

# Lesson-by-Lesson Review

## 8-1 Adding and Subtracting Polynomials

Write each polynomial in standard form. **11.**  $3x^2 + x + 2$

11.  $x + 2 + 3x^2$

12.  $1 - x^4 - x^4 + 1$

13.  $2 + 3x + x^2$   
 $x^2 + 3x + 2$

14.  $3x^5 - 2 + 6x - 2x^2 + x^3$   
 $3x^5 + x^3 - 2x^2 + 6x - 2$

Find each sum or difference.

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

16.  $a^2 + 5a - 3 - (2a^2 - 4a + 3)$   $-a^2 + 9a - 6$

17.  $(4x - 3x^2 + 5) + (2x^2 - 5x + 1)$   $-x^2 - x + 6$

18. **PICTURE FRAMES** Jean is framing a painting that is a rectangle. What is the perimeter of the frame?



$5x + 3$

$2x^2 - 3x + 1$

$4x^2 + 4x + 8$

### Example 1

Write  $3 - x^2 + 4x$  in standard form.

**Step 1** Find the degree of each term.

3: degree 0

$-x^2$ : degree 2

$4x$ : degree 1

**Step 2** Write the terms in descending order of degree.

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

### Example 2

Find  $(8r^2 + 3r) - (10r^2 - 5)$ .

$(8r^2 + 3r) - (10r^2 - 5)$

$= (8r^2 + 3r) + (-10r^2 + 5)$  Use the additive inverse.

$= (8r^2 - 10r^2) + 3r + 5$  Group like terms.

$= -2r^2 + 3r + 5$  Add like terms.

$(11) 3x^2 + x + 2$

## 8-2 Multiplying a Polynomial by a Monomial

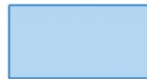
Solve each equation.

19.  $x^2(x + 2) = x(x^2 + 2x + 1)$  **0**

20.  $2x(x + 3) = 2(x^2 + 3)$  **1**

21.  $2(4w + w^2) - 6 = 2w(w - 4) + 10$  **1**

22. **GEOMETRY** Find the area of the rectangle.



$3x$

$x^2 + x - 7$

$3x^3 + 3x^2 - 21x$

### Example 3

Solve  $m(2m - 5) + m = 2m(m - 6) + 16$ .

$m(2m - 5) + m = 2m(m - 6) + 16$

$2m^2 - 5m + m = 2m^2 - 12m + 16$

$2m^2 - 4m = 2m^2 - 12m + 16$

$-4m = -12m + 16$

$8m = 16$

$m = 2$

① 
$$\begin{array}{r} x^3 + 2x^2 \\ - (x^3 - 2x^2) \\ \hline 4x^2 \end{array} = x^3 + 2x^2 + x$$

$$0 = x$$

### 8-3 Multiplying Polynomials

Find each product. **23.**  $x^2 + 4x - 21$  **24.**  $18a^2 + 3a - 10$

**23.**  $(x - 3)(x + 7)$       **24.**  $(3a - 2)(6a + 5)$

**25.**  $(3r - 7t)(2r + 5t)$       **26.**  $(2x + 5)(5x + 2)$   
 $6r^2 + rt - 35t^2$        $10x^2 + 29x + 10$

**27. PARKING LOT**

The parking lot shown is to be paved. What is the area to be paved?



$10x^2 + 7x - 12$

$5x - 4$

#### Example 4

Find  $(6x - 5)(x + 4)$ .

$(6x - 5)(x + 4)$

**F**      **O**      **I**      **L**

$= (6x)(x) + (6x)(4) + (-5)(x) + (-5)(4)$

$= 6x^2 + 24x - 5x - 20$       Multiply.

$= 6x^2 + 19x - 20$       Combine like terms.

### 8-4 Special Products

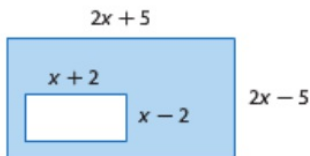
Find each product.

