

**Section 1.3 Guided Notebook****Section 1.3 Complex Numbers**

- Work through Section 1.3 TTK
- Work through Objective 1
- Work through Objective 2
- Work through Objective 3
- Work through Objective 4
- Work through Objective 5

**Section 1.3 Complex Numbers****1.3 Things To Know**

## 1. Simplifying Radical Expressions Using the Product Rule

Can you simply the radical expression  $\sqrt{12}$  or  $\sqrt{50x^4y^3}$ ? Work through the animation and video and then try working through a “You Try It” problem or refer to Section R.3.

**THE IMAGINARY UNIT**

Take notes on the video that explains the imaginary unit here:

### Section 1.3

What is the definition of the **imaginary unit**?

#### Section 1.3 Objective 1 Simplifying Powers of $i$

Explain the cyclic nature of powers of  $i$ :

Work through Example 1 and take notes here:

Simplify each of the following:

a.  $i^{43}$

b.  $i^{100}$

c.  $i^{-21}$

## COMPLEX NUMBERS

What is a complex number?

Give several examples of complex numbers.

Is every real number considered a complex number? Why or why not?

### Section 1.3

#### Section 1.3 Objective 2 Adding and Subtracting Complex Numbers

Watch the video, work through Example 2 and explain how to add/subtract complex numbers.

Perform the indicated operations:

a.  $(7 - 5i) + (-2 - i)$

b.  $(7 - 5i) - (-2 - i)$

#### Section 1.3 Objective 3 Multiplying Complex Numbers

Fill in the blanks:

When multiplying complex numbers, treat the problem as if it were the multiplication of two \_\_\_\_\_ . Just remember that \_\_\_\_\_ = \_\_\_\_\_ .

Work through Example 3 and show your work here. Watch the video to check your solution.

Multiply  $(4 - 3i)(7 + 5i)$ .

Example 4: Simplify  $(\sqrt{3} - 5i)^2$ . Work through the video that accompanies Example 4 and write your notes here:

What is the definition of a **complex conjugate**?

Work through Example 5 and show your work:

Multiply the complex number  $z = -2 - 7i$  by its complex conjugate  $\bar{z} = -2 + 7i$ .

What will **always** happen when you multiply a complex number by its complex conjugate?

## Section 1.3

### Section 1.3 Objective 4 Finding the Quotient of Complex Numbers

What is the goal when dividing two complex numbers?

Work through Example 6 and take notes here. Watch the video at the top of page 1.3-11 to check your solution.

Write the quotient in the form  $a + bi$ :  $\frac{1-3i}{5-2i}$

### Section 1.3 Objective 5 Simplifying Radicals with Negative Radicands

Write down the property seen on page 1.3-12.

Work through Example 7 and write your notes here: Simplify:  $\sqrt{-108}$

True or False:  $\sqrt{a}\sqrt{b} = \sqrt{ab}$  for all real numbers  $a$  and  $b$ . Explain.

Work through Example 8 and write your notes here: Simplify the following expressions:

a)  $\sqrt{-8} + \sqrt{-18}$

b)  $\sqrt{-8} \cdot \sqrt{-18}$

c)  $\frac{-6 + \sqrt{(-6)^2 - 4(2)(5)}}{2}$

d)  $\frac{4 \pm \sqrt{-12}}{4}$