



Sections 7.1–7.3

REVIEW

Greatest Common Factor 7.1

The **greatest common factor (GCF)** of two integers is the largest integer that is a factor of both integers.

Methods of Factoring 7.1

7.2

1. If there is a common factor, find the greatest common factor (GCF) and factor it out.

2. A difference of two squares is always factorable:

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

7.3A 3. To factor a trinomial that can be expressed in the form $x^2 + bx + c$, see Section 7.3A.

7.3B 4. Use guessing-and-checking to try to factor a trinomial that can be expressed in the form $ax^2 + bx + c$.

Sections 7.1–7.3

REVIEW EXERCISES Set I

Factor each polynomial completely and check, or write “not factorable.”

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|----------------------|------------------------|---------------------------|-------------------------------------|
| 1. $8x - 4$ | 2. $5 + 7a$ | 15. $8 - 2a^2$ | 16. $10c^2 - 44c + 16$ |
| 3. $m^2 - 4$ | 4. $25 + n^2$ | 17. $15u^2v - 3uv$ | 18. $5ab^2 - 10a^2b - 5ab$ |
| 5. $x^2 + 10x + 21$ | 6. $y^2 - 10y + 15$ | 19. $10x^2 - xy - 24y^2$ | 20. $8x^5y^2 - 12x^2y^4 - 16x^2y^2$ |
| 7. $2u^2 + 4u$ | 8. $3b - 6b^2 + 12b^3$ | 21. $3y^2 - 300$ | 22. $t^2 - 72 - t$ |
| 9. $z^2 - 7z - 18$ | 10. $7x - 30 - x^2$ | 23. $5u^2 + 2ut - 7t^2$ | 24. $x^2 + x + 8$ |
| 11. $4x^2 - 25x + 6$ | 12. $4x^2 + 20x + 25$ | 25. $7x^2 + 8x + 1$ | 26. $6x^2 + 48x + 90$ |
| 13. $9k^2 - 144$ | 14. $100 + 81p^2$ | 27. $x^2y^2 + 9$ | 28. $s^2 - 16s + 63$ |
| | | 29. $3(u + v) - t(u + v)$ | 30. $3st - 8uv$ |
| | | 31. $4m^2 + 23m - 6$ | 32. $v(w - 5) - 8(w - 5)$ |

6. $(1 + b)(1 - b)$
 7. $(\sqrt{4c^2 + \sqrt{1}})(\sqrt{4c^2 - \sqrt{1}}) = (2c + 1)(2c - 1)$
 8. $(4d + 1)(4d - 1)$
 9. $(\sqrt{16x^2 + \sqrt{9y^2}})(\sqrt{16x^2 - \sqrt{9y^2}}) = (4x + 3y)(4x - 3y)$
 10. $(5a + 2b)(5a - 2b)$ 11. Not factorable
 12. Not factorable 13. GCF is $2x$; $2x(2x^3 - 1)$
 14. $3a(3a^3 - 1)$ 15. Not factorable 16. Not factorable
 17. $(\sqrt{49u^4 + \sqrt{36v^4}})(\sqrt{49u^4 - \sqrt{36v^4}})$
 $= (7u^2 + 6v^2)(7u^2 - 6v^2)$
 18. $(9m^3 + 10n^2)(9m^3 - 10n^2)$
 19. $x^6 - a^4 = (\sqrt{x^6 + \sqrt{a^4}})(\sqrt{x^6 - \sqrt{a^4}}) = (x^3 + a^2)(x^3 - a^2)$
 20. $(b + y^3)(b - y^3)$
 21. $2x^2 - 18 = 2(x^2 - 9) = 2(x + 3)(x - 3)$
 22. $3(x + 2)(x - 2)$ 23. Not factorable
 24. Not factorable
 25. $(\sqrt{a^2b^2 + \sqrt{c^2d^2}})(\sqrt{a^2b^2 - \sqrt{c^2d^2}}) = (ab + cd)(ab - cd)$
 26. $(mn + rs)(mn - rs)$
 27. $(\sqrt{49} + \sqrt{25w^2z^2})(\sqrt{49} - \sqrt{25w^2z^2})$
 $= (7 + 5wz)(7 - 5wz)$
 28. $(6 + 5uv)(6 - 5uv)$
 29. $(\sqrt{4h^4k^4 + \sqrt{1}})(\sqrt{4h^4k^4 - \sqrt{1}}) = (2h^2k^2 + 1)(2h^2k^2 - 1)$
 30. $(3x^2y^2 + 1)(3x^2y^2 - 1)$
 31. $(\sqrt{81a^4b^6 + \sqrt{16m^2n^8}})(\sqrt{81a^4b^6 - \sqrt{16m^2n^8}})$
 $= (9a^2b^3 + 4mn^4)(9a^2b^3 - 4mn^4)$
 32. $(7c^4d^2 + 10e^3f)(7c^4d^2 - 10e^3f)$ 33. $7x^2(7x^2y^2 - 1)$
 34. $5y^2(5x^2y^2 - 1)$ 35. $5x(x^2 - 9y^2) = 5x(x + 3y)(x - 3y)$
 36. $11r(r + 2s)(r - 2s)$
 37. $225x^2s^2 - 100x^2t^2 = 25x^2(9s^2 - 4t^2)$
 $= 25x^2(3s + 2t)(3s - 2t)$
 38. $16y^2(2u + 3v)(2u - 3v)$

