5. 
$$8m^{2} + 4m - 16 = -m^{2} + m^{2} + m^{2}$$

7. 
$$4b^{2} + 8b + 7 = 4$$
 $4b^{2} + 8b + 3 = 0$ 
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## 8-2 Complex Operations

Objective: Students will be able to:

Know the parts of a complex number

Know how to add, subtract, and multiply 2 complex numbers

Reduce different powers of  $\dot{t}$ 

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

$$(i)^2 = (\sqrt{-1})^2$$

$$i^2 = -1$$

$$i^2 = -1$$

## Definition

Complex numbers are numbers of the form a+bi, where a and b are real numbers. The real number a is called the real part and the number b is called the imaginary part.

Standard form

Identify the real and imaginary parts of each complex number.

Write each of the following as a pure imaginary number. 
$$\sqrt{-16} = \sqrt{16 \cdot -1} \qquad \sqrt{-3} = \sqrt{3 \cdot -1} = \sqrt{13} \cdot \sqrt{-1}$$

$$\sqrt{-18} = \sqrt{18 \cdot -1} \qquad \sqrt{18} \cdot \sqrt{-1}$$

$$\sqrt{36} = \sqrt{372} i$$

You Try
$$\sqrt{-12} \qquad \sqrt{-5}$$

$$\sqrt{36} \qquad 6i$$

You Try
$$-2 - \sqrt{-8}$$

$$-2 - \sqrt{-8}$$

$$-2 - \sqrt{-8}$$

$$-2 - \sqrt{-2}$$

$$-2 - \sqrt{-$$

Add:  

$$(4-3i) \oplus (-2+5i)$$

$$4-3i-2+5i$$

$$2+2i$$

$$(4+\sqrt{-25})+(-6-\sqrt{-16})$$

$$(4+6i) \oplus (-6-4i)$$

$$4+-6+6i+-4i$$

$$-2+i$$

Subtract: 
$$(-3+7i)-(5-4i)$$

$$-3+7i-5+4i$$

$$-8+11i$$

$$(3+\sqrt{-12})-(-2-\sqrt{-27})$$

$$(3+\sqrt{12}i)-(-2-\sqrt{27}i)$$

$$(3+2\sqrt{3}i)-(-2-\sqrt{3}i)$$

$$(3+2\sqrt{3}i)-(-2-\sqrt{3}i)$$

$$(3+2\sqrt{3}i)+2\sqrt{3}i$$

$$(3+2\sqrt{3}i)+3\sqrt{3}i$$

You Try

$$(4 - \sqrt{-4}) + (-7 + \sqrt{-9})$$

$$(4-2i)-(-2+7i)$$

Multiply
$$4i(3-6i)$$

$$12i-24i^{2}$$

$$12i-24(-1)$$

$$12i+24$$

$$24+12i$$

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

$$|9.(3+2i)^2 = (3+2i)(3+2i)$$

Remember from before:

$$\sqrt[n]{a}\sqrt[n]{b} = \sqrt[n]{ab}$$

only works when  $\sqrt[n]{a}$  and  $\sqrt[n]{b}$  are real numbers

This means that

$$\sqrt{a}\sqrt{b} \neq \sqrt{ab}$$
 if  $a < 0$  or  $b < 0$ 

Multiply

$$\sqrt{-25}\sqrt{-4}$$

$$(2+\sqrt{-16})(1-\sqrt{-4})$$

You Try

$$\sqrt{-9}\sqrt{-36}$$

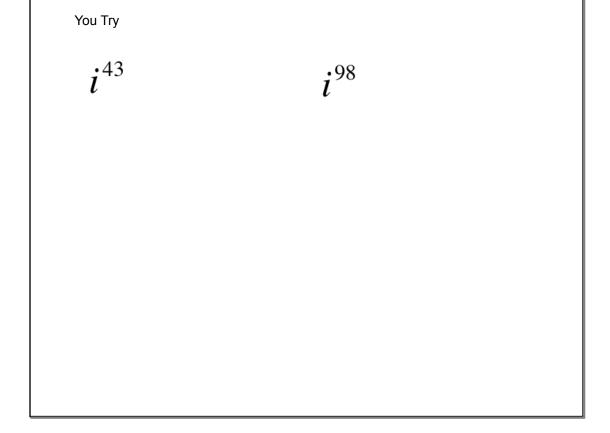
$$\left(2+\sqrt{-36}\right)\!\!\left(4-\sqrt{-25}\right)$$

Evaluate

$$i^1$$
 $i^5$ 
 $i^2$ 
 $i^6$ 
 $i^7$ 

 $i^8$ 

Evaluate:		
$i^{34}$	$i^{101}$	



The rest is Hor	ore

Multiply (What Happens?)

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

## Complex Conjugate

If a+bi is a complex number, then its conjugate is defined as a-bi

Divide:

$$\frac{3+4i}{2i}$$

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

You Try

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

$$\frac{4+3i}{1-3i}$$