Name:	Date:	Unit 6 Class Work

#### **Polynomials with Imaginary Roots Class Work**

♂ **Objective:** You will be able to rewrite polynomials with imaginary roots.

## **Review Do-Now**

Determine the roots, as well as their multiplicities of each function:

$$f(q) = q^4 - 8q^2 + 16.$$

$$p(w) = 4w + 16w^3 + 16w^5$$

#### **Polynomials with Imaginary Roots Class Work**

**Solution:** You will be able to rewrite polynomials with imaginary roots.

### Task A:

Which equation has imaginary factors, and why?

$$x^2 - 18 = 18$$

$$x^{2} + 18 = -18$$

$$x^{2} = -36$$

$$x^{2} + 64 = -16x$$

$$x^{2} - 16x + 64 = -(x - 8)(x - 8)$$

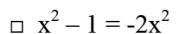
$$x^2 + 64 = -16x$$
  
 $x - 16x + 64 = (x - 8)(x - 8)$ 

$$x^2 - 80 = -16x$$

**Task B:** Which equation has *i* as a root, and why?

$$x^2 + 1 = 2x^2$$

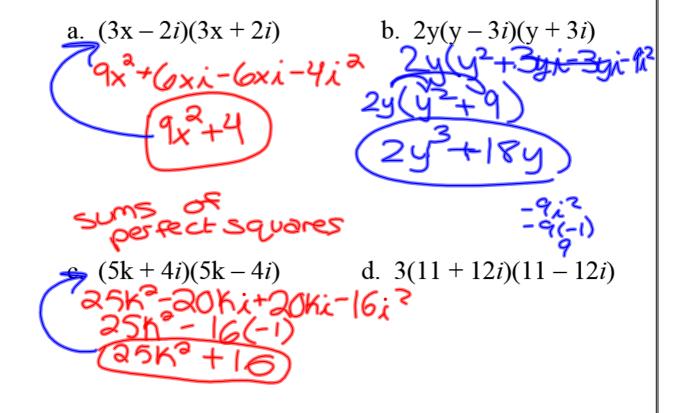
$$\Box 4x^2 - 1 = 3x^2$$



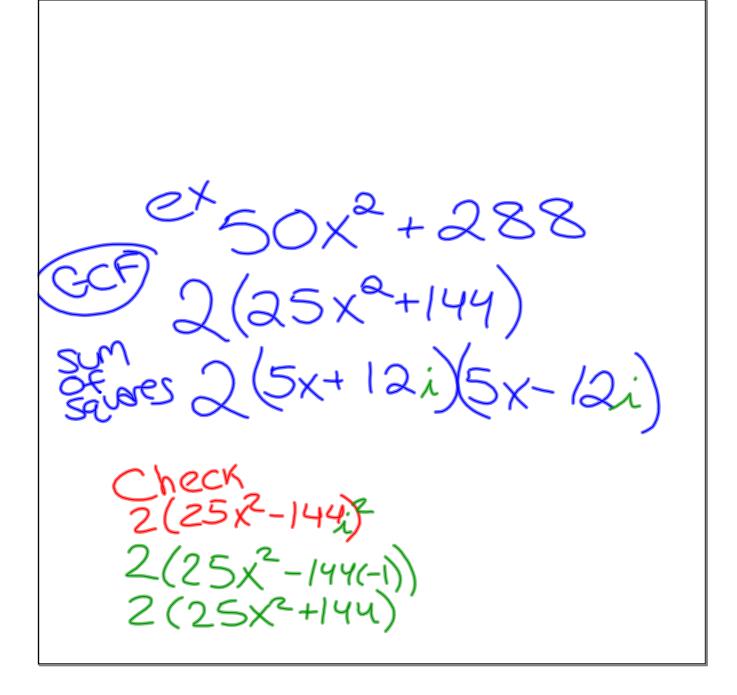
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# **EXPRESSIONS WITH IMAGINARY ROOTS: Goal 1:**

Rewrite each expression as a single binomial.



**Goal 2:** State any relationships you noticed or observations you can make about the types of problems in a, b, c, and d.



**Goal 3:** Work Backwards! Express each binomial as a sum of two or three factors.

a. 
$$9r^2 + 169$$
 $3r + 13i$ 
 $8(m^2 + 200)$ 
 $(3x - 13i)(3x + 13i)$ 
 $8(m + 5i)(m - 5i)$ 

c. 
$$400b^{2} + 9$$
 d.  $3x^{3} + 48x$    
 $(20b+3i)$   $3 \times (x^{2} + 16)$    
 $3 \times (x+4i)(x-4i)$ 

**Goal 4:** Compare and contrast "difference of two squares," and "sum of two squares" expressions. How are they alike; how are the different? You may choose to create examples to support your claims! ©

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Homework: Factor each expression.

$$1.4d^2 + 81$$

2. 
$$3x^2 + 147$$

3. 
$$36n^3 + 16n$$

4. 
$$196f^4 + 121$$

**Solutions:** 

1. 
$$(2d + 9i)(2d - 9i)$$
 2.  $3(x + 7i)(x - 7i)$ 

2. 
$$3(x + 7i)(x - 7i)$$

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

3. 
$$4n(3n + 2i)(3n - 2i)$$
 4.  $(14f^2 + 11i)(14f^2 - 11i)$ 

\*Also remember to work on some Tenmarks! ©