

Chapter 4 answers

4.1

1. $4(x - 4)$
3. $5x(7x - 3)$
5. $3a(2a + 1)$
7. $5x(3x - y + 2)$
9. $5x^3(9x^3 - 7x - 15)$
11. $m^5n^3(m^2 - n^3 + m^2n^2)$
13. $2x(x^3 - x^2 - 1)$
15. $3ab(2ab - 3a + 4b)$
17. $9x^4y^3(x^2 - 4y^2 + 5x^2y^2)$
19. $7x^3(4x^4 - 5x - 14)$
21. $21y(3x^2 + 2x + 1)$
23. $4pq^2(4pq - 6p^2q + 3)$
25. $5x^3y(4x^4 - 3x - 10)$
27. $L^4W^3(2L^3 - 6W^2 + 3L^2W^3)$
29. $9x^5y^4z(x^2 - 3y^2 + 5x^3y^3)$
31. $10xy(6x^3 + 3x^2 + 2x - 10)$
33. $a(b - c + d - a - 1)$
35. $6x^5y^3(x^2 - 2y^3 + 5x^3y^3 - 1)$
37. $(4x - 5)(x - 8)$
39. $(3a + 2)(6a^3 + 7)$
41. $(2x - 3)(2x - 9)$
43. $(x - 2)(4x^2 - 5)$
45. $(2x + 9)(8x - 1)$
47. $(4y - 1)^2$
49. $4(3x + 4)(x + 2)$
51. $x(x - 2)(5y - 3)$
53. $xy(2x + 3)(2x - 1)$
55. $(x - 1)^2(3x + 2)$
57. $(x + 7)(7x^2 + 49x + 4)$
59. $(x + 2)^3(x^2 + 2x + 2)$

4.2

1. $(x + y)(a + b)$
3. $(a + z)(y + b)$
5. $(y + x)(y + a)$
7. $(x + t)(x + a)$
9. $(x - 4)(x - y)$
11. $(a + b)(x - 1)$
13. $(x - a)(x - y)$
15. $(c + d)(2 - d)$
17. $(x - y)(x - 4)$
19. $(x - y)(7 - y)$
21. $(t^2 + 3x)(c - 1)$
23. $(x^2 + 2y)(x^2 + 2)$
25. $(m + 3)(m - n)$
27. $(x - 2)(x^3 + 3)$
29. $2(a - 1)(a^2 - x)$
31. $2(x^2 + y^2)(a - b)$
33. $x(x - a)(x - 2)$
35. $2x(x^2 + 5)(x - 4)$
37. $3x^2y(x^2 + 3)(x + 3)$
39. $y^2(xz + t)(xz + y)$

4.3

1. $(x + 3)(x - 5)$
3. $(a + 9)(a - 7)$
5. Prime
7. $(y + 3)(y + 8)$
9. $(a - 2)^2$
11. $(c + 3)(c - 7)$
13. $(b + 9)(b - 3)$
15. $(x + 4y)(x + 9y)$
17. $(xy - 3)(xy - 1)$
19. $(x - 8)^2$
21. $(x + 7)(x - 30)$
23. Prime
25. Prime
27. $(nm + 2)(nm - 8)$
29. $(x + 3y)(x + 5y)$
31. $5(x - 3)(x - 4)$
33. $3(a - 1)(a + 4)$
35. $x(x + 10)^2$
37. $-(x - 15)(x + 13)$
39. $-y(x - 4)(x + 11)$
41. $xy(x + 8)^2$
43. $4b^2(a - 2)(a + 4)$
45. $5b(a - 6b)(a - 7b)$
47. $-2a(x - 4y)(x + 12y)$
49. $-3a^5(a - 4)(a + 12)$
51. $3x^2(x - 7)^2$
53. $5x^2(x + 7y)(x + 3y)$
55. $7x^3(xy + 11)(xy + 3)$
57. $2a^7b^3(a - 8)(a + 10)$
59. $5x^6yz(xy - 9)(xy + 11)$

