***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question*: How do I perform the different operations under Complex Numbers?**

imaginary unit: $\boldsymbol{i}$ is defined as $\boldsymbol{i = \sqrt{-1}}$

imaginary number: $\sqrt{-x} = i\sqrt{x}$ where x is positive

Ex: $\sqrt{-5} =$ $\sqrt{-9} =$ $\sqrt{-18} =$

complex number: $a + bi$

the complex conjugate of $a + bi$ is $a - bi$ & vice versa

Pattern of $\boldsymbol{i}$ to a power

$i^0 =$ $i^4 =$
$i^1 =$ $i^5 =$
$i^2 =$ $i^6 =$
$i^3 =$ $i^7 =$

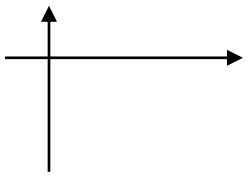
The absolute value of a complex number is the distance between the plotted point & the origin on the complex plane & is defined as

$$|a + bi| = \sqrt{(a)^2 + (b)^2}$$

## EX.1 – GRAPHING COMPLEX NUMBERS ON THE COMPLEX NUMBER PLANE & FINDING ABSOLUTE VALUE.

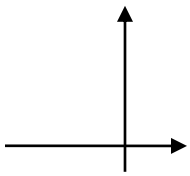
Plot the point and then find its distance from the origin.

a) $4 - 3i$



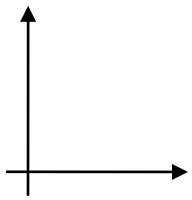
$|4 - 3i| =$

b) $-1 + 5i$



$|-1 + 5i| =$

c) $5 + 12i$



$|5 + 12i| =$

***Short Summary#1:***

***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question*: How do I perform the different operations under Complex Numbers?**

## EX.2 – SIMPLIFYING COMPLEX NUMBERS

Simplify the expression. Make sure the expression is written in the form of $a + bi$.

a) $5 + \sqrt{-7} =$

b) $6 - \sqrt{-20} =$

c) $-4 + \sqrt{-50} =$

d) $\sqrt{-121} - 7$

***Short Summary #2:***

## EX.3 – SIMPLIFYING COMPLEX NUMBERS USING ADDITION OR SUBTRACTION.

Simplify each expression.

a) $(3 - 2i) + (-5 + 6i) =$

b) $(3 - 2i) - (-5 + 6i) =$

c) $(8 + 3i) - (2 - 4i)$

d) $7 - (3 + 2i)$

***Short Summary #3:***

***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question***: **How do I perform the different operations under Complex Numbers?**

## EX.4 – SIMPLIFYING COMPLEX NUMBERS USING MULTIPLICATION

Simplify each expression.

a) $(3-2i)(-5+6i) =$

b) $(3-2i)^2 =$

c) $(12i)(7i) =$

d) $(9+4i)^2$

e) $(-2i)(5i)$

f) $(-6-5i)(1+3i)$

***Short Summary #4:***

***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question*: How do I perform the different operations under Complex Numbers?**

## EX.5 – SIMPLIFYING COMPLEX NUMBERS USING DIVISION AND COMPLEX CONJUGATES.

Simplify each expression.

a) $\frac{-14}{2i} =$

b) $\frac{5}{4-7i} =$

c) $\frac{3-2i}{-5+6i} =$

d) $\frac{5i}{2+2i}$

e) $\frac{4-3i}{3-2i}$

f) $\frac{1}{2+5i}$

***Short Summary #5:***

***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question*: How do I perform the different operations under Complex Numbers?**

