SM 2

Date: **Section:**

Objective:

History:

For centuries, mathematicians kept running into problems that required them to take the square roots of negative numbers in the process of finding a solution. None of the numbers that mathematicians were used to dealing with (the “real” numbers) could be multiplied by themselves to give a negative. These square roots of negative numbers were a new type of number. The French mathematician René Descartes named these numbers “imaginary” numbers in 1637. Unfortunately, the name “imaginary” makes it sound like imaginary numbers don’t exist. They do exist, but they seem strange to us because most of us don’t use them in day-to-day life, so we have a hard time visualizing what they mean. However, imaginary numbers are extremely useful (especially in electrical engineering) and make many of the technologies we use today (radio, electrical circuits) possible.

The number i:

Examples: Express in terms of i.

a) $\sqrt{-64}$ b) $\sqrt{-12}$ c) $-\sqrt{-49}$ d) $-\sqrt{-18}$

Imaginary Number:

Complex Number:

Steps for Adding and Subtracting Complex Numbers:

1.

2.

Examples: Add or subtract and simplify.

a) $(2+5i)+(1-3i)$

b) $(4-3i)-(-2+5i)$

c) $(-3-7i)-(-6)$

d) $5i-(1-i)$

Steps for Multiplying Complex Numbers if they are written as square roots:

1.

2.

3.

★ **Why is $i^2 = -1$?**

Examples: Multiply and simplify. If the answer is imaginary, write it in the form $a+bi$.

a) $\sqrt{-9}\cdot\sqrt{-4}$

b) $\sqrt{-3}\cdot\sqrt{-5}$

c) $-\sqrt{-8}\cdot\sqrt{-27}$

Steps for Multiplying Complex Numbers if they are written *i*.

1.

2.

3.

Examples: Multiply and simplify. If the answer is imaginary, write it in the form $a+bi$.

a) $-2i\cdot 7i$

b) $-3i\cdot i\sqrt{5}$

c) $3i(2-i)$

d) $(7+3i)(9-8i)$

e) $(2-i)^2$

f) $(3-4i)(3+4i)$