4.4

1. $(3x + 5)(x + 1)$
3. $(4x + 1)(x + 5)$
5. $(5y - 8)(y + 5)$
7. Prime
9. $(3x + 7y)(4x - 5y)$
11. $(5xy + 3)(2xy - 1)$
13. $(2a - 1)(3a - 2)$
15. $(7x - 1)(5x - 7)$
17. $(3x - 5)^2$
19. Prime
21. $(4a - 7b)(a + 4b)$
23. $(6nm + 5)(2nm - 7)$
25. $(4x - 3)^2$
27. $(7x + 9)(8x + 7)$
29. $(5p + 4q)(3p - 2q)$
31. $5(x - 2)(3x + 4)$
33. $8(x - 5)^2$
35. $-6(x - 7)(3x + 16)$
37. $a(4b + 5a)(5b + 3a)$
39. $3x^2(3xy + 5)(xy + 1)$
41. $-5y(x - 3)(3x + 4)$
43. $2y^2(2x - 5)^2$
45. $LW(4LW - 3)(3LW - 8)$
47. $2b(2c + 3)(8c - 5)$
49. $3xy(x - 3y)(3x + 4y)$
51. $2v(7u - 1)(5u - 7)$
53. $13a(b - 3)^2$
55. $-2x(2xy - 3)(3xy - 2)$
57. $y(8x + 3)(2x + 9)$
59. $5xz^2(4x - 5z)^2$

4.5

1. $(x - 2)(x + 2)$
3. $(x - y)(x^2 + xy + y^2)$
5. $(a + 3)(a^2 - 3a + 9)$
7. Prime
9. $(y - 1)(y^2 + y + 1)$
11. $(b - 4)(b + 4)$
13. $(x - 2y)(x^2 + 2xy + 4y^2)$
15. $(4c + 3)(16c^2 - 12c + 9)$
17. $(x - 9y)(x + 9y)$
19. $(2x - 1)(2x + 1)$
21. $(xy + z)(x^2y^2 - xyz + z^2)$
23. $(2a - 11b)(2a + 11b)$
25. $(2x - 5yz)(4x^2 + 10xyz + 25y^2z^2)$
27. $(x^2y + z^3)(x^4y^2 - x^2yz^3 + z^6)$
29. $(ab - c^2d^2)(ab + c^2d^2)$
31. $(2n^3 - 3m^4)(4n^6 + 6n^3m^4 + 9m^8)$
33. $(xy^4 + a^3b^6)(x^2y^8 - xy^4a^3b^6 + a^6b^{12})$
35. $2(x^2 - 2)(x^2 + 2)$
37. $8(p^2 - q^3)(p^4 + p^2q^3 + q^6)$
39. $xy^4(xy + 1)(x^2y^2 - xy + 1)$
41. $-2(ab^4 - 2)(ab^4 + 2)$
43. $xy^2(yz^2 - x)(y^2z^4 + xyz^2 + x^2)$

45. $(x - 3)(x + 3)(x^2 + 9)$
 49. $2x(2y^2 + 3x)(4y^4 - 6xy^2 + 9x^2)$
 53. $3x(3x - 2y^2)(9x^2 + 6xy^2 + 4y^4)$
 57. $(x - y)(x^2 + xy + y^2)(x^6 + x^3y^3 + y^6)$
 47. $(a^2bc^3 - 3)(a^4b^2c^6 + 3a^2bc^3 + 9)$
 51. $3x^3y(3y - 1)(3y + 1)$
 55. $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$
 59. $2(x - 1)(x^2 + x + 1)(x + 1)(x^2 - x + 1)$

