

Answers for 9.1

For use with pages 557–559

9.1 Skill Practice

1. monomial
2. Yes; a polynomial is a monomial or a sum of monomials, since 6 is a monomial, it is also a polynomial.
3. $9m^5$; 5, 9
4. $-6y + 2$; 1, -6
5. $2x^2y^2 - 8xy$; 4, 2
6. $5n^3 + 2n - 7$; 3, 5
7. $3z^4 + 2z^3 - z^2 + 5z$; 4, 3
8. $-h^6 + 2h^4 - 2h^2$; 6, -1
9. C 10. D
11. not a polynomial; variable exponent
12. not a polynomial; negative exponent
13. polynomial; 1, binomial
14. polynomial; 2 trinomial
15. polynomial; 3, trinomial
16. polynomial; 4, trinomial
17. $13a^2 - 4$
18. $6h^2 - 4h - 2$
19. $m^2 + 9m + 9$
20. $10k^2 - 9k - 14$
21. $6c^2 + 14$
22. $-4x^3 + 2x^2 + 15x - 9$
23. $-2n^3 + n - 12$
24. $9b^3 + 6b - 14$
25. $-15d^3 + 3d^2 - 3d + 2$
26. $p^3 + 6p^2 - 11p + 7$
27. Two unlike terms, $-4x^2$ and $8x$, were combined;
 $-2x^3 - 4x^2 + 8x + 1$.
28. When the subtraction was rewritten as addition, the last two terms of the second polynomial were not multiplied by -1 ;
 $(6x^2 - 2x^2) + (-5x - 3x) + 2$,
 $4x^2 - 8x + 2$.
29. $2x^2 + 6x - 9$, $4x^2 - 4x - 5$
30. $12x + 8$
31. $12x - 3$
32. $3r^2s - 8rs^2 - 4rs - 9$
33. $-x^2 + 10xy + y^2$
34. $-8mn + m - 9n$
35. $6a^2b - 6a + 4b - 19$

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36. a. $2x + 1$

b. The sum of any two consecutive integers can be written in the form $2x + 1$ where x is an integer. Since x is an integer, $2x$ is an integer with a factor of 2, so $2x$ must be even. Then $2x + 1$ must be odd.

9.1 Problem Solving

37. about 39,800,000 people

38. \$8016

39. a. $T = 9.5t^3 - 73t^2 + 130t + 860$

b. 1998; substitute $t = 0$ into the equation for T to find the number of books shipped in 1998 to get 860 million books. Substitute $t = 4$ into the equation for T to find the number of books shipped in 2002 to get 820 million books. More books were shipped in 1998.

40. $T = -18.53t^2 + 1056.6t + 56,189$; about 86%

41. a. $D = -0.44t^2 + 49t + 19.7$

b. about 855 decisions

c. about 61%; Cy Young's career lasted $1911 - 1890 = 21$ years. To find the number of wins in his career, find the value of W when $t = 21$; about 525 wins. From part (b), we know that the total number of decisions in his career is about 855, so to find the percent of the decisions that were wins find $525 \div 855 \approx 0.614$, or about 61%.

42. a. $P = 0.2813t + 63.5$,
 $C = 0.912t + 67.86$

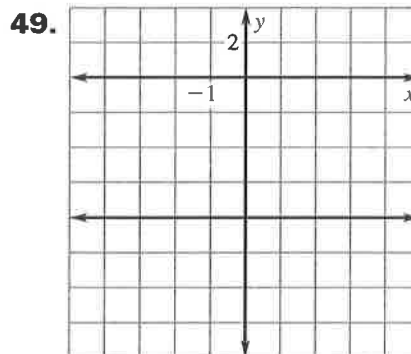
b. 4.36 quadrillion BTU,
about 23.91 quadrillion BTU;
28.272 quadrillion BTU

