Chapter 21 Exercise 21.1

Q. 1. (i) 4 (ii) 1 (iii) x (iv) x^2 (v) $10x^2$ (vi) $4x^3$

Q. 2. (i) 3 (ii) 9 (iii) $27x$ (iv) $3x^2$ (v) $6x^3$ (vi) $2y^2$

Q. 3. (i) 1 (ii) 40 (iii) $4x$ (iv) $10xy$ (v) $6x^3$ (vi) $5y^2$

Q. 4. (i) 5 (ii) x (iii) 1 (iv) $-2y$ (v) $-2x^2$ (vi) $6xy$

Q. 5. (i) 3 (ii) $6a$ (iii) 10 (iv) $-2ba$ (v) $-8a^2$ (vi) $12b^2$

Q. 6. (i) 4 (ii) $36y^2$ (iii) -1 (iv) x^2 (v) $3x$ (vi) $4xy^2$

Q. 7. (i) 2 (ii) $-4x$ (iii) -1 (iv) y (v) $5x^3$ (vi) $4xy^2$

Q. 8. (i) 1 (ii) 4 (iii) $2x$ (iv) $-x^2y$ (v) $4y^4$ (vi) $4x^2y$

Exercise 21.2

Q. 1. $2(3x + 5y)$

Q. 2. $3(3a + 2b)$

Q. 3. $5(5a + 7b)$

Q. 4. $7(3p + 4q)$

Q. 5. $3(4x - 5y)$

Q. 6. $20(2m + 3n)$

Q. 7. $x(2 + y)$

Q. 8. $a(a + b)$

Q. 9. $3p(4p - 1)$

Q. 10. $3a(3b - 5c)$

Q. 11. $3(2x + 3y)$

Q. 12. $2(2a + 5b)$

Q. 13. $7(2p + 3q)$

Q. 14. $5(3a + 5b)$

Q. 15. $3(4k - 5m)$

Q. 16. $11(2c - 3d)$

Q. 17. $5x(3x - 5)$

Q. 18. $2(2x - 3)$

Q. 19. $7(2y - 1)$

Q. 20. $5(d - 7e)$

Q. 21. $6p(p - 2q)$

Q. 22. $11x(2x - 3y)$

Q. 23. $8x(3y - 2z)$

Q. 24. $5b(7b - 5a)$

Q. 25. $a(a - 1)$

Q. 26. $25a(b - 3c)$

Q. 27. $x(y - z)$

Q. 28. $2x(x - 3)$

Q. 29. $3p(2 - 3q)$

Q. 30. $x^2(x - 1)$

Q. 31. $2x(3x + 4y)$

Q. 32. $8y(2x - 3y)$

Q. 33. $5a(8a - 1)$

Q. 34. $9t(2 + 3t)$

Q. 35. $25xy(3 + 4y)$

Q. 36. $22a(2a - 3)$

Q. 37. $4(6x - 7y + 11z)$

Q. 38. $5(7a - 9b - 3c)$

Q. 39. $3ab(4a^2 + 5b)$

Q. 40. $8ax(2ax - 3x^2 - 4a^2)$

Q. 41. $x^3(x - 1)$

Q. 42. $x^2(2 - x)$

Exercise 21.3

Q. 1. $p(x + y) + q(x + y)$
$= (p + q)(x + y)$

Q. 2. $m(a + b) + n(a + b)$
$= (m + n)(a + b)$

Q. 3. $3(a + b) + k(a + b)$
$= (3 + k)(a + b)$

Q. 4. $w(x + y) + 5(x + y)$
$= (w + 5)(x + y)$

Q. 5. $c(a + 3) + b(a + 3)$
$= (c + b)(a + 3)$

Q. 6. $p(x + y) + 6(x + y)$
$= (p + 6)(x + y)$

Q. 7. $a(x + y) + 7(x + y)$

$\quad = (a + 7)(x + y)$

Q. 8. $c(a + b) + 3(a + b)$

$\quad = (c + 3)(a + b)$

Q. 9. $k(a + b) + 4(a + b)$

$\quad = (k + 4)(a + b)$

Q. 10. $x(1 + y) + 5(1 + y)$

$\quad = (x + 5)(1 + y)$

Q. 11. $p(x − y) + q(x − y)$

$\quad = (p + q)(x − y)$

Q. 12. $a(b − x) + y(b − x)$

$\quad = (a + y)(b − x)$

Q. 13. $m(r − s) + n(r − s) = (m + n)(r − s)$

Q. 14. $a(x − 2y) + b(x − 2y) = (a + b)(x − 2y)$

Q. 15. $2a(c − d) + b(c − d) = (2a + b)(c − d)$

Q. 16. $3y(2x − a) + 5b(2x − a)$

$\quad = (3y + 5b)(2x − a)$

Q. 17. $3x(5a − 2b) + y(5a − 2b)$

$\quad = (3x + y)(5a − 2b)$

Q. 18. $3m(2x − y) + n(2x − y) = (3m + n)(2x − y)$