4.6

1. $(5y + 3)(y - 7)$
 7. $(2x - 1)(4x^2 + 3)$
 13. $(x + 2)(4x^2 - 3)$
 19. $-(a^2 + 4)(a - 5)$
 25. $4x^3(5x - 3)(x + 2)$
 31. $5ab(a + 8)(a - 2)$
 37. $(x + 5)(x + y)$
 43. $5(7x + 1)(x - 3)$
 49. $2a(x - 5)(x - 6)$
 53. $(x - 2)(x + 2)(x - 5)(x + 5)$
 59. $xy(2x - 7y)(2x + 7y)$
 65. $x^2y(2x + 5)(x - 4)$
 69. $3x(x^6y^3 - 3z)(x^{12}y^6 + 3x^6y^3z + 9z^2)$
 73. $(t - 6)(t + 6)(t - 1)(t + 1)$
 77. $(x - 3)(x + 3)(x - 1)(x^2 + x + 1)$
 81. $a^2b^2(2a - b)(3a - 4b)$
 85. $x(x - 2)(x + 2)^2$
 3. $(x - 2)(x^2 + 2x + 4)$
 9. $(2x - 9)(2x + 9)$
 15. $(a + 3)(a^2 - 3a + 9)$
 21. $5x^2(x - 4)(x - 2)$
 27. $(b - 2)(b + 2)(b^2 + 4)$
 33. $3x(x + 5)(x + 2)$
 39. $4x(3x - 4)(3x + 4)$
 45. $(y + 8)(x - y)$
 51. $(x - y)(x + y)(x^2 + y^2)$
 55. $2x^2(2x + 7)^2$
 61. $5(x - 2y)(x + 6y)$
 67. $3xy(3x + 5y)(x + 2y)$
 71. $2ab^3(3a^2b + 20ab^2 + 4)$
 75. $2ab(a^3b - 12)(a^3b + 12)$
 79. $(x^3y^4 + z^5)(x^6y^8 - x^3y^4z^5 + z^{10})$
 83. $y(x - 1)(x^2 + x + 1)(x + 1)(x^2 - x + 1)$
 5. $(6x + y)(2x - 3y)$
 11. $(7x - 3)(2x - 5)$
 17. $(3x + 2y)(9x^2 - 6xy + 4y^2)$
 23. $(n - 1)(n + 1)(n^2 + 1)$
 29. $(a - 3)(a + 3)(a^2 - 3)$
 35. $u^2(u + 8)(u - 7)$
 41. $(x - d)(x + 7)$
 47. $(x + 2y)(x^2 - 2xy + 4y^2)$
 57. $m(3n - 8)(n - 3)$
 63. $2(3x - y)(x^2 + 4)$

4.7

1. $\{-2, 3\}$
 3. $\left\{\frac{1}{5}, \frac{3}{2}\right\}$
 5. $\{-3, 0, 9\}$
 7. $\left\{-\frac{1}{2}, 0, 2\right\}$
 9. $\left\{-\frac{2}{5}, 2, 3\right\}$
 11. $\{3, 9\}$
 13. $\left\{-9, \frac{5}{4}\right\}$
 15. $\left\{-\frac{1}{2}, \frac{1}{2}\right\}$
 17. $\left\{-\frac{1}{2}, 3\right\}$
 19. $\left\{-\frac{3}{2}, 4\right\}$
 21. $\left\{-\frac{1}{3}, -\frac{3}{2}\right\}$
 23. $\{0, 3\}$
 25. $\{-4, 0, 4\}$
 27. $\{-10, 10\}$
 29. $\{-2, 1\}$
 31. $\left\{-7, 0, \frac{5}{3}\right\}$
 33. $\{-2, 0, 2\}$
 35. $\{-1, 15\}$
 37. $\{-4, 9\}$
 39. $\{-2, 3\}$
 41. $\{-1, 3\}$
 43. $\{-6, 6\}$
 45. $\{-9, 2\}$
 47. $\{-3, 1\}$
 49. $\{-4, 4\}$
 51. $\{-3, -1\}$
 53. $\{-3, 2\}$
 55. $\left\{\frac{2}{3}, \frac{3}{2}\right\}$
 57. $\{-7, 4\}$
 59. $\{-3, 2\}$
 61. $\left\{-1, 0, \frac{3}{2}\right\}$
 63. $\left\{-2, 0, \frac{5}{3}\right\}$

4.8

1. 17 and 18
 3. 12 and 15
 5. Andrew is 18 and Ethan is 12
 7. 22 years old
 9. Joshua is 11 and McKay is 10
 11. 8 ft X 13 ft
 13. 5 ft X 8 ft
 15. 20 yds X 30 yds
 17. 9 in X 4 in
 19. 9 ft X 7 ft
 21. 10 in X 7 in
 23. 5 yds X 20 yds
 25. 8 in base, 21 in height
 27. 12 people
 29. 10 appliances
 31. $\frac{1}{2}$ a month and 15 months
 33. 2 sec
 35. 6 feet
 37. 2 sec
 39. 6 sec
 41. 3 sec
 43. 4.75 sec
 45. 1 sec
 47. 5 sec
 49. 1.5 sec and 4.5 sec