9.1 Mixed Review

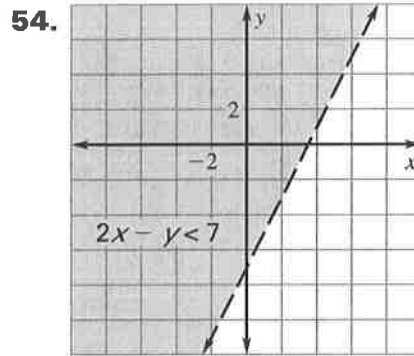
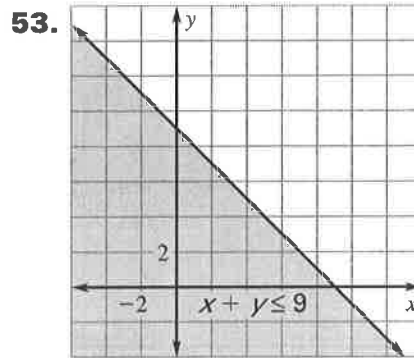
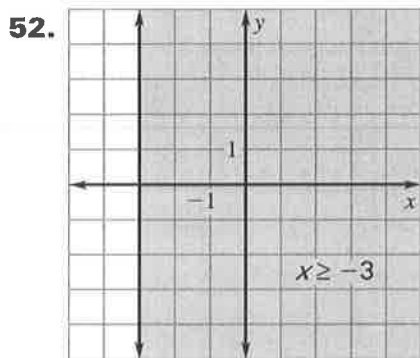
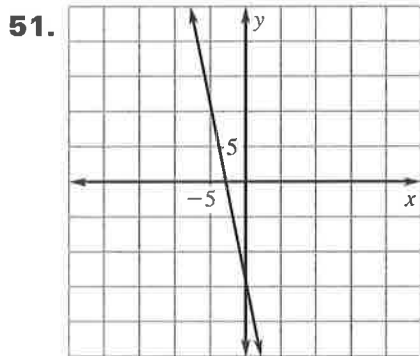
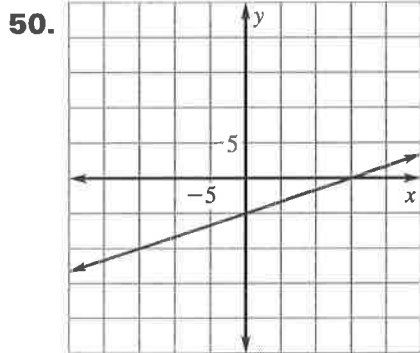
43. $1.8 - 0.6x$ **44.** $4y + 24$

45. $4 - 9b$ **46.** $-64c + 32$

47. $36t^{14}$ **48.** $2m^2n^2$



Answers for 9.1 *continued*
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Answers for 9.2

For use with pages 565–568

9.2 Skill Practice

1. binomials
2. The letters of the word FOIL remind you to find the sum of the products of these terms:
First terms of each binomial,
Outer terms of each binomial,
Inner terms of each binomial,
Last terms of each binomial.
3. $2x^3 - 3x^2 + 9x$
4. $-4y^4 - 8y^2 - 4y$
5. $4z^6 + z^5 - 11z^4 - 6z^2$
6. $24c^7 - 3c^5 - 9c^4 + 15c^3$
7. $9a^7 - 5a^6 - 13a^5$
8. $-20b^8 + 10b^6 - 5b^4 + 55b^3$
9. $x^2 - x - 6$
10. $2y^2 - 7y - 15$
11. $4b^2 - 31b + 21$
12. $5s^2 + 42s + 16$
13. $12k^2 + 23k - 9$
14. $24n^2 - 63n + 30$
15. The second term of the first binomial is -5 , not 5 , so the entries in the second row of the diagram should be $-15x$ and -5 ;
 $3x^2 - 14x - 5$.
16. When combining like terms, the exponents on the variable should stay the same, rather than being added together;
 $2x^3 + 11x^2 - 25x - 28$.
17. $y^2 + y - 30$
18. $10x^2 - 41x + 40$
19. $77w^2 + 34w - 15$
20. $b^3 - 3b^2 + 3b - 2$
21. $s^3 + 10s^2 + 19s - 20$
22. $-2r^3 + 15r^2 + 2r - 63$
23. $-15x^3 + 14x^2 + 3x - 2$
24. $4y^3 + 29y^2 - 48y + 18$
25. $54z^3 - 21z^2 - 14z + 5$
26. B
27. $10r^2 + r - 3$
28. $21a^2 - 34a + 8$
29. $8m^2 + 46m + 63$
30. $48t^2 + 58t - 11$
31. $48x^2 - 88x + 35$
32. $40z^2 + 47z + 12$
33. $3p^2 - 3p - 9$
34. $7x^3 + 3x^2 - 4x + 6$
35. $-3c^3 - 45c^2 + 23c - 10$
36. $4w^6 - 14w^4 + 3w^3 + 2w^2$

