MATH 1010 ~ Intermediate Algebra   Chapter 7: RADICALS AND COMPLEX NUMBERS

Section 7.6: Complex Numbers
Objectives:

❋ Write the square roots of negative numbers in i-form and perform operations on them.
❋ Determine the equality of two complex numbers
❋ Add, subtract and multiply complex numbers.
❋ Use complex conjugates to write the quotient of two complex numbers in standard form.

$$\sqrt{-1} = i$$

$$\sqrt{-45}$$

$$3-2i$$

The Imaginary Unit i

Powers of i

$$\sqrt{-1} = i$$

$$i^1 =$$

$$i^2 =$$

$$i^3 =$$

$$i^4 =$$

$$i^5 =$$

$$i^6 =$$

$$i^7 =$$

① Simplify these.

a) $\sqrt{-9} =$ b) $\sqrt{-27} =$

c) $\sqrt{-\dfrac{81}{8}} =$

Standard Form of Complex Numbers

$$a + bi$$

Equality of Two Complex Numbers

$$a + bi = c + di$$

Operations on Complex Numbers

Addition and Subtraction:

② EXAMPLE
Combine and simplify these.

$a)\quad (3 - i) + (-2 + 5i)$

$b)\quad 2 - i + \sqrt{25} - \sqrt{-49}$

$c)\quad 7 + 3i + 1 - \sqrt{-8} - \sqrt{-4}$

Multiplying Complex Numbers

③ EXAMPLE

Multiply and simplify these.

a) $(2 - 3i)(\sqrt{-4})$

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

c) $(4 - i)(4 + i)$

Complex Conjugates

④ EXAMPLE

Determine the conjugate of each of these and multiply the number and the conjugate.

a) $7 - 3i$

b) $-8 + 2i$

c) $9\sqrt{3} - 2\sqrt{5}i$

Division of Complex Numbers

⑤ EXAMPLE
Determine the quotient of these.

a) $\dfrac{2-3i}{2i}$

b) $\dfrac{6}{4+i}$

c) $\dfrac{2-4i}{1+3i}$

A few more things:

a) i^{25}

b) i^{177}

c) i^{104}

Remember this:

$\sqrt{-72}\,\sqrt{-8} =$ $\dfrac{\sqrt{-72}}{\sqrt{-8}} =$