

UNIT 2: FACTORING POLYNOMIALS

Note-Taking Supplement

Student Package

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Lesson 1

Common Factors

1.1 Common Factors

The meaning of **expand** in mathematics.

The meaning of **factor** in mathematics.

$$2x(x + 3) =$$

$$2x^2 + 6x =$$

$$xy(x - y) =$$

$$x^2y - xy^2 =$$

1.2 Greatest Common Factor

Find the greatest common factor.

18, 24

Finding the Greatest Common Factors of Variables

With Exponents

Example 1:

Find the greatest common factor.

(use mental math)

a) 30, 48

Example 2: Find the greatest common factor.

b) 28, 35

$$a^3b^2, ab^6$$

1.3 Finding the Greatest Common

Find the greatest common of:

$9x^2y^3, -12x^3y^2, 15x^2y^4$

Example 3 Find the greatest common of:

a) $16a^2b^5, 24a^3b^4, 32a^5b^2$

b) $-54m^3n^2, 36m^5n, -72m^2n^2$

1.4 Factoring Polynomials**Example 4** Completely factor $7a^3b - 28ab^3 + 14ab^2$

1.5 Factoring Polynomials**Completely factor $7a^3b - 28ab^3 + 14ab^2$** **USING MENTAL MATH**

$$7a^3b - 28ab^3 + 14ab^2$$

1.6 Factoring Polynomials**Example 5 a) $-15x^5 + 12x^2$**

$$\text{b) } 14a^2b^3 - 18a^3b^2 + 12a^4b^2$$

1.7 Binomial Factors**Completely factor $2xa + 3ya$** **Example 6 Factor completely.**

$$4x(7x - y) - 3y(7x - y)$$

1.8 Binomial Factors**Example 6 Factor each of the following completely**

a) $a(10b - 2) + (10b - 2)$

b) $x(x - 5) + 3(5 - x)$

Lesson 2

Factoring Simple Trinomials

2.1 Factoring Simple Trinomials

Expand and Simplify: $(x + 3)(x + 2)$

Factor completely: $x^2 + 5x + 6$

2.2 Factoring Simple Trinomials

Example 1: Factor Completely: $x^2 + 11x + 28$

Factor Completely: $x^2 + 7x + 10$

2.3 Factoring Simple Trinomials**Example 2: Factor Completely: $x^2 - 13x + 22$** **Factor Completely: $x^2 - 5x + 4$** **2.4 Factoring Simple Trinomials****Factor Completely: $a^2 + 4ab - 12b^2$** **Example 3: Factor Completely: $a^2 - 2ab - 15b^2$**

2.5 Factoring Simple Trinomials

Finding two numbers whose product and sum are given.

$$x^2 - 5x + 36$$

Example 4: Determine two numbers whose products and sums are given.

a) Product 20 Sum 9

d) Product 8 Sum 6

g) Product -16 Sum 6

b) Product -20 Sum -8

e) Product -8 Sum -2

h) Product -16 Sum 15

c) Product -20 Sum 1

f) Product 8 Sum 9

i) Product 18 Sum -11

2.6 Factoring Simple Trinomials

What special feature makes these trinomials simple trinomials?

Is this trinomial a simple trinomial?

$$3x^2 + 15x + 18$$

Example 5:

Factor completely: $5x^2 + 10x - 75$

2.7 Factoring Simple Trinomials

Example 6: Factor each of the following completely.

a) $3x^3 - 21x^2 + 36x$

b) $-4x^2 - 8x + 12$

Lesson 3 Factoring Messy Trinomials

3.1 Factoring Messy Trinomials

Factor completely: $3x^2 + 8x + 4$

Can you remove a common factor?

Factor completely: $3x^2 + 8x + 4$

3.2 Factoring Messy Trinomials

Example 1: Factor each of the following completely.