Answers for 9.2 *continued*

For use with pages 565–568

37. $2x^2 + x - 45$

38. $2x^2 + 12x$

39. $x^2 + 8x + 15$

40. $\frac{1}{2}x^2 + \frac{11}{2}x + 15$

41. $80 - 6x^2$

42. $x^2 - 3x + 36$

43. $2x^2 - 10x - 132$

44. C

45. $2x^4 - 11x^3 - 20x^2 - 7x$; graph

$Y_1 = (x^2 - 7x)(2x^2 + 3x + 1)$

and

$Y_2 = 2x^4 - 11x^3 - 20x^2 - 7x$

in the same viewing window.

Because the graphs coincide, the expressions for Y_1 and Y_2 must be equivalent.

46. $3x^2 + xy - 4y^2$

47. $2x^3y + 3x^2y^2 + 18xy + 27y^2$

48. $4x^3y - 20x^2y^2 + 4xy^3$

9.2 Problem Solving

49. a. $4x^2 + 84x + 440$

b. 840 in.^2

50. a. $2x^2 + 100x + 800$

b. 1350 ft^2

51. a. \$12,300 million, 0.171; for $t = 0$, the amount of money (in millions of dollars) people between 15 and 19 years old spent on sound recordings in the U.S. in 1997.

b. $R \cdot P =$

$-1.18t^4 + 14.4t^3 - 57.4t^2$
 $- 10.4t + 2100.$

c. about \$1680 million

52. a. $H \cdot P = 2t^2 + 263t + 8366$;

find the product $H \cdot P$, because the number of housing units times the percent of housing units that were vacant will give the number of vacant housing units.

b. about 15,120 housing units

Answers for 9.2 *continued*
 For use with pages 565–568

53. a. *Sample answer:* $T = t + 90$; use the data points from 1995–1999: (5, 95), (6, 96), (7, 97), (8, 98), (9, 99). All these points lie on a line with slope $m = 1$; use any one of the points to find the y -intercept $b = 90$. The other data points, (0, 92), (10, 101), and (11, 102), lie close to the line $T = t + 90$.

b. $V = -0.0015t^3 - 0.103t^2 + 2.949t + 6.21$

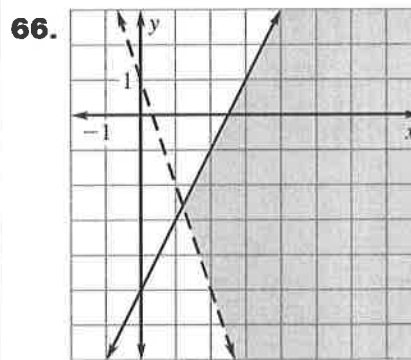
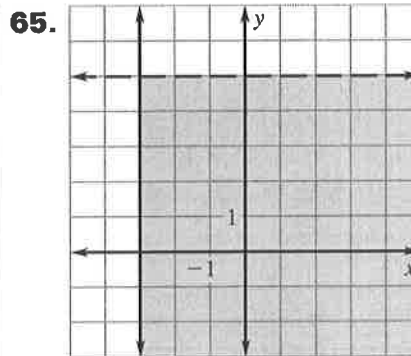
c. about 24.2 million households, about 22.2 million households

54. a. 35.5%

b. $C \cdot 0.01P$
 $= -0.00075t^3 - 0.03825t^2 + 0.78t + 31.92$

9.2 Mixed Review

- 55.** $15x - 35$ **56.** $14x - 3$
57. $8x - 21$ **58.** $-2x^2$
59. $x^2 - 13x$ **60.** $8x^2 + 3x$
61. (7, -19) **62.** (3, 5)
63. no solution
64. all real numbers



