Factoring - ANSWERS

F1 Exercises

1. false

3. Both are correct but the second one is preferable as the binomial factor has integral coefficients.

5. $7a^3b^5$

7. $x(x-3)$

9. $(x-2y)$

11. $x^{-4}(x+2)^{-2}$

13. $8k(k^2+3)$

15. $-6a^2(6a^2-a-3)$

17. $5x^2y^2(y-2x)$

19. $(a-2)(y^2-3)$

21. $2n(n-2)$

23. $(4x-y)(4x+1)$

25. $-(p-3)(p^2-10p+19)$

27. $k^{-4}(k^2+2)$

29. $-p^{-5}(2p^3-p^2-3)$

31. $x^{-2}y^{-3}(2xy-5)$

33. $(a^2-7)(2a+1)$

35. $-(xy+3)(x-2)$

37. $(x^2-y)(x-y)$

39. $-(y-3)(x^2+z^2)$

41. $(x^2-a)(y^2-b)$

43. $(x-1)(xy+1)$

45. $(x^n+1)(y-3)$

47. $5(x-bc)(1-a)$

49. $x(x-1)(x^3+x^2-1)$

51. no, as $(2xy^2-4)$ can still be factored to $2(xy^2-2)$

53. $p=\frac{2M}{q+r}$

55. $y=\frac{x}{3-w}$

57. $A=(4-\pi)x^2$

59. $A=(\pi-1)r^2$

F2 Exercises

1. no

3. All of them; however, the preferable answer is $-(2x-3)(x+5)$.

5. $x-3$

7. $x-5y$

9. $(x+3)(x+4)$

11. $(y+8)(y-6)$

13. not factorable

15. $(m-7)(m-8)$

17. $-(n+9)(n-2)$

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

21. $-(x+3)(x-7)$

23. $n^2(n+2)(n-15)$

25. $-2(x-10)(x-4)$

27. $y(x^2+12)(x^2-5)$

29. $-5(t^{15}+8)(t^{15}-1)$

31. $-n(n^4+16)(n^4-3)$

33. $\pm12, \pm13, \pm15, \pm20, \pm37$

35. $3x-4$

37. $3x-5$

39. $(2y+1)(3y-2)$

41. $(2t-3)(3t-2)$

43. $(6n+5)(7n-5)$

45. $-2(2x-3)(3x+5)$

47. $(6x+5y)(3x+2y)$

49. $-(2n+5)(4n-3)$

51. $2x^2(2x-1)(x+3)$

53. $(9xy-4)(xy+1)$

55. $(2p^2-7q)^2$

57. $(2a+9)(a+5)$

59. $\pm4, \pm7, \pm11, \pm17, \pm28, \pm59$

61. $(3x+2)$ feet

F3 Exercises

1. difference of squares **3.** neither **5.** difference of cubes **7.** difference of squares

9. perfect square **11.** difference of cubes

13. $25x^2 + 100 = 25(x^2 + 4)$; The sum of squares is factorable in integral coefficients only if the two terms have a common factor.

15. $(x + y)(x - y)$ **17.** $(x - y)(x^2 + xy + y^2)$

19. $(2z - 1)^2$ **21.** not factorable

23. $(5 - y)(25 + 5y + y^2)$ **25.** $(n + 10m)^2$

27. $(3a^2 + 5b^3)(3a^2 - 5b^3)$ **29.** $(p^2 - 4q)(p^4 + 4p^2q + 16q^2)$

31. $(7p + 2)^2$ **33.** $r^2(r + 3)(r - 3)$

35. $\frac{1}{8}(1 - 2a)(1 + 2a + 4a^2)$ or $\left(\frac{1}{2} - a\right)\left(\frac{1}{4} + \frac{1}{2}a + a^2\right)$ **37.** not factorable

39. $x^2(4x^2 + 11y^2)(4x^2 - 11y^2)$ **41.** $-(ab + 5c^2)(a^2b^2 - 5abc^2 + 25c^4)$

43. $(3a^4 - 8b)^2$ **45.** $(x + 8)(x - 6)$ **47.** $2t(t - 4)(t^2 + 4t + 16)$

49. $(x^n + 3)^2$ **51.** $(4z^2 + 1)(2z + 1)(2z - 1)$ **53.** $5(3x^2 + 15x + 25)$

55. $0.01(5z - 7)^2$ or $(0.5z - 0.7)^2$ **57.** $-3y(2x - y)$ **59.** $4(3x^2 + 4)$

61. $2(x - 5a)^2$ **63.** $(y + 6 + 3a)(y + 6 - 3a)$

65. $(m + 2)(m^2 - 2m + 4)(m - 1)(m^2 + m + 1)$ **67.** $(a^4 + b^4)(a^2 + b^2)(a + b)(a - b)$

69. $(x^2 + 1)(x + 3)(x - 3)$ **71.** $(a + b + 3)(a - b - 3)$

73. $z(3xy + 4z)(xy + 7z)$ **75.** $(x^2 + 1)(x + 1)(x - 1)^3$

77. $c(c^w + 1)^2$

F4 Exercises

1. true **3.** false **5.** false **7.** $x \in \{-4, 1\}$

9. $x \in \left\{-\frac{4}{5}, -\frac{1}{3}\right\}$ **11.** $x \in \{-6, -3\}$ **13.** $x \in \left\{-\frac{7}{2}, 1\right\}$ **15.** $x \in \{-6, 0\}$

17. $a \in \{4\}$ **19.** $n \in \left\{\frac{5}{2}\right\}$ **21.** $p \in \{-8, 4\}$ **23.** $x \in \left\{\frac{1}{3}, 3\right\}$

25. $x \in \left\{-2, \frac{8}{9}\right\}$ **27.** $y \in \{0, 6\}$ **29.** $x \in \{-4, 2\}$ **31.** $x \in \{1, 5\}$

33. $x \in \left\{-\frac{15}{8}, -1\right\}$ **35.** $x \in \{-5, 0, 3\}$ **37.** $x \in \left\{-\frac{8}{5}, 0, \frac{8}{5}\right\}$ **39.** $y \in \{-5, -1, 1, 5\}$

41. $x \in \{0, 2, 4\}$ **43.** $a \in \{-3, -1, 3\}$ **45.** $x \in \left\{-2, -\frac{2}{5}, 2\right\}$

47. 3; $\{-3,0,3\}$; Do not divide by x as x can be equal to zero. Also, $\sqrt{x^2} = |x|$ so in the last step, we should obtain $x = \pm 3$. The safest way to solve polynomial equations is by factoring and using the zero-product property.

49. $x \in \left\{\frac{1}{2}, 7\right\}$ **51.** $x \in \left\{-3, \frac{7}{3}\right\}$ **53.** $s = \frac{5-2p}{r+3}$ **55.** $r = \frac{R}{E-1}$

57. $t = \frac{4}{c+2}$ **59.** 8 seconds **61.** -12 or 13

63. width = 9 cm; length = 16 cm **65.** width = 7 m; height = 10 m

67. 7 m by 12 m **69.** 2 cm **71.** 9 in