Q. 19. $p(q − 3y) + 2x(q − 3y) = (p + 2x)(q − 3y)$

Q. 20. $10x(5b − y) + 6a(5b − y)$

$\quad = (10x + 6a)(5b − y)$

Q. 21. $a(a + 3) + b(a + 3) = (a + b)(a + 3)$

Q. 22. $x(x − w) + 9(x − w) = (x + 9)(x − w)$

Q. 23. $5(1 + b) + a(1 + b) = (5 + a)(1 + b)$

Q. 24. $y(x − 1) + 8(x − 1) = (y + 8)(x − 1)$

Q. 25. $x(2x − 3y) + a(2x − 3y)$

$\quad = (x + a)(2x − 3y)$

Q. 26. $2(5a − 4b) + a(5a − 4b)$

$\quad = (2 + a)(5a − 4b)$

Q. 27. $4p(5p − 4q) + 3(5p − 4q)$

$\quad = (4p + 3)(5p − 4q)$

Q. 28. $3x(3x − 2y) + 7z(3x − 2y)$

$\quad = (3x + 7z)(3x − 2y)$

Q. 29. $7(a − 3b) + a(a − 3b) = (7 + a)(a − 3b)$

Q. 30. $x(x − 1) + 4k(x − 1) = (x + 4k)(x − 1)$

Exercise 21.4

Q. 1. $−5a + 10b = −5(a − 2b)$

Q. 2. $−6x − 8y = −2(3x + 4y)$

Q. 3. $−15t + 21s = −3(5t − 7s)$

Q. 4. $−24a − 28b = −4(6a + 7b)$

Q. 5. $−2x − x^2 = −x(2 + x)$

Q. 6. $−6x + 14z = −2(3x − 7z)$

Q. 7. $−2x + 3y = −1(2x − 3y)$

Q. 8. $−15p + 9r − 12s = −3(5p − 3r + 4s)$

Q. 9. $−xy − xz = −x(y + z)$

Q. 10. $−x^2 + x = −x(x − 1)$

Q. 11. $a(x − y) − c(x − y)$

$\quad = (a − c)(x − y)$

Q. 12. $3(x + y) − a(x + y)$

$\quad = (3 − a)(x + y)$

Q. 13. $7(x − y) − k(x − y)$

$\quad = (7 − k)(x − y)$

Q. 14. $a(k + t) − 5(k + t)$

$\quad = (a − 5)(k + t)$

Q. 15. $x(x − 4) − a(x − 4)$

$\quad = (x − a)(x − 4)$

Q. 16. $p(q + s) − 9(q + s)$

$\quad = (p − 9)(q + s)$

Q. 17. $a(b − c) − b(b − c)$

$\quad = (a − b)(b − c)$

Q. 18. $ak − bk + at − bt$

$\quad k(a − b) + t(a − b)$

$\quad (k + t)(a − b)$

Q. 19. $3a(x - 2y) - x(x - 2y)$

$\quad = (3a - x)(x - 2y)$

Q. 20. $5y(3x - 4y) - 3(3x - 4y)$

$\quad = (5y - 3)(3x - 4y)$

Q. 21. $ak + at + bt + bk$

$\quad = a(k + t) + b(k + t)$

$\quad = (a + b)(k + t)$

Q. 22. $2ac + 2ad + bc + bd$

$\quad = 2a(c + d) + b(c + d)$

$\quad = (2a + b)(c + d)$

Q. 23. $3ax + 3bx - ay - by$

$\quad = 3x(a + b) - y(a + b)$

$\quad = (3x - y)(a + b)$

Q. 24. $5ac + bc - 10a - 2b$

$\quad = c(5a + b) - 2(5a + b)$

$\quad = (c - 2)(5a + b)$

Q. 25. $10ac - 5bc - 2a + b$

$\quad = 5c(2a - b) - (2a - b)$

$\quad = (5c - 1)(2a - b)$

Q. 26. $ab + 3a + 3 + b$

$\quad = a(b + 3) + 1(b + 3)$

$\quad = (a + 1)(b + 3)$

Q. 27. $15ac + 10bc + 3ad + 2bd$

$\quad = 5c(3a + 2b) + d(3a + 2b)$

$\quad = (5c + d)(3a + 2b)$

Q. 28. $3xy - x + 21y - 7$

$\quad = x(3y - 1) + 7(3y - 1)$

$\quad = (x + 7)(3y - 1)$

Q. 29. $35ab - 10a - 21b + 6$

$\quad = 5a(7b - 2) - 3(7b - 2)$

$\quad = (5a - 3)(7b - 2)$

