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## Chapter 5 Polynomial Expressions and Functions

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### 5.1 Polynomial Functions

1. term
3. degree
5. polynomial
7. degree of a polynomial
9. quadratic
11. like terms
13. add
15. linear
17. cubic
19.  $f(x) - g(x)$

### Monomials and Polynomials

1. yes
3. no

### Addition and Subtraction of Polynomials

5.  $3x^3 + x^2$
7.  $ab^2 + 7a$
9.  $7a^2 + 5$
11.  $x^2 - xy - 6y^2$
13.  $2x^5 - 3x^3 + 4x^2$
15.  $6x^4 - 3x^3 - 7x^2 + 7x + 3$

### Polynomial Functions

17. Yes; linear; 1

### Evaluating Polynomials

19. 4
21. (a)  $L^3$   
(b)  $729 \text{ in.}^3$
23. 21

### Operations on Functions

25. 8
27.  $5x^2 + 3$

### Applications and Models

29. 278.18 million

### 5.2 Multiplication of Polynomials

1.  $ab + ac$
3.  $a^{mn}$
5. monomial
7. trinomial
9.  $a^2 - b^2$
11.  $a^2 - 2ab + b^2$

**Review of Basic Properties**

1.  $14 - 2x$
3.  $15x - 5$
5.  $10x^5y^3$
7.  $-a^4b + ab^2$
9.  $9x^2$
11.  $-s^8t^4$

**Multiplying Polynomials**

13.  $3x^2 + 10x - 8$
15.  $6x^2 - 13x - 15$
17.  $-t^5 + 3t^4 - 4t^3$
19.  $3a^4b - 6a^3b^2 + 12a^2b^3$
21.  $3x^3 - x^2y - 13xy^2 - 5y^3$

**Some Special Products**

23.  $36 - 25x^4$
25.  $16x^2 - 9y^4$
27.  $16 - 40x + 25x^2$
29.  $9a^2 - 6a + 1 - z^2$

**5.3 Factoring Polynomials**

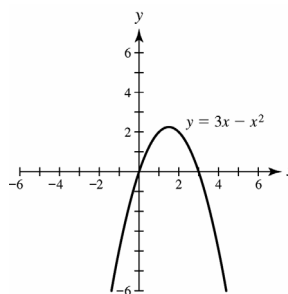
1. greatest common factor
3. zero;  $x$ -intercept; solution

**Common Factors**

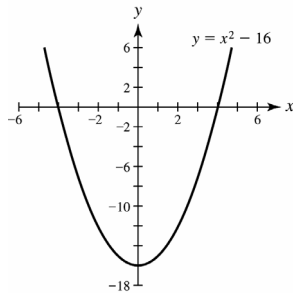
1.  $t(3t + 2)$
3.  $2a(a^2 - 3a + 4)$
5.  $5x^2(4x^3 - 3x + 1)$
7.  $-4t(2t^2 - 3t - 3)$

**Factoring and Equations**

9.  $-4, 0$
11.  $-\frac{2}{3}, 5$
13.  $0, 5$
15.  $0$
17.  $0, 3$



19.  $-4, 4$



21. After 7 sec

**Factoring by Grouping**

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

25.  $(x+1)(4x^2-7)$

27.  $(x+5)(x^2-2)$

29.  $(x+y)(3-a)$

**5.4 Factoring Trinomials****Factoring**  $x^2 + bx + c$ 

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

3.  $(x-2)(x-6)$

5.  $(x+2)(x-10)$

7.  $(x-4)(x-4) = (x-4)^2$

9.  $3(x-1)(x+6)$

11.  $4x(x+2)(x+5)$

13.  $-2x(x-5)(x+3)$

15. (a)  $(80-x)(1500+100x)$

(b) \$35 or \$60

**Factoring Trinomials by Grouping**

17.  $(3x-4)(x+3)$

19.  $(3y-5)(4y+3)$

21.  $(2t-7)(4t+1)$

**Factoring Trinomials with FOIL**

23.  $(3x-4)(x+2)$

25.  $(2x+5)(4x+3)$

27.  $(2a-3)(2a-7)$

29. 15 seconds

**5.5 Special Types of Factoring**

1.  $(a+b)(a-b)$

3.  $(a-b)^2$

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

**Difference of Two Squares**

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

3. Cannot be factored

5.  $9a(a+1)(a-1)$

7.  $(m+10)(m-8)$

9.  $5(r+2t^2)(r-2t^2)$

**Perfect Square Trinomials**

11.  $(x+2)^2$

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

15.  $(4x+7)^2$

17.  $(5a+b)^2$

19.  $2(6x+y)^2$

**Sum and Difference of Two Cubes**

21.  $(t+3)(t^2-3t+9)$

23.  $(2a+1)(4a^2-2a+1)$

25.  $(4s+5t)(16s^2-20st+25t^2)$

27.  $(x-3y^3)(x^2+3xy^3+9y^6)$

29.  $(2x+3y^2)(4x^2-6xy^2+9y^4)$

**5.6 Summary of Factoring****Guidelines for Factoring Polynomials**

1.  $(a+b)(a-b)$

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

1.  $(a+b)^2$

**Factoring Polynomials**

1.  $t(t-1)$

3.  $5a(a^2+5)$

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

7.  $(x^2+9)(x+3)(x-3)$

9.  $5x(x^2+1)(x+1)(x-1)$

11.  $5(2-3x)^2$

13.  $3(x+3)(x^2-3x+9)$

15.  $3(a+5)(a^2-5a+25)$

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

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

21.  $-3x(2x-3)(2x+5)$

23.  $(4x+3a)(4x-3a)$

25.  $(4a^2+5b)(4a^2-5b)$

27.  $-3x^2(x-9)(x-1)$

29.  $a^2(b-16)(b-1)$

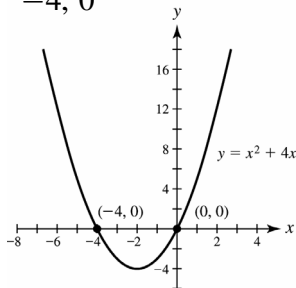
**5.7 Polynomial Equations**

**Quadratic Equations**

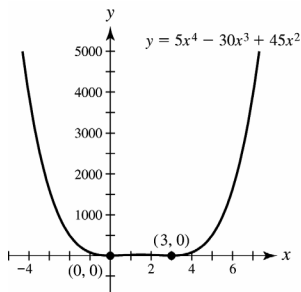
- 1.  $-3, 3$
- 3. No solutions
- 5.  $-5, 5$
- 7.  $-\frac{5}{2}, 2$
- 9.  $-\frac{1}{6}, 2$
- 11. 400 feet on either side of the crest  
 $-400, 400$

**Higher Degree Equations**

- 13.  $-5, 0, 5$
- 15.  $-\frac{5}{3}, 2$
- 17. 3
- 19.  $-4, 0$



- 21.  $0, 3$



**Equations in Quadratic Form**

- 23.  $-2, 2$
- 25.  $-4, -1, 1, 4$

**Applications**

- 27. 12 in. by 16 in.
- 29. 45 mph