What is the number one rule of factoring?

a) $2x^2 + 13x + 15$

Factor completely: $8x^2 + 42x + 10$

b) $6x^2 + 51x + 45$

3.3 Factoring Messy TrinomialsFactor completely: $6a^2 - 5ab + b^2$ **Example 2:** Factor each of the following completely.

a) $2a^2 - 7ab + 3b^2$

b) $4a^2 - 11a + 6$

3.4 Factoring Messy TrinomialsFactor completely: $4x^2 - x - 3$ **Example 3:** Factor each of the following completely.

a) $12x^2 - 2xy - 2y^2$

b) $2m^2 + 3m - 9$

Lesson 4

Factoring Difference of Squares and Perfect Trinomial Squares

4.1 Difference of Squares

Expand and simplify: $(2x - 5)(2x + 5) =$ Factor completely: $16 - 49b^2$ **You must be able to recognize a Difference of Squares!!!**Is $18a^2 - 8b^2$ a difference of squares?Factor completely: $25x^2 + 36y^2 =$

4.2 Difference of Squares

Example 1: Factor each of the following completely.

a) $81x^2 - 1$

b) $20a^2 - 5b^2$

c) $32x^2 + 50y^2$

4.3 Difference of Squares

Example 2: Factor each of the following completely.

$$9a^2 - 4b^2$$

a) $81a^2 - (3a + b)^2$

Is this expression a difference of squares?

$$(x + 5)^2 - 49$$

b) $(2a - 1)^2 - (7a + 4)^2$

4.4 Difference of Squares

Example 3: Factor each of the following completely.

$$(7)(7) =$$

a) $64x^2 - \frac{49}{16}$

$$\left(\frac{3}{5}\right)\left(\frac{3}{5}\right) =$$

Is this expression a difference of squares?

b) $\frac{36}{25}a^2 - \frac{9}{4}b^2$

$$\frac{9}{25} - y^2$$

4.5 Difference of Squares

Example 4: Factor completely: $x^4 - 3x^2 - 4$

6.9 Perfect Square Trinomials

Example 7:

Factor completely: $49a^2 + 42a + 9$

Factor each of the following completely.

a) $9x^2 - 6x + 1$

b) $36a^2 - 60ab + 25b^2$

Example 6:

Factor completely: $x^2 - 16xy + 64y^2$

c) $16x^2 - 15x + 1$

Lesson 5

Factor by Substitution and Grouping

5.1 Factoring Polynomials

Factoring a simple trinomial.

$$x^2 + 4x - 5$$

Factoring a messy trinomial.

$$6x^2 - 13x + 5$$

Difference of Squares

$$a^2 - b^2$$

5.2 Factoring Polynomials

First Rule of Factoring

Factor Completely

$$5x^2 - 10x - 15$$

$$x^4 + 3x^2 - 28$$

$$4x^3 - 3x^2 - x$$

5.3 Factoring Polynomials

Example 1

Completely factor the following:

a) $x^4 - 4x^2 - 45$

b) $6x^2 - 14x - 12$

c) $30x^4 - 34x^3 - 8x^2$

5.4 Factoring by Substitution

Example 2

Factor completely.

$$(x + 1)^2 + 4(x + 1) - 5$$

Factor completely. $(3x + 1)^2 + 4(3x + 1) + 3$

Factor completely.

$$a^2 + 4a - 5$$

Example 3

Factor completely. $(a - 3b)^2 - 3(a - 3b) - 10$

5.5 Factor by Grouping

Factor

$$ax + ay$$

Factor by Grouping

When there are 4 terms in a polynomial then these are good candidates for factor by grouping.

Factor $ax + ay + bx + by$

Example 4

Completely factor: $x^3 + x^2 + 2x + 2$

5.6 Factor by Grouping

Example 5 Completely factor each of the following by grouping

a) $5ab + 5b - 3a - 3$

b) $2xy - x - 2y + 1$

5.7 Factor by Grouping

Completely factor:

$$x^5 + 5x^3 - 7x^2 - 35$$

Example 6

Completely factor the following polynomials:

a) $x^3 - 3x^2 - 4x + 12$

b) $x^5 + 3x^3 - 8x^2 - 24$