Q. 30. $22wx - 2wy - 11xz + yz$

$\quad = 2w(11x - y) - z(11x - y)$

$\quad = (2w - z)(11x - y)$

Q. 31. $2a(5x - y) - b(5x - y) = (2a - b)(5x - y)$

Q. 32. $ab + bm + an + mn$

$\quad = b(a + m) + n(a + m) = (b + n)(a + m)$

Q. 33. $b(a - 1) - (a - 1) = (b - 1)(a - 1)$

Q. 34. $7x^2 - 7x + xy - y$

$\quad = 7x(x - 1) + y(x - 1) = (7x + y)(x - 1)$

Q. 35. $a^2 - 3ab + 7a - 21b$

$\quad = a(a - 3b) + 7(a - 3b)$

$\quad = (a + 7)(a - 3b)$

Q. 36. $(y^2 - 2)(a + 6)$

Q. 37. $t(x - 5) - (x - 5) = (t - 1)(x - 5)$

Q. 38. $k(a + b) + 1(a + b) = (k + 1)(a + b)$

Q. 39. $1(c - a) + p(a - c) = 1(c - a) - p(c - a)$

$\quad = (1 - p)(c - a)$

Q. 40. $(a - b) + k(a - b) = (1 + k)(a - b)$

Exercise 21.5

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

Q. 2. $(x + 2)^2$

Q. 3. $(x + 2)(x + 5)$

Q. 4. $(x + 5)(x + 1)$

Q. 5. $(x + 3)(x + 4)$

Q. 6. $(x + 1)(x + 4)$

Q. 7. $(x + 1)(x + 11)$

Q. 8. $(x + 1)^2$

Q. 9. $(x + 15)(x + 1)$

Q. 10. $(a + 4)(a + 2)$

Q. 11. $(x + 10)(x + 2)$

Q. 12. $(x + 7)(x + 2)$

Q. 13. $(x + 4)(x + 5)$

Q. 14. $(x + 1)(x + 10)$

Q. 15. $(x + 2)^2$

Q. 16. $(x + 3)^2$

Q. 17. $(p + 1)(p + 7)$

Q. 18. $(x + 6)(x + 3)$

Q. 19. $(x + 9)(x + 2)$

Q. 20. $(x + 5)^2$

Q. 21. $(x + 3)(x + 9)$

Q. 22. $(x + 4)(x + 7)$

Q. 23. $(x + 4)(x + 9)$

Q. 24. $(x + 3)(x + 11)$

Q. 25. $(x + 2)(x + 6)$

Q. 26. $(x + 5)(x + 6)$

Q. 27. $(x + 3)(x + 10)$

Q. 28. $(x + 2)(x + 15)$

Q. 29. $(x + 1)(x + 30)$

Q. 30. $(x + 6)^2$

Q. 31. $(x + 6)(x + 7)$

Q. 32. $(x + 7)^2$

Q. 33. $(x + 4)(x + 8)$

Q. 34. $(x + 3)(x + 8)$

Q. 35. $(x + 5)(x + 8)$

Q. 36. $(x + 9)^2$

Q. 37. $(x + 4)(x + 25)$

Q. 38. $(x + 6)(x + 8)$

Q. 39. $(x + 2)(x + 25)$

Q. 40. $(x + 3)(x + 17)$

Exercise 21.6

Q. 1. $(x - 1)(x - 2)$

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

Q. 3. $(x - 3)(x - 1)$

Q. 4. $(x - 2)(x - 5)$

Q. 5. $(x - 2)(x - 6)$

Q. 6. $(x - 4)(x - 5)$

Q. 7. $(x - 13)(x - 2)$

Q. 8. $(x - 3)(x - 7)$

Q. 9. $(x - 3)(x - 5)$

Q. 10. $(x - 1)(x - 4)$

Q. 11. $(x - 4)(x + 2)$

Q. 12. $(x - 10)(x + 2)$

Q. 13. $(x - 8)(x + 3)$

Q. 14. $(x - 5)(x + 3)$

Q. 15. $(x - 15)(x + 1)$

Q. 16. $(x - 3)(x + 1)$

Q. 17. $(x + 5)(x - 3)$

Q. 18. $(x - 4)(x + 3)$

Q. 19. $(x + 3)(x - 2)$

Q. 20. $(x - 3)(x + 2)$

Q. 21. $(x + 3)(x - 1)$

Q. 22. $(x + 7)(x - 1)$

Q. 23. $(x + 5)(x - 2)$

Q. 24. $(x + 8)(x - 2)$

Q. 25. $(x + 8)(x - 4)$

Q. 26. $(x + 7)(x - 2)$

Q. 27. $(x - 6)(x - 5)$

Q. 28. $(x + 6)(x + 5)$

