

Name: \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

## NOTES: Section 5.4 – Factor and Solve Polynomial Equations

Goals: #1 - I can factor a polynomial completely including methods for common monomials, difference of two squares, sum or difference of two cubes, factoring by grouping, the quadratic form.

#2 - I can recognize on my own which method of factoring is appropriate for a polynomial.

#3 - I can find the real number solutions of a polynomial.



*Homework: Lesson 5.4 Worksheet*

**Exploration #1:** Work with a partner and answer the following questions.

1. Factor the following completely:

a.  $2x^2 - 3x - 20$

b.  $x^2 + 8x + 16$

c.  $9x^2 - 1$

d.  $8x^2 + 20x$

**Notes:**

We can also factor \_\_\_\_\_ with degree greater than 2!

Some of these \_\_\_\_\_ can be \_\_\_\_\_ using techniques we already learned!

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**Example #1:** Factor the polynomial completely.

1.  $x^3 + 2x^2 - 15x$

2.  $2y^5 - 18y^3$

**You practice:** Factor the polynomial completely.

2.  $3x^3 + 30x^2 + 75x$

2.  $5g^5 - 80g^3$

**Notes:**

There are \_\_\_\_\_ factoring patterns we can look for!

**Sum of Two Cubes**

**Difference of Two Cubes**

**Example #2:** Factor the polynomial completely.

1.  $x^3 + 64$

2.  $16z^5 - 250z^2$

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**You practice:** Factor the polynomial completely.

1.  $w^3 - 27$

2.  $16b^5 + 686b^2$

**Notes:**

When a polynomial has \_\_\_\_\_ terms, we \_\_\_\_\_.

**Example #3:** Factor the polynomial completely.

1.  $x^3 - 3x^2 - 16x + 48$

2.  $x^3 + 7x^2 - 9x - 63$

**Notes:**

Another pattern we can look for, is if a polynomial is in \_\_\_\_\_.

An expression in the form \_\_\_\_\_ is in quadratic form.

**Examples:**

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**Example #4:** Factor the polynomial completely.

1.  $16x^4 - 81$

2.  $2p^8 + 10p^5 + 12p^2$

**You practice:** Factor the polynomial completely.

1.  $16g^4 - 625$

2.  $4t^6 - 20t^4 + 24t^2$

**Notes:**

We can still use \_\_\_\_\_ to solve certain \_\_\_\_\_.

We set the polynomial equation equal to \_\_\_\_\_ and use the \_\_\_\_\_.

- **Zero Product Property:**

**Example #5:** Solve the following equations.

1.  $3x^5 + 15x = 18x^3$

2.  $-27x^3 + 15x^2 = -6x^4$

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**You practice:** Solve the following equations.

1.  $4x^5 - 40x^3 + 36x = 0$

2.  $2x^5 + 24x = 14x^3$

**Example #6:** A catering company is designing a box for packing Christmas candies. The company would like the volume of the box to be 54 cubic inches and the bottom of the box to be a square.

a.) Suppose that the bottom of the box has a width that is 3 inches smaller than the height  $x$  of the box. Write a simplified polynomial equation, in standard form, for the volume of the box.

b.) Solve the equation from part (a).

a.) \_\_\_\_\_

c.) What are the dimensions of the box?

b.) \_\_\_\_\_

c.)

length: \_\_\_\_\_

width: \_\_\_\_\_

height: \_\_\_\_\_