Answer Key

Lesson 9.2

Practice Level B

1. $6x^4 - 3x^3 - x^2$ 2. $-20a^7 + 15a^4 - 5a^3$
3. $-8d^5 + 20d^4 - 24d^3 + 8d^2$
4. $6x^2 - 13x - 5$ 5. $2y^2 - 7y - 15$
6. $24a^2 - 18a + 3$ 7. $5b^2 - 42b + 16$
8. $16m^2 + 38m + 21$ 9. $-3p^3 + 6p^2 - p + 2$
10. $-2z^2 + 13z - 21$ 11. $-6d^2 + 23d - 10$
12. $n^3 + 5n^2 + 9n + 5$ 13. $w^3 + 5w^2 - 23w - 3$
14. $2s^3 + 11s^2 + 13s - 5$
15. $5x^3y - 20x^2y^2 + 5xy^3$ 16. $4a^2 + a - 1$
17. $-3x^2 - 8x + 10$ 18. $2m^2 + 5m - 41$
19. $3x^2 + 15x$ 20. $x^2 + 6x + 8$
21. a. $A = 4x^2 + 22x + 30$ b. 72 ft^2
22. a. S : 66,939 students; P : 40%; A p P indicates the number of students that are between 7 and 13.
b. A p $P = 0.000163t^7 - 0.01166225t^6 + 0.218856t^5 - 1.510115t^4 + 0.46605t^3 + 38.8676t^2 + 181.107t + 26,775.6$ c. about 26,776
29. a. A : 76,226 acres; P : 60%; A p P indicates the number of acres that are parks.
b. A p $P = -0.1688t^3 - 59.0818t^2 + 812.634t + 45,735.6$

Answers for 9.3

For use with pages 572–574

9.3 Skill Practice

1. *Sample answer:* $x - 5, x + 5$
2. The square of a binomial is a trinomial. To find the first term of the trinomial, square the first term of the binomial. To find the second term of the trinomial, find twice the product of the terms of the binomial, using the sign of the second term. To find the third term of the trinomial, square the second term of the binomial.
3. $x^2 + 16x + 64$
4. $a^2 + 12a + 36$
5. $4y^2 + 20y + 25$
6. $t^2 - 14t + 49$
7. $n^2 - 22n + 121$
8. $36b^2 - 12b + 1$
9. The middle term of the products, $2(s)(-3)$ was left out;
 $s^2 - 6s + 9.$
10. The middle term of the products should be twice the product of the terms of the binomial;
 $4d^2 - 40d + 100.$
11. $t^2 - 16$
12. $m^2 - 36$
13. $4x^2 - 1$
14. $9x^2 - 1$
15. $49 - w^2$
16. $9s^2 - 64$
17. B
18. D
19. Use the sum and difference pattern to find the product $(20 - 4)(20 + 4).$
20. Use the sum and difference pattern to find the product $(30 - 2)(30 + 2).$
21. Use the square of a binomial pattern to find the product $(20 - 3)^2.$
22. Use the square of a binomial pattern to find the product $(40 + 4)^2.$
23. $r^2 + 18rs + 81s^2$
24. $36x^2 + 60x + 25$
25. $9m^2 - 121n^2$
26. $49a^2 - 64b^2$
27. $9m^2 - 42mn + 49n^2$
28. $169 - 52x + 4x^2$
29. $9f^2 - 81$
30. $81 - 16t^2$
31. $9x^2 + 48xy + 64y^2$
32. $x^2 + 4xy + 4y^2$
33. $4a^2 - 25b^2$
34. $36x^2 - y^2$
35. $9x^2 - 0.25$
36. $9x^2 + 3x + 0.25$

Answers for 9.3 *continued*
For use with pages 572–574

37. $9x^2 - 3x + 0.25$

38. $x - 11, x + 11$; since $x^2 - 121 = x^2 - 11^2$ is in the form $a^2 - b^2$, you can use the sum and difference pattern in reverse to find the binomials $a - b = x - 11$ and $a + b = x + 11$.

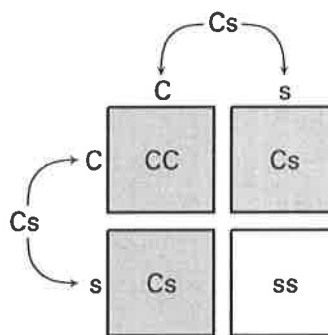
39. $a^3 + 3a^2b + 3ab^2 + b^3$

9.3 Problem Solving

40. a. 25%

b. The gene from each parent is modeled by $0.5G + 0.5y$. The possible genes of the offspring are modeled by $(0.5G + 0.5y)^2 = 0.25G^2 + 0.5Gy + 0.25y^2$. Because any gene combination with a G results in a green pod, the coefficients of the first two terms show that $25\% + 50\% = 75\%$ of the offspring will have green pods, and the coefficient of the last term shows that 25% of the offspring will have yellow pods.