Exercises 7.3A (page 339)

1. $(x + 2)(x + 4)$ 2. $(x + 1)(x + 8)$ 3. $(x + 1)(x + 4)$
 4. $(x + 2)(x + 2)$ or $(x + 2)^2$ 5. $(k + 1)(k + 6)$
 6. $(k + 2)(k + 3)$ 7. $u^2 + 7u + 10 = (u + 2)(u + 5)$
 8. $(u + 1)(u + 10)$ 9. Not factorable 10. Not factorable
 11. $(b - 2)(b - 7)$ 12. $(b - 1)(b - 14)$
 13. $(z - 4)(z - 5)$ 14. $(z - 2)(z - 10)$
 15. $x^2 - 11x + 18 = (x - 2)(x - 9)$ 16. $(x - 3)(x - 6)$
 17. $(x + 10)(x - 1)$ 18. $(y - 5)(y + 2)$
 19. $(z - 3)(z + 2)$ 20. $(m + 6)(m - 1)$
 21. GCF is $5x$; $5x(x + 2)$ 22. $4y^2(2y + 1)$
 23. $(x + 5)(x - 1)$ 24. $(y + 7)(y - 1)$
 25. Not factorable 26. Not factorable
 27. $z^3(z^2 + 9z - 10) = z^3(z + 10)(z - 1)$
 28. $x^2(x + 8)(x - 1)$ 29. Not factorable
 30. Not factorable
 31. $(u^2 - 4)(u^2 + 16) = (u + 2)(u - 2)(u^2 + 16)$
 32. $(v^2 + 2)(v^2 - 32)$
 33. $(4 - v)(4 - v)$ or $(4 - v)^2$ or $(v - 4)^2$
 34. $(2 - v)(8 - v)$ or $(v - 2)(v - 8)$ 35. $(b + 4d)(b - 15d)$
 36. $(c + 20x)(c - 3x)$ 37. $(r + 3s)(r - 16s)$
 38. $(s + 24t)(s - 2t)$
 39. $x^2(x^2 + 2x - 35) = x^2(x + 7)(x - 5)$
 40. $x^2(x + 8)(x - 6)$
 41. $x(x^2 + 14x - 15) = x(x + 15)(x - 1)$

42. $x^2(x + 9)(x - 1)$
 43. $3(x^2 + 2x - 8) = 3(x + 4)(x - 2)$
 44. $5(x + 5)(x - 2)$
 45. $4(x^2 - 4x + 3) = 4(x - 3)(x - 1)$
 46. $2(x - 3)(x - 4)$ 47. $x^2(x^2 + 6x + 1)$
 48. $y^2(y^2 + 5y + 1)$ 49. $(x^2 + 3)(x^2 - 3)$
 50. $(a^2 + 5)(a^2 - 5)$

