

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Unit 6 Class Work

**Polynomials with Imaginary Roots Class Work**

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

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**Review Do-Now**

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

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

*quartic trinomial 4 solutions*

Factor

$(q^2 - 4)(q^2 - 4) = 0$

$(q-2)(q+2)(q-2)(q+2) = 0$

$(q-2)^2(q+2)^2 = 0$

$q-2=0$   
 $q=2 (M.2)$

$q+2=0$   
 $q=-2 (M.2)$

*Roots Solutions zeroes Factors synonyms*

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

*quintic Solutions*

$4w(1 + 4w^2 + 4w^4) = 0$

$4w(1 + 2w^2)(1 + 2w^2) = 0$

$\frac{4w}{4} = 0$   
 $w = 0$   
 $(M.1)$

$1 + 2w^2 = 0$   
 $2w^2 = -1$   
 $w^2 = -\frac{1}{2}$   
 $\sqrt{w^2} = \sqrt{-1/2}$   
 $w = \pm i\sqrt{1/2}$

$w = i\sqrt{1/2} (M.2)$   
 $w = -i\sqrt{1/2} (M.2)$

*5 Solutions*

$r(s) = s^4 - 6s^2 + 9$

$(s^2 - 3)(s^2 - 3) = 0$

$s^2 - 3 = 0$   $\sqrt{s^2} = \sqrt{3}$

$s = \pm\sqrt{3} (M.2)$

$s = \sqrt{3} (M.2)$   
 $s = -\sqrt{3} (M.2)$

$f(x) = 3x + 18x^3 + 27x^5$

$3x(1 + 6x^2 + 9x^4)$

$3x(1 + 3x^2)(1 + 3x^2)$

$3x = 0$   
 $x = 0$   
 $(M.1)$

$1 + 3x^2 = 0$   
 $3x^2 = -1$   
 $x^2 = -1/3$   
 $x = i\sqrt{1/3} (M.2)$   
 $x = -i\sqrt{1/3} (M.2)$

**Polynomials with Imaginary Roots Class Work**

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

**Task A:**

Which equation has imaginary factors, and why?

$x^2 - 18 = 18$

$x^2 + 18 = -18$

$x^2 + 64 = -16x$

$x^2 - 80 = -16x$

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

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

$4x^2 + 1 = 3x^2$

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

$x^2 - 1 = -2x^2$

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

Rewrite each expression as a single binomial.

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

b.  $2y(y - 3i)(y + 3i)$

c.  $(5k + 4i)(5k - 4i)$

d.  $3(11 + 12i)(11 - 12i)$

**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.  $9r^2 + 169$

b.  $8m^2 + 200$

c.  $400b^2 + 9$

d.  $3x^3 + 48x$

**Goal 4:** Compare and contrast “difference of two squares,” and “sum of two squares” expressions. How are they alike; how are they 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.  $3(x + 7i)(x - 7i)$

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

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

\*Also remember to work on some Tenmarks! ☺