41. a.



b. $0.25C^2 + 0.5Cs + 0.25s^2$

c. 75%

42. 50%; the gene from one parent is modeled by $0.5N + 0.5a$ and the gene from the other parent is modeled by $0.5a + 0.5a = a$, so the possible gene combinations of the offspring are modeled by $a(0.5N + 0.5a) = 0.5Na + 0.5a^2$. Because any gene combination with N results in normal coloring, only the second term, $0.5a^2$, represents albino offspring. The coefficient of a^2 , 0.5, shows that 50% of the offspring will be albino.

Answers for 9.3 *continued*

For use with pages 572–574

- 43. a.** 88.1%; the areas of the four regions are: 2 complete passes: $0.655^2 \approx 0.429$ square units; 1 complete pass, 1 incomplete pass: $0.655(0.345) \approx 0.226$ square units; 1 incomplete pass, 1 complete pass: $0.345(0.655) \approx 0.226$ square units; and 2 incomplete passes: $0.345^2 \approx 0.119$ square units. The regions that involve at least one complete pass cover $0.429 + 0.226 + 0.226 = 0.881$ square units, or 88.1% of the whole square region.
- b.** The outcome of each attempted pass is modeled by $0.655C + 0.345I$, so the possible outcomes of two attempted passes is modeled by $(0.655C + 0.345I)^2 = 0.429C^2 + 0.452CI + 0.119I^2$. Because any combination of outcomes with a C results in at least one completed pass, the coefficients of the first two terms show that $42.9\% + 45.2\% = 88.1\%$ of the outcomes will have at least one completed pass, and the coefficient of the last term shows that 11.9% of the outcomes will have two incomplete passes.
- 44. a.** $6 - w$
- b.** $\pi w^2 - 12\pi w + 36\pi$
- c.** 30.25π , 4π ; substitute the least width $w = 0.5$ millimeter into the polynomial from part (b) to find the greatest possible area: $\pi(0.5)^2 - 12\pi(0.5) + 36\pi = 0.25\pi - 6\pi + 36\pi = 30.25\pi$ square millimeters. Substitute the greatest width $w = 4$ millimeters into the polynomial from part (b) to find the least possible area: $\pi(4)^2 - 12\pi(4) + 36\pi = 16\pi - 48\pi + 36\pi = 4\pi$ square millimeters.
- 45.** $625 - x^2$; the area of the original square is $25^2 = 625$ square feet, and the area of a square when the dimensions are changed is $(25 - x)(25 + x) = 625 - x^2$ square feet; since x^2 is always positive, the area of the new square will be less than 625 square feet.

9.3 Mixed Review

- | | | |
|---------------|---------------|---------------|
| 46. 5 | 47. 18 | 48. 7 |
| 49. 2 | 50. 13 | 51. 1 |
| 52. 11 | 53. 6 | 54. -5 |
| 55. -2 | 56. 10 | 57. -3 |

Answer Key

Lesson 9.3

Practice Level B

1. $x^2 - 18x + 81$ 2. $m^2 + 22m + 121$
3. $25s^2 + 20s + 4$ 4. $9m^2 + 42m + 49$
5. $16p^2 - 40p + 25$ 6. $49a^2 - 84a + 36$
7. $100z^2 - 60z + 9$ 8. $4x^2 + 4xy + y^2$
9. $9y^2 - 6xy + x^2$ 10. $a^2 - 81$
11. $z^2 - 400$ 12. $25r^2 - 1$ 13. $36m^2 - 100$
14. $49p^2 - 4$ 15. $81c^2 - 1$ 16. $16x^2 - 9$
17. $-w^2 + 16$ 18. $-4y^2 + 25$ 19. Find the product $(20 - 5)(20 + 5)$.
20. Find the product $(50 - 7)(50 + 7)$. 21. Find the product $(20 - 2)^2$.
22. $16x^2 - 0.25$ 23. $16x^2 + 4x + 0.25$
24. $16x^2 - 4x + 0.25$

25. a.

	S	I
S	SS	SI
I	IS	II

- b. $0.25S^2 + 0.5SI + 0.25I^2$ c. 25%
26. a. 75%; Three of the four squares in the area model represent at least one foul shot being made. b. The chance of making a foul shot is 50% and the chance of not making a foul shot is 50%. So the polynomial $(0.5C + 0.5I)^2 = 0.25C^2 + 0.5CI + 0.25I^2$ represents this situation where C represents a foul shot made and I represents a foul shot missed.