Exercises 7.3B (page 345)

1. $(x + 2)(3x + 1)$ 2. $(x + 1)(3x + 2)$
 3. $(x + 1)(5x + 2)$ 4. $(x + 2)(5x + 1)$
 5. $4x^2 + 7x + 3 = (x + 1)(4x + 3)$ 6. $(x + 3)(4x + 1)$
 7. Not factorable 8. Not factorable
 9. $(a - 3)(5a - 1)$ 10. $(m - 1)(5m - 3)$
 11. $(b - 7)(3b - 1)$ 12. $(u - 1)(3u - 7)$
 13. $(z - 7)(5z - 1)$ 14. $(z - 1)(5z - 7)$
 15. $3n^2 + 14n - 5 = (n + 5)(3n - 1)$
 16. $(k - 1)(5k + 7)$ 17. $(3x + 7)(3x - 7)$
 18. $(4y + 1)(4y - 1)$ 19. $(x + 3y)(7x + 2y)$
 20. $(a + 6b)(7a + b)$ 21. $(h - k)(7h - 4k)$
 22. $(h - 2k)(7h - 2k)$ 23. Not factorable
 24. Not factorable 25. $(7x - 3)(7x - 3)$ or $(7x - 3)^2$
 26. $(5x - 2)(5x - 2)$ or $(5x - 2)^2$
 27. $3u(6u^2 + 13u - 5) = 3u(2u + 5)(3u - 1)$
 28. $2y(2y - 1)(3y + 5)$ 29. $4(x^2 + x + 1)$
 30. $6(x^2 + x + 3)$ 31. $7(x^2 - 7)$ 32. $5(x^2 - 5)$
 33. $(3 - v)(2 - 5v)$ 34. $(1 - v)(6 - 5v)$
 35. $3x^2 + 20x + 12 = (3x + 2)(x + 6)$ 36. $(3x + 4)(x + 3)$
 37. $5(9x^2 - 24x + 16) = 5(3x - 4)(3x - 4)$, or $5(3x - 4)^2$
 38. $4(4x - 3)(4x - 3)$, or $4(4x - 3)^2$ 39. $(2x - 3)(4x + 5)$
 40. $(8x + 5)(x - 3)$ 41. $(2y - 5)(3y - 2)$
 42. $(2y - 1)(3y - 10)$ 43. $(3a - 2)(3a + 10)$
 44. $(3b + 5)(3b - 4)$ 45. $(2e^2 - 5)(3e^2 + 4)$
 46. $(5f^2 + 3)(2f^2 - 7)$ 47. Not factorable
 48. Not factorable

Sections 7.1–7.3 Review

Exercises (page 346)

1. $4(2x - 1)$ 2. Not factorable 3. $(m + 2)(m - 2)$
 4. Not factorable 5. $(x + 3)(x + 7)$ 6. Not factorable
 7. $2u(u + 2)$ 8. $3b(1 - 2b + 4b^2)$ 9. $(z + 2)(z - 9)$
 10. Not factorable 11. $(4x - 1)(x - 6)$
 12. $(2x + 5)(2x + 5)$ or $(2x + 5)^2$
 13. $9(k^2 - 16) = 9(k + 4)(k - 4)$ 14. Not factorable
 15. $2(4 - a^2) = 2(2 + a)(2 - a)$ 16. $2(5c - 2)(c - 4)$
 17. $3uv(5u - 1)$ 18. $5ab(b - 2a - 1)$
 19. $(2x + 3y)(5x - 8y)$ 20. $4x^2y^2(2x^3 - 3y^2 - 4)$
 21. $3(y^2 - 100) = 3(y + 10)(y - 10)$ 22. $(t + 8)(t - 9)$
 23. $(5u + 7t)(u - t)$ 24. Not factorable
 25. $(7x + 1)(x + 1)$ 26. $6(x + 3)(x + 5)$
 27. Not factorable 28. $(s - 7)(s - 9)$
 29. $(u + v)(3 - t)$ 30. Not factorable
 31. $(4m - 1)(m + 6)$ 32. $(w - 5)(v - 8)$