

CHOOSING A FACTORING STRATEGY

Step 1: If necessary, put the polynomial in descending order.

Step 2: If possible, factor out a GCF. If the highest degree term is negative, factor out a negative GCF.

Step 3: How many terms are in the polynomial?

a. If there are two terms, decide if one of the following can be applied.

Difference of two squares: $a^2 - b^2 = (a + b)(a - b)$

Difference of two cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Sum of two cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

b. If there are three terms, try one of the following

Perfect square trinomials: $a^2 + 2ab + b^2 = (a + b)^2$

$a^2 - 2ab + b^2 = (a - b)^2$

If not a perfect square trinomial, factor using methods presented in Sections 4.2, 4.3 and 4.4.

Leading Coefficient 1 – Multi/Add

AC/B method works for both leading coefficients of one or not one.

If there are four or more terms, try factoring by grouping.

Step 4: See if any factors in the factored polynomial can be factored further.

Step 5: Check by Multiplying

Name: _____

Course/Section: _____

Instructor: _____

Chapter 13 Factoring Polynomials and Solving Equations

13.4 Special Types of Factoring

Difference of Two Squares ~ Perfect Square Trinomials ~ Sum and Difference of Two Cubes

STUDY PLAN

Read: Read Section 13.4 on pages 822-827 in your textbook or eText.

Practice: Do your assigned exercises in your Book MyMathLab Worksheets

Review: Keep your corrected assignments in an organized notebook and use them to review for the test.

Key Terms

Exercises 1-6: Use the expressions listed below to complete each statement.

Note that some expressions may not be used.

$$a^2 + b^2$$

$$(a + b)^2$$

$$a^2 - b^2$$

$$(a - b)^2$$

$$(a + b)^3$$

$$(a - b)^3$$

$$(a - b)(a + b)$$

$$a^2 + 2ab + b^2$$

$$a^2 - 2ab + b^2$$

$$(a - b)(a^2 + ab + b^2)$$

$$(a - b)(a^2 + 2ab + b^2)$$

$$(a + b)(a^2 - ab + b^2)$$

$$(a + b)(a^2 - 2ab + b^2)$$

1. For any real numbers a and b , $a^3 + b^3 =$ _____.
2. For any real numbers a and b , $a^2 - 2ab + b^2 =$ _____.
3. For any real numbers a and b , $a^3 - b^3 =$ _____.
4. For any real numbers a and b , $a^2 + 2ab + b^2 =$ _____.
5. For any real numbers a and b , $a^2 - b^2 =$ _____.
6. The expressions _____ and _____ are called perfect square trinomials.

Difference of Two Squares

Exercises 1-4: Refer to Example 1 on page 822 in your text and the Section 13.4 lecture video.

Factor each difference of two squares.

1. $x^2 - 16$ 1. _____

2. $25x^2 - 4$ 2. _____

3. $81 - 25a^2$ 3. _____

4. $9x^2 - 100y^2$ 4. _____

Perfect Square Trinomials

Exercises 5-8: Refer to Example 2 on pages 823-824 in your text and the Section 13.4 lecture video.

If possible, factor each trinomial as a perfect square trinomial.

5. $x^2 + 12x + 36$ 5. _____

6. $9t^2 + 6t + 1$ 6. _____

7. $25x^2 - 40x + 16$ 7. _____

8. $x^2 - 14xy + 49y^2$ 8. _____

Sum and Difference of Two Cubes

Exercises 9-16: Refer to Examples 3-5 on pages 825-826 in your text and the Section 13.4 lecture video.

Factor each polynomial.

9. $x^3 + 125$

9. _____

10. $a^3 - 8$

10. _____

11. $x^3 - 216$

11. _____

12. $64x^3 - 27$

12. _____

13. $16y^2 + 24y + 9$

13. _____

14. $16b^2 - 25$

14. _____

Factor each polynomial completely.

15. $12x^3 - 60x^2 + 75x$

15. _____

16. $9a^3 - 64ab^2$

16. _____

Name: _____ Course/Section: _____ Instructor: _____

Chapter 13 Factoring Polynomials and Solving Equations
13.5 Summary of Factoring

Guidelines for Factoring Polynomials ~ Factoring Polynomials

STUDY PLAN

Read: Read Section 13.5 on pages 829-833 in your textbook or eText.

Practice: Do your assigned exercises in your Book MyMathLab Worksheets

Review: Keep your corrected assignments in an organized notebook and use them to review for the test.

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.

17. $5x^3 - 20x^2 + 25x$ 17. _____

18. $4t^4 - 144t^2$ 18. _____

19. $-45a^3 - 30a^2 - 5a$ 19. _____

20. $5x^3 - 320$ 20. _____

21. $24x^4 + 10x^3 - 4x^2$ 21. _____

22. $8x^3 + 4x^2 - 72x - 36$ 22. _____

23. $16a^3b - 36ab^3$ 23. _____

24. $12x^3 + 9x^2 + 20x + 15$ 24. _____

13.4 Key Terms

- 1) $(a+b)(a^2-ab+b^2)$
- 2) $(a-b)^2$
- 3) $(a-b)(a^2+ab+b^2)$
- 4) $(a+b)^2$
- 5) $(a-b)(a+b)$
- 6) $a^2+2ab+b^2, a^2-2ab+b^2$

- | | |
|---------------------------|-------------------------|
| 1) $(x+4)(x-4)$ | 17) $5x(x-5)(x+1)$ |
| 2) $(5x+2)(5x-2)$ | 18) $4x^2(x+6)(x-6)$ |
| 3) $(9-5a)(9+5a)$ | 19) $-5a(3a+1)^2$ |
| 4) $(3x-10y)(3x+10y)$ | 20) $5(x-4)(x^2+4x+16)$ |
| 5) $(x+6)^2$ | 21) $2x^2(4x-1)(3x+2)$ |
| 6) $(3x+1)^2$ | 22) $4(x-3)(x+3)(2x+1)$ |
| 7) $(5x-4)^2$ | 23) $4ab(2a+3b)(2a-3b)$ |
| 8) $(x-7y)^2$ | 24) $(3x^2+5)(4x+3)$ |
| 9) $(x+5)(x^2-5x+25)$ | |
| 10) $(a-2)(a^2+2a+4)$ | |
| 11) $(x-6)(x^2+6x+36)$ | |
| 12) $(4x-3)(16x^2+12x+9)$ | |
| 13) $(4y+3)^2$ | |
| 14) $(4b-5)(4b+5)$ | |
| 15) $3x(2x-5)^2$ | |
| 16) $a(9a^2-64b^2)$ | |
| $a(3a-8b)(3a+8b)$ | |

Key Terms 13.5

- 1) GCF
- 2A) Factor by grouping
- 2B1) a^2-b^2 ; difference of 2 squares
- 2B2) a^3-b^3 ; difference of 2 cubes
- 2B3) a^3+b^3 ; sum of cubes
- 2C) perfect square
 - 2C1) $(a+b)^2$; perfect square trinomial
 - 2C2) $(a-b)^2$; perfect square trinomial
- 3) FOIL