

Solution

- a. $0.002n^2 + 0.002n + 0.009$
 $0.002(30)^2 + 0.002(30) + 0.009 = 1.8 + 0.06 + 0.009 = 1.869 \approx 2$ seconds
- b. $0.00032(1.7)^n$
 $0.00032(1.7)^{30} \approx 0.00032(8,193,465.726)$
 ≈ 2600 seconds

► Try Exercise 82, page 38

EXERCISE SET P.3**Concept Check**

In Exercises 1 to 10, match the descriptions, labeled A to J, with the appropriate examples.

- | | |
|--------------------------------|----------------------------|
| A. $x^3y + xy$ | B. $7x^2 + 5x - 11$ |
| C. $\frac{1}{2}x^2 + xy + y^2$ | D. $4xy$ |
| E. $8x^3 - 1$ | F. $3 - 4x^2$ |
| G. 8 | H. $3x^5 - 4x^2 + 7x - 11$ |
| I. $8x^4 - \sqrt{5}x^3 + 7$ | J. 0 |

- A monomial of degree 2 **D**
- A binomial of degree 3 **E**
- A polynomial of degree 5 **H**
- A binomial with a leading coefficient of -4 **F**
- A zero-degree polynomial **G**
- A fourth-degree polynomial that has a third-degree term **I**
- A trinomial with integer coefficients **B**
- A trinomial in x and y **C**
- A polynomial with no degree **J**
- A fourth-degree binomial **A**

In Exercises 11 to 14, use the special product formulas to perform the indicated operation.

- | | |
|----------------------|----------------------|
| 11. $(x - 4)(x + 4)$ | 12. $(y + 5)^2$ |
| $x^2 - 16$ | $y^2 + 10y + 25$ |
| 13. $(z - 4)^2$ | 14. $(a + 2)(a - 2)$ |
| $z^2 - 8z + 16$ | $a^2 - 4$ |

In Exercises 15 to 20, for each polynomial, determine its a. standard form, b. degree, c. coefficients, d. leading coefficient, and e. terms.

- $2x + x^2 - 7$ a. $x^2 + 2x - 7$ b. 2 c. 1, 2, -7
d. 1 e. $x^2, 2x, -7$
- $-3x^2 - 11 - 12x^4$ a. $-12x^4 - 3x^2 - 11$ b. 4 c. $-12, -3, -11$
d. -12 e. $-12x^4, -3x^2, -11$
- $x^3 - 1$ a. $x^3 - 1$ b. 3 c. 1, -1
d. 1 e. $x^3, -1$
- $4x^2 - 2x + 7$ a. $4x^2 - 2x + 7$ b. 2 c. 4, $-2, 7$
d. 4 e. $4x^2, -2x, 7$
- $2x^4 + 3x^3 + 5 + 4x^2$ a. $2x^4 + 3x^3 + 4x^2 + 5$ b. 4
c. 2, 3, 4, 5 d. 2 e. $2x^4, 3x^3, 4x^2, 5$
- $3x^2 - 5x^3 + 7x - 1$ a. $-5x^3 + 3x^2 + 7x - 1$ b. 3
c. $-5, 3, 7, -1$ d. -5 e. $-5x^3, 3x^2, 7x, -1$

In Exercises 21 to 26, determine the degree of the given polynomial.

- $3xy^2 - 2xy + 7x$ **3**
- $x^3 + 3x^2y + 3xy^2 + y^3$ **3**
- $4x^2y^2 - 5x^3y^2 + 17xy^3$ **5**
- $-9x^5y + 10xy^4 - 11x^2y^2$ **6**
- xy **2**
- $5x^2y - y^4 + 6xy$ **4**

In Exercises 27 to 44, perform the indicated operation and simplify if possible by combining like terms. Write the result in standard form.

- $(3x^2 + 4x + 5) + (2x^2 + 7x - 2)$ $5x^2 + 11x + 3$
- $(5y^2 - 7y + 3) + (2y^2 + 8y + 1)$ $7y^2 + y + 4$
- $(4w^3 - 2w + 7) + (5w^3 + 8w^2 - 1)$ $9w^3 + 8w^2 - 2w + 6$
- $(5x^4 - 3x^2 + 9) + (3x^3 - 2x^2 - 7x + 3)$
 $5x^4 + 3x^3 - 5x^2 - 7x + 12$
- $(r^2 - 2r - 5) - (3r^2 - 5r + 7)$ $-2r^2 + 3r - 12$
- $(7s^2 - 4s + 11) - (-2s^2 + 11s - 9)$ $9s^2 - 15s + 20$
- $(u^3 - 3u^2 - 4u + 8) - (u^3 - 2u + 4)$ $-3u^2 - 2u + 4$
- $(5v^4 - 3v^2 + 9) - (6v^4 + 11v^2 - 10)$ $-v^4 - 14v^2 + 19$

