GUIDED NOTES – 2.4 COMPLEX NUMBERS
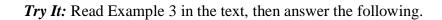
LEARNING OBJECTIVES

In this section, you will:

- Add and subtract complex numbers.
- Multiply and Divide complex numbers.

EXPRESSING SQUARE ROOTS OF NEGATIVE NUMBERS AS MULTIPLES OF i

- If the value in the radicand is negative, the root is said to be an _____. The imaginary number i is defined as _____.

$$\text{If } i = \underline{\hspace{1cm}}, \text{ then } i^2 = \underline{\hspace{1cm}}.$$

- A complex number is expressed in standard form when written _____. Where a is _____ and b is _____. Give an example of a complex number in standard form below.

- If $b = 0$, then $a + bi$ is a _____. If $a = 0$ and b is not equal to 0, the complex number is called a _____.

Try It: Read Example 1 in the text, then answer the following.

Express $\sqrt{-24}$ in standard form.

ADDING AND SUBTRACTING COMPLEX NUMBERS

- Write out the 3 step process for finding the sum or difference of two complex numbers.

1.

2.

3.

Try It: Read Example 3 in the text, then answer the following.

Subtract $2 + 5i$ from $3 - 4i$.

MULTIPLYING COMPLEX NUMBERS

- Write out the 2 step process for multiplying to find the product given a complex number and a real number.

  1.

  2.

Try It: Read Example 4 in the text, then answer the following.

Find the product: $\frac{1}{2}(5 - 2i)$.

- Write out the 3 step process for multiplying to find the product given two complex numbers.

  1.

  2.

  3.

Try It: Read Example 5 in the text, then answer the following.

Multiply: $(3 - 4i)(2 + 3i)$

DIVIDING COMPLEX NUMBERS

- Dividing two complex numbers can be more complicated, because we cannot divide by an imaginary number. This means a fraction must have a _____ to write the answer in standard form a + bi.
- The term by which we can multiply the numerator and the denominator that will eliminate the imaginary portion of the denominator is called the _____. Please explain below how to find this term.

Study the box in your textbook titled "the complex conjugate."

- When a complex number is multiplied or added to its complex conjugate, the result is a _____.

Try It: Read Example 6 in the text, then answer the following.

Find the complex conjugate of $-3 + 4i$.

- Write out the 4 step process for dividing two complex numbers.

1.

2.

3.

4.

Try It: Read Example 7 in the text, then answer the following.

Divide: $(2 - 6i)$ by $(4 + 8i)$

SIMPLIFYING POWERS OF i

- The powers of i are cyclic. Fill out the values for the increasing powers of i.

$$i = \underline{\hspace{2cm}} \qquad i^5 = \underline{\hspace{2cm}}$$

$$i^2 = \underline{\hspace{2cm}} \qquad i^6 = \underline{\hspace{2cm}}$$

$$i^3 = \underline{\hspace{2cm}} \qquad i^7 = \underline{\hspace{2cm}}$$

$$i^4 = \underline{\hspace{2cm}} \qquad i^8 = \underline{\hspace{2cm}}$$

- The cycle is repeated every \underline{\hspace{2cm}} powers.

Try It: Read Example 8 in the text, then answer the following.

Evaluate: i^{18}