

Name: \_\_\_\_\_ Course/Section: \_\_\_\_\_ Instructor: \_\_\_\_\_

**Chapter 13 Factoring Polynomials and Solving Equations**  
**13.5 Summary of Factoring**

Guidelines for Factoring Polynomials ~ Factoring Polynomials

**Key Terms**

*Exercises: Use the vocabulary terms listed below to complete each statement.  
Note that some terms or expressions may not be used. Some terms may be used more than once.*

$$a^2 + b^2$$

$$(a + b)^2$$

$$a^2 - b^2$$

$$(a - b)^2$$

$$a^3 + b^3$$

$$a^3 - b^3$$

**FOIL**

grouping

perfect square

sum of two cubes

completely factored

difference of two squares

perfect square trinomial

greatest common factor (GCF)

difference of two cubes

**Guidelines for Factoring Polynomials**

**STEP 1:** Factor out the \_\_\_\_\_, if possible.

**STEP 2: A.** If the polynomial has four terms, try factoring by \_\_\_\_\_.

**B.** If the polynomial is a binomial, try one of the following.

1. \_\_\_\_\_ =  $(a - b)(a + b)$  This is referred to as a(n) \_\_\_\_\_.

2. \_\_\_\_\_ =  $(a - b)(a^2 + ab + b^2)$  This is referred to as a(n) \_\_\_\_\_.

3. \_\_\_\_\_ =  $(a + b)(a^2 - ab + b^2)$  This is referred to as a(n) \_\_\_\_\_.

**C.** If the polynomial is a trinomial, check for a(n) \_\_\_\_\_.

1.  $a^2 + 2ab + b^2 =$  \_\_\_\_\_ This is referred to as a(n) \_\_\_\_\_.

2.  $a^2 - 2ab + b^2 =$  \_\_\_\_\_ This is referred to as a(n) \_\_\_\_\_.

Otherwise, try to factor the trinomial by \_\_\_\_\_ or apply \_\_\_\_\_ in reverse.

**STEP 3:** Check to make sure that the polynomial is \_\_\_\_\_.

**Factoring Polynomials**

*Exercises 1-8: Refer to Examples 1-8 on pages 830-832 in your text and the Section 13.5 lecture video.*

**Factor.**

1.  $5x^3 - 20x^2 + 25x$  1. \_\_\_\_\_

2.  $4t^4 + 144t^2$  2. \_\_\_\_\_

3.  $-45a^3 - 30a^2 - 5a$  3. \_\_\_\_\_

4.  $5x^3 - 320$  4. \_\_\_\_\_

5.  $24x^4 + 10x^3 - 4x^2$  5. \_\_\_\_\_

6.  $8x^3 + 4x^2 - 72x - 36$  6. \_\_\_\_\_

7.  $16a^3b - 36ab^3$  7. \_\_\_\_\_

8.  $12x^3 + 9x^2 + 20x + 15$  8. \_\_\_\_\_

## Chapter 13 Factoring Polynomials and Solving Equations

### 13.6 Solving Equations by Factoring I (Quadratics)

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The Zero-Product Property ~ Solving Quadratic Equations ~ Applications

#### Key Terms

*Exercises 1-5: Use the vocabulary terms listed below to complete each statement.*

*Note that some terms or expressions may not be used.*

zeros  
standard form  
zero-product  
quadratic equation  
quadratic polynomial

- A) The \_\_\_\_\_ property states that if the product of two numbers (or expressions) is 0, then at least one of the numbers (or expressions) must equal 0.
- B) Any \_\_\_\_\_ in the variable  $x$  can be written as  $ax^2 + bx + c$  with  $a \neq 0$ .
- C) The \_\_\_\_\_ of a polynomial in  $x$  are the values that, when substituted for  $x$ , result in 0.
- D) Any \_\_\_\_\_ in the variable  $x$  can be written as  $ax^2 + bx + c = 0$  with  $a \neq 0$ .
- E) The form  $ax^2 + bx + c = 0$  is called the \_\_\_\_\_ of a quadratic equation.

**The Zero-Product Property**

*Exercises 1-4: Refer to Example 1 on page 835 in your text and the Section 13.6 lecture video.*

*Solve each equation.*

9.  $x(x+2) = 0$

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10.  $3a^2 = 0$

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11.  $(b+1)(b-4) = 0$

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12.  $x(x-3)(x+5) = 0$

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**Solving Quadratic Equations**

*Exercises 5-9: Refer to Examples 2-3 on pages 836-837 in your text and the Section 13.6 lecture video.*

*Solve each quadratic equation. Check your answers.*

13.  $x^2 + 4x = 0$

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14.  $t^2 = 9$

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15.  $a^2 - 5a + 6 = 0$

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16.  $10x^2 + 7x = 12$

\_\_\_\_\_

17. Solve  $2x^2 - 9x = 5$ .

\_\_\_\_\_

**Applications**

*Exercises 10-12: Refer to Examples 4-6 on pages 838-839 in your text and the Section 13.6 lecture video.*

18. The height  $h$  in feet of a baseball after  $t$  seconds is given by  $h(t) = -16t^2 + 88t + 4$ . At what values of  $t$  is the height of the baseball 100 feet?

\_\_\_\_\_

19. The braking distance  $D$  in feet required to stop a car traveling at  $x$  miles per hour on wet, level pavement can be approximated by  $D = \frac{1}{9}x^2$ .

(a) Calculate the braking distance for a car traveling at 40 miles per hour.

(a) \_\_\_\_\_

(b) If the braking distance is 60 feet, estimate the speed of the car.

(b) \_\_\_\_\_

20. A digital photograph is 20 pixels longer than it is wide and has a total area of 3500 pixels. Find the dimensions of this photograph.

\_\_\_\_\_

13.5

Step 1: GCF

2A: Grouping

B1:  $a^2 - b^2$ , difference of squaresB2:  $a^3 - b^3$ , difference of cubesB3:  $a^3 + b^3$ , sum of cubes

C: perfect square

C1:  $(a+b)^2$ , perfect square trinomialC2:  $(a-b)^2$ , perfect square trinomial

C: grouping, FOIL

Step 3: completely factored

- 1)  $5x(x^2 - 4x + 5)$
- 2)  $4t^2(t^2 + 36)$
- 3)  $-5a(3a+1)^2$
- 4)  $5(x-4)(x^2 + 4x + 16)$
- 5)  $2x^2(4x-1)(3x+2)$
- 6)  $4(x-3)(x+3)(2x+1)$
- 7)  $4ab(2a-3b)(2a+3b)$
- 8)  $(3x^2+5)(4x+3)$

13.6

- A) zero-product
- B) quadratic polynomial
- C) zeros
- d) quad equation
- e) standard form

- 9)  $x=0, x=-2$
- 10)  $a=0$
- 11)  $b=-1, 4$
- 12)  $x=0, 3, -5$
- 13)  $x=0, -4$
- 14)  $t = \pm 3$
- 15)  $a = 2, 3$
- 16)  $x = 4/5, -3/2$
- 17)  $x = 5, -\frac{1}{2}$
- 18)  $t = \frac{3}{2}, 4$  sec
- 19) a)  $177.\bar{7}$  ft  
b) 23.24 mph
- 20) 50 by 70 pixels