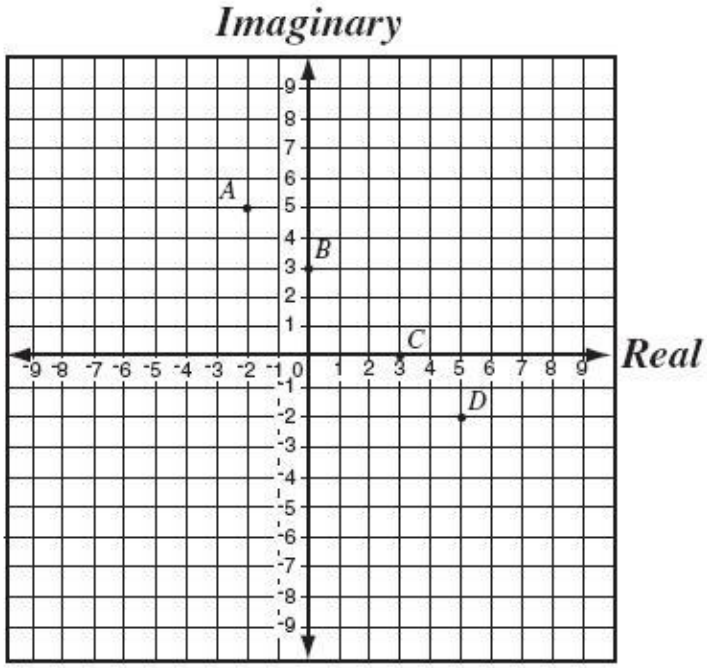
## EX.6 – SIMPLIFYING POWERS OF *i*.

Simplify each power of *i*.

a.) $i^{53}$ b.) $i^{-13}$ c.) $i^{148}$ d.) $i^{-86}$

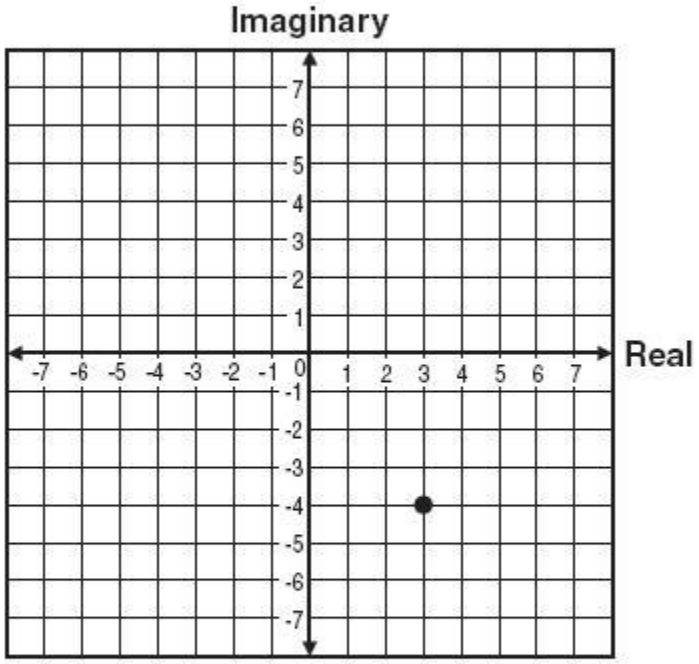
### *Short Summary #6:*

**29** If $i = \sqrt{-1}$, which point shows the location of $5 - 2i$ on the plane?




A point *A*
B point *B*
C point *C*
D point *D*

**31** Which of the following complex numbers is represented by the point on the graph below?




A $4 + 3i$
B $4 - 3i$
C $3 - 4i$
D $3 + 4i$

***Lesson 5-6* – Complex Numbers** I CAN $+, -, \times, \div$ and graph Complex Numbers.
***Essential Question***: **How do I perform the different operations under Complex Numbers?**

**30** If $i = \sqrt{-1}$, what is the value of $i^4$?

A $i$

B $-i$

C 1

D $-1$

**32** If $i = \sqrt{-1}$, then $4i(6i) =$

A 48

B 24

C $-24$

D $-48$

**33** What is an equivalent form of $\frac{2}{3+i}$?

A $\frac{3-i}{4}$

B $\frac{3-i}{5}$

C $\frac{4-i}{4}$

D $\frac{4-i}{5}$