i$

(3) $(3 - x^2) - 7i$

(4) $(3 + 3x^2) - 7i$

15) The modulus of the complex number $a + bi$ is given by $\sqrt{a^2 + b^2}$. Which of the complex numbers z_1, z_2, z_3, z_4, and z_5 below has the greatest modulus?

A. z_1
B. z_2
C. z_3
D. z_4
E. z_5



16) Given i is the imaginary unit, find $(2 - yi)^2$ in simplest form.

17) If $A = -2 + 7i, B = -3 - 5i$ and $C = 1 + 8i$ where i is the imaginary unit, find $A - BC$ in $a + bi$ form.

18) If $x = 4i, y = 2i,$ and $z = m + i$, find the expression x^3y^3z in $a + bi$ form.

19) Write two complex numbers with a product 18.

Solve each of the following equations.

20) $\sqrt{-4x + 16} - \sqrt{3x - 12} = 0$

21) $\frac{4}{5}(2x - 15)^{5/3} - 12 = 807.2$

22) Is the sum of two irrational numbers always irrational? Justify your answer.

23) Completely simplify the following expression:

$$\frac{(-8)^{2/3} + (-100)^{1/2}}{(\frac{1}{4})^{-3/2} - (-2)^{5/2}}$$