**28.**  $(x + 5)(x - 5)$        $x^2 - 25$       **29.**  $(3x - 2)^2$        $9x^2 - 12x + 4$

**30.**  $(5x + 4)^2$       **31.**  $(2x - 3)(2x + 3)$        $4x^2 - 9$

**32.**  $(2r + 5t)^2$       **33.**  $(3m - 2)(3m + 2)$        $9m^2 - 4$   
 $4r^2 + 20rt + 25t^2$        $9m^2 - 4$

**34. GEOMETRY** Write an expression to represent the area of the shaded region.  $3x^2 - 21$



#### Example 5

Find  $(x - 7)^2$ .

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

Square of a Difference

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

$a = x$  and  $b = 7$

$= x^2 - 14x + 49$

Simplify.

#### Example 6

Find  $(5a - 4)(5a + 4)$ .

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

Product of a Sum and Difference

$(5a - 4)(5a + 4) = (5a)^2 - (4)^2$

$a = 5a$  and  $b = 4$

$= 25a^2 - 16$

Simplify.

## 8-5 Using the Distributive Property

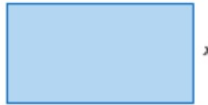
Use the Distributive Property to factor each polynomial.

35.  $12x + 24y$   $12(x + 2y)$   
 36.  $14x^2y - 21xy + 35xy^2$   $7xy(2x - 3 + 5y)$   
 37.  $8xy - 16x^3y + 10y$   $2y(4x - 8x^3 + 5)$   
 38.  $a^2 - 4ac + ab - 4bc$   $(a + b)(a - 4c)$   
 39.  $2x^2 - 3xz - 2xy + 3yz$   $(2x - 3z)(x - y)$   
 40.  $24am - 9an + 40bm - 15bn$   $(3a + 5b)(8m - 3n)$

Solve each equation. Check your solutions.

41.  $x(3x - 6) = 0$   $0, 2$     42.  $6x^2 = 12x$   $0, 2$   
 43.  $x^2 = 3x$   $0, 3$     44.  $3x^2 = 5x$   $0, \frac{5}{3}$

45. **GEOMETRY** The area of the rectangle shown is  $x^3 - 2x^2 + 5x$  square units. What is the length?



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

### Example 7

Factor  $12y^2 + 9y + 8y + 6$ .

$$\begin{aligned} 12y^2 + 9y + 8y + 6 \\ &= (12y^2 + 9y) + (8y + 6) \\ &= 3y(4y + 3) + 2(4y + 3) \\ &= (4y + 3)(3y + 2) \end{aligned}$$

Group terms with common factors.

Factor the GCF from each group.

Distributive Property

### Example 8

Solve  $x^2 - 6x = 0$ . Check your solutions.

Write the equation so that it is of the form  $ab = 0$ .

$$\begin{aligned} x^2 - 6x &= 0 && \text{Original equation} \\ x(x - 6) &= 0 && \text{Factor by using the GCF.} \\ x = 0 \text{ or } x - 6 = 0 &&& \text{Zero Product Property} \\ x &= 6 && \text{Solve.} \end{aligned}$$

The roots are 0 and 6. Check by substituting 0 and 6 for  $x$  in the original equation.

$$41 \quad x = 0$$

$$3x - 6 = 0$$

$$42 \quad 6x^2 = 12x$$

$$6x^2 = 12x$$

$$x = 2$$

$$6x^2 = 12x$$

$$x^2 = 2x$$

$$x = 2$$

$$\begin{aligned} 42 \quad 6x^2 &= 12x \\ -12x &-12x \\ \hline 6x^2 - 12x &= 0 \\ 6x(x - 2) &= 0 \end{aligned}$$

$$\begin{aligned} \text{GCF: } 6x \\ 6x^2 \\ \div 6x \\ x = 2 \end{aligned}$$

$$\begin{aligned} x - 2 &= 0 \\ +2 &+2 \\ \hline x &= 2 \end{aligned}$$