

**8-1 Adding & Subtracting Polynomials**

1. Classify the polynomial  $4x^3 - 2$  as indicated:

a. by degree:

Cubic

b. by number of terms:

binomial

2. Give an example of a **quadratic trinomial**.

*answers will vary*

3. Find each sum or difference. Express your answer in standard form.

a.  $(5x - 8x^2) + (x - 6)$

$$5x - 8x^2 + x - 6$$

$$\boxed{-8x^2 + 6x - 6}$$

b.  $(4x - 2 - 5x^2) - (3 + x^2 - 4x^3)$

$$4x - 2 - 5x^2 - 3 - x^2 + 4x^3$$

$$\boxed{4x^3 - 6x^2 + 4x - 5}$$



**8-2 Multiplying and Factoring**

1. Multiply:

a.  $-2x^2(x-3)$

$-2x^3 + 6x^2$

b.  $3x(2x^2 - 4x + 5)$

$6x^3 - 12x^2 + 15x$

c.  $-5x(x^3 - x - 2)$

$-5x^4 + 5x^2 + 10x$

2. Find the GCF of each expression:

a.  $36x - 24$

$12$

b.  $20x^2 + 35x$

$5x$

c.  $-2x^3 + 4x^2 - 6x$

$-2x$

3. Factor out the GCF of each expression:

a.  $12x - 8$

$4(3x - 2)$

b.  $8x^2 - 6x$

$2x(4x - 3)$

a.  $6x^3 - 12x^2 + 4x$

$2x(3x^2 - 6x + 2)$

$2x(3x - 2)(x - 2)$

$\begin{array}{r} 12 \\ -2 \quad -6 \\ \hline -8 \end{array}$

b.  $-6x^4 + 21x^3 + 12x^2$

$-3x^2(2x^2 - 7x - 4)$

$-3x^2(2x + 1)(x - 4)$

→

KEY

**8-3 Multiplying Binomials**

Simplify completely (1-4):

1.  $(x + 3)(x + 7)$

$$x^2 + 10x + 21$$

2.  $(x - 5)(x - 4)$

$$x^2 - 9x + 20$$

3.  $(2x - 1)(3x + 5)$

$$6x^2 + 7x - 5$$

4.  $(x + 2)(x^2 + 3x - 1)$

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

5.  $(2x - 3)^2$

$$4x^2 - 12x + 9$$

**8-5 Factoring  $x^2 + bx + c$** 

Factor completely (1-4):

1.  $x^2 + 6x + 5$

$$(x+5)(x+1)$$

2.  $x^2 - 11x - 42$

$$(x-14)(x+3)$$

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

$$3(x^2 - 5x + 6)$$

$$= 3(x-2)(x-3)$$

4.  $-2x^3 + 10x^2 + 28x$

$$-2x(x^2 - 5x - 14)$$

$$-2x(x-7)(x+2)$$

5. What is the length of a rectangle that has a width of  $x - 3$  and an area of  $x^2 - 18x + 45$ ?

$$(x-3)(\quad) = x^2 - 18x + 45$$

$$(x-3)(x-15)$$

The length of the rectangle is  $x-15$ .

**8-6 Factoring  $ax^2 + bx + c$** 

Factor completely (1-4):

1.  $5x^2 + 19x - 4$

$$= (5x - 1)(x + 4)$$

2.  $6x^2 - 23x + 20$

$$= (3x - 4)(2x - 5)$$

3.  $4x^2 - 5x - 6$

$$(4x + 3)(x - 2)$$

4.  $12x^2 + 20x - 8$

$$= 4(3x^2 + 5x - 2)$$

$$= 4(3x - 1)(x + 2)$$

5. What is the length of a rectangle that has a width of  $3x + 4$  and an area of  $18x^2 + 69x + 60$ ?

$$(3x + 4)(?) = 18x^2 + 69x + 60$$

$$(3x + 4)(6x + 15)$$

The length of the rectangle is  $6x + 15$

**8-7 Factoring Special Cases**

Factor completely (1-4):

1.  $x^2 - 12x + 36$

$$(x-6)^2$$

2.  $4x^2 - 9$

$$(2x+3)(2x-3)$$

→

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

$$3(x^2 - 10x + 25)$$

$$= 3(x-5)^2$$

4.  $2x^3 - 128x$

$$= 2x(x^2 - 64)$$

$$= 2x(x+8)(x-8)$$

5. The area of a square is  $9x^2 - 24x + 16$ . How long is each side?

$$9x^2 - 24x + 16 = ( ? )^2$$

$$(3x-4)(3x-4)$$

Each side is  $3x-4$  long.

KEY

## 8-8 Factoring by Grouping

Factor completely:

$$\begin{aligned} 1. \quad & 10x^3 - 25x^2 + 4x - 10 \\ & = 5x^2(2x - 5) + 2(2x - 5) \\ & = \boxed{(2x - 5)(5x^2 + 2)} \end{aligned}$$

(2)

$$\begin{aligned} 2. \quad & 2x^3 + x^2 - 6x - 3 \\ & = x^2(2x + 1) - 3(2x + 1) \\ & = \boxed{(2x + 1)(x^2 - 3)} \end{aligned}$$

(2)

$$\begin{aligned} 3. \quad & 30x^3 - 12x^2 + 120x - 48 \\ & = 6(5x^3 - 2x^2 + 20x - 8) \\ & = 6[x^2(5x - 2) + 4(5x - 2)] \\ & = \boxed{6(5x - 2)(x^2 + 4)} \end{aligned}$$

(3)

$$\begin{aligned} 4. \quad & 10x^4 + 30x^3 + 5x^2 + 15x \\ & = 5x[2x^3 + 6x^2 + x + 3] \\ & = 5x[2x^2(x + 3) + 1(x + 3)] \\ & = \boxed{5x(x + 3)(2x^2 + 1)} \end{aligned}$$

(3)