35. $(4x - 5)(2x^2 + 7x - 8)$ $8x^3 + 18x^2 - 67x + 40$

36. $(5x - 7)(3x^2 - 8x - 5)$ $15x^3 - 61x^2 + 31x + 35$

37. $(3x^2 - 5x + 6)(3x - 1)$ $9x^3 - 18x^2 + 23x - 6$

38. $(3x - 4)(x^2 - 6x - 9)$ $3x^3 - 22x^2 - 3x + 36$

39. $(2x + 6)(5x^3 - 6x^2 + 4)$ $10x^4 + 18x^3 - 36x^2 + 8x + 24$

40. $(2x^3 - 7x - 1)(6x - 3)$ $12x^4 - 6x^3 - 42x^2 + 15x + 3$

41. $(x^3 - 4x^2 + 9x - 6)(2x + 5)$ $2x^4 - 3x^3 - 2x^2 + 33x - 30$

42. $(3x^3 + 4x^2 - x + 7)(3x - 2)$ $9x^4 + 6x^3 - 11x^2 + 23x - 14$

43. $(3x^2 - 2x + 5)(2x^2 - 5x + 2)$
 $6x^4 - 19x^3 + 26x^2 - 29x + 10$

44. $(2y^3 - 3y + 4)(2y^2 - 5y + 7)$
 $4y^5 - 10y^4 + 8y^3 + 23y^2 - 41y + 28$

In Exercises 45 to 58, use the FOIL method to find the indicated product.

45. $(y + 2)(y + 1)$
 $y^2 + 3y + 2$

47. $(2x + 4)(5x + 1)$
 $10x^2 + 22x + 4$

49. $(4z - 3)(z - 4)$
 $4z^2 - 19z + 12$

51. $(a + 6)(a - 3)$
 $a^2 + 3a - 18$

53. $(5x - 11y)(2x - 7y)$
 $10x^2 - 57xy + 77y^2$

55. $(9x + 5y)(2x + 5y)$
 $18x^2 + 55xy + 25y^2$

57. $(3p + 5q)(2p - 7q)$
 $6p^2 - 11pq - 35q^2$

46. $(y - 5)(y + 3)$
 $y^2 - 2y - 15$

48. $(5x - 3)(2x + 7)$
 $10x^2 + 29x - 21$

50. $(5z - 6)(z - 1)$
 $5z^2 - 11z + 6$

52. $(a - 10)(a + 4)$
 $a^2 - 6a - 40$

54. $(3a - 5b)(4a - 7b)$
 $12a^2 - 41ab + 35b^2$

56. $(3x - 7z)(5x - 7z)$
 $15x^2 - 56xz + 49z^2$

58. $(2r - 11s)(5r + 8s)$
 $10r^2 - 39rs - 88s^2$

In Exercises 59 to 66, use the special product formulas to perform the indicated operation.

59. $(3x + 5)(3x - 5)$
 $9x^2 - 25$

61. $(3x^2 - y)^2$
 $9x^4 - 6x^2y + y^2$

63. $(4w + z)^2$
 $16w^2 + 8wz + z^2$

65. $[(x + 5) + y][(x + 5) - y]$ $x^2 + 10x + 25 - y^2$

66. $[(x - 2y) + 7][(x - 2y) - 7]$ $x^2 - 4xy + 4y^2 - 49$

In Exercises 67 to 74, evaluate the given polynomial for the indicated value of the variable.

67. $x^2 + 7x - 1$, for $x = 3$ 29

68. $x^2 - 8x + 2$, for $x = 4$ -14

69. $-x^2 + 5x - 3$, for $x = -2$ -17

70. $-x^2 - 5x + 4$, for $x = -5$ 4

71. $3x^3 - 2x^2 - x + 3$, for $x = -1$ -1

72. $5x^3 - x^2 + 5x - 3$, for $x = -1$ -14

73. $1 - x^5$, for $x = -2$ 33

74. $1 - x^3 - x^5$, for $x = 2$ -39

75. **Recreation** The air resistance (in pounds) on a cyclist riding a bicycle in an upright position can be given by $0.016v^2$, where v is the speed of the cyclist in miles per hour (mph). Find the air resistance on a cyclist when

a. $v = 10$ mph 1.6 lb b. $v = 15$ mph 3.6 lb

76. **Highway Engineering** On an expressway, the recommended safe distance between cars in feet is given by $0.015v^2 + v + 10$, where v is the speed of the car in miles per hour. Find the safe distance when

a. $v = 30$ mph 53.5 ft b. $v = 55$ mph 110.375 ft

77. **Geometry** The volume of a right circular cylinder (as shown below) is given by $\pi r^2 h$, where r is the radius of the base and h is the height of the cylinder. Find the volume when

a. $r = 3$ inches,

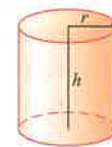
$h = 8$ inches

72π in.³

b. $r = 5$ centimeters,

$h = 12$ centimeters

300π cm³



78. **Automotive Engineering** The fuel efficiency (in miles per gallon of gas) of a car is given by $-0.02v^2 + 1.5v + 2$, where v is the speed of the car in miles per hour. Find the fuel efficiency when

a. $v = 45$ mph 29 mi/gal b. $v = 60$ mph 20 mi/gal

79. **Psychology** Based on data from one experiment, the reaction time, in hundredths of a second, of a person to a visual stimulus varies according to age and is given by the expression $0.005x^2 - 0.32x + 12$, where x is the age of the person. Find the reaction time to the stimulus for a person who is

a. $x = 20$ years old 0.076 s b. $x = 50$ years old 0.085 s

80. **Committee Membership** The number of committees consisting of exactly 3 people that can be formed from a group of n people is given by the polynomial

$$\frac{1}{6}n^3 - \frac{1}{2}n^2 + \frac{1}{3}n$$

Find the number of committees consisting of exactly 3 people that can be formed from a group of 21 people.

1330 committees