Q. 29. $(x - 5)(x + 1)$

Q. 30. $(x - 6)(x + 5)$

Q. 31. $(x + 11)(x - 2)$

Q. 32. $(x - 2)^2$

Q. 33. $(x - 3)^2$

Q. 34. $(x + 8)(x - 3)$

Q. 35. $(x - 10)(x + 9)$

Q. 36. $(x + 9)(x - 7)$

Q. 37. $(x - 7)(x - 8)$

Q. 38. $(x + 7)(x - 6)$

Q. 39. $(x + 10)(x - 7)$

Q. 40. $(x - 6)(x - 4)$

Exercise 21.7

Q. 1. $(x - 3)(x + 3)$

Q. 2. $(x - 2)(x + 2)$

Q. 3. $(y - 6)(y + 6)$

Q. 4. $(x - 4)(x + 4)$

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

Q. 6. $(x - 10)(x + 10)$

Q. 7. $(x - 8)(x + 8)$

Q. 8. $(p - 11)(p + 11)$

Q. 9. $(14 - a)(14 + a)$

Q. 10. $(x - 9)(x + 9)$

Q. 11. $(y - 12)(y + 12)$

Q. 12. $(x - 1)(x + 1)$

Q. 13. $(8 - 6)(8 + 6) = 2(14) = 28$

Q. 14. $(100 - 99)(100 + 99) = 1(199) = 199$

Q. 15. $(51 - 49)(51 + 49) = 2(100) = 200$

Q. 16. $(21 - 20)(21 + 20) = 1(41) = 41$

Q. 17. $(7.6 - 2.4)(7.6 + 2.4) = (5.2)(10) = 52$

Revision Exercises

Q. 1.   (i) $(x - 6)(x + 6)$

     (ii) $(x - 9)(x + 8)$

     (iii) $x(x - y) + 7(x - y) = (x + 7)(x - y)$

     (iv) $x(p - 2q) - 11(p - 2q)$

         $= (x - 11)(p - 2q)$

     (v) $(y - 7)(y + 7)$

Q. 2.   (i) $a(x + 6) + p(x + 6) = (a + p)(x + 6)$

     (ii) $(x + 9)(x - 6)$

     (iii) $(y - 3)(y + 3)$

     (iv) $5(y^2 - 9) = 5(y - 3)(y + 3)$

     (v) $pr + qr + qs + ps$

         $r(p + q) + s(p + q) = (r + s)(p + q)$

Q. 3.   (i) $(x - 6)(x - 5)$

     (ii) $x(2x - 3y) - (2x - 3y)$

         $= (x - 1)(2x - 3y)$

     (iii) $3ab(a + 10b)$

     (iv) $3ab(a + 10b) - (a + 10b)$

         $= (3ab - 1)(a + 10b)$

     (v) $(x - 7)(x + 6)$

Q. 4.   (a) $a = 7$ $b = -8$

     (b) $p = -16$ $q = 63$

     (c) $-k = -1$ $-t = -2$

         $k = 1$ $t = 2$

Q. 5.   (a) $(a - 8)(a + 8)$

     (b) $x^2 + 8x - 65 = (x - 5)(x + 13)$

         $\therefore (x + 13)$

     (c) (i) $-2a^2 b(a - 2b)$

         (ii) $13(a - 2b) - 2a^2b(a - 2b)$

           $= (13 - 2a^2b)(a - 2b)$

Q. 6.   (a) (i) $(x + 8)(x - 4)$

         (ii) $(-8 + 8)(-8 - 4) = (0)(-12) = 0$

     (b) (i) $b(a - c) - (a - c) = (b - 1)(a - c)$

         (ii) $(x + 9)(x - 7)$

     (c) $(30.3 - 29.7)(30.3 + 29.7)$

         $= (0.6)(60)$

         $= 36$

Q. 7.   (a) (i) $(x - 2)(x + 2)$

         (ii) $x(x - 4)$

         (iii) $(x - 2)^2$

     (b) $a = -14$

         $b = -51$

     (c) (i) $7(x^2 - 4)$

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

         (ii) $(x - 13)(x + 13)$

         (iii) $x(x - 49)$

            $x(x - 7)(x + 7)$