

Polynomials and Polynomial Functions - ANSWERS

P1 Exercises

1. yes
3. no
5. 4; 1
7. 2; $\sqrt{2}$
9. $-\frac{2}{5}x^3 + 3x^2 - x + 5$; 3; $-\frac{2}{5}$
11. $x^5 + 8x^4 + 2x^3 - 3x$; 5; 1
13. $3q^4 + q^2 - 2q + 1$; 4; 3
15. first degree binomial
17. zero degree monomial
19. seventh degree monomial
21. -8
23. -12
25. -5
27. $2a - 3$
29. -21
31. $6a - 9$
33. $-x + 13y$
35. $4xy + 3x$
37. $6p^3 - 3p^2 + p + 2$
39. $3m + 11$
41. $-x - 4$
43. $-5x^2 + 4y^2 - 11z^2$
45. $-4x^2 - 3x - 5$
47. $5r^6 - r^5 - 7r^2 + 5$
49. $-5a^4 - 6a^3 + 9a^2 - 11$
51. $5x^2y^2 - 7y^3 + 17xy$
53. $-z^2 - x + 4m$
55. $10z^2 - 16z$
57. a. $(f + g)(x) = 8x - 8$
- b. $(f - g)(x) = 2x - 4$
59. a. $(f + g)(x) = -2x^2 - 3x + 1$
- b. $(f - g)(x) = 8x^2 - 7x - 1$
61. a. $(f + g)(x) = -6x^{2n} - 2x^n - 1$
- b. $(f - g)(x) = 10x^{2n} - 4x^n + 7$
63. $(P - Q)(-2) = -1$
65. $(R - Q)(0) = -7$
67. $(P + Q)(a) = a^2 + 2a + 1$
69. $(P + R)(2k) = 4k^2 + 2k - 6$
71. ~ 9.3 cm
73. a. $R(n) = 56n$
- b. $P(n) = 24n - 1500$
- c. $P(100) = 900$;
The profit from selling 100 dresses is \$900.

P2 Exercises

1. a. no; $x^2 \cdot x^4 = x^6$
- b. no; $-2x^2$ is in the simplest form
- c. yes
- d. yes
- e. no; $(a^2)^3 = a^6$
- f. no; $4^5 \cdot 4^2 = 4^7$
- g. no; $\frac{6^5}{3^2} = 2^5 \cdot 3^3$
- h. no; $xy^0 = x$
- i. yes
3. $-8y^8$
5. $14x^3y^8$
7. $-27x^6y^3$
9. $\frac{-5x^3}{y^2}$

11. $\frac{64a^6}{b^3}$ 13. $\frac{-125p^3}{q^9}$ 15. $12a^5b^5$ 17. $\frac{16y}{x^3}$
19. $64x^{18}y^6$ 21. x^{2n-1} 23. 5^{2ab} 25. $-2x^2$
27. $x^{a^2-b^2}$ 29. $-16x^7y^4$ 31. $-6x^2 + 10x$ 33. $-12x^5y + 9x^4y^2$
35. $15k^4 - 10k^3 + 20k^2$ 37. $x^2 + x - 30$ 39. $6x^2 + 5x - 6$
41. $6u^4 - 8u^3 - 30u^2$ 43. $6x^3 - 7x^2 - 13x + 15$
45. $6m^4 - 13m^2n^2 + 5n^4$ 47. $a^2 - 4b^2$ 49. $a^2 - 4ab + 4b^2$
51. $y^3 + 27$ 53. $2x^4 - 4x^3y - x^2y^2 + 3xy^3 - 2y^4$ 55. true
57. true 59. false; $(2 - 1)^3 \neq 2^3 - 1^3$ 61. $25x^2 - 16$
63. $\frac{1}{4}x^2 - 9y^2$ 65. $x^4 - 49y^6$ 67. $0.64a^2 + 0.32ab + 0.04b^2$
69. $x^2 - 6x + 9$ 71. $25x^2 - 60xy + 36y^2$ 73. $4n^2 - \frac{4}{3}n + \frac{1}{9}$
75. $x^8y^4 + 6x^4y^2 + 9$ 77. $4x^4 - 12x^2y^3 + 9y^6$
79. $8a^5 + 40a^4b + 50a^3b^2$ 81. $x^4 - x^2y^2$
83. $x^4 - 1$ 85. $a^4 - 2a^2b^2 + b^4$ 87. $4x^2 + 12xy + 9y^2 - 25$
89. $4k^2 - 12k + 4hk - 6h + h^2 + 9$ 91. $x^{4a} - y^{4b}$
93. $101 \cdot 99 = (100 + 1)(100 - 1) = 10000 - 1 = 9999$
95. $505 \cdot 495 = (500 + 5)(500 - 5) = 250000 - 25 = 249975$
97. $x^2 - x - 12$ 99. $(fg)(x) = 15x^2 - 28x + 12$
101. $(fg)(x) = -3x^4 + 8x^3 + 22x^2 - 45x$ 103. $(PR)(x) = x^3 - 2x^2 - 4x + 8$
105. $(PQ)(a) = 2a^3 - 8a$ 107. $(PQ)(3) = 30$
109. $(QR)(x) = 2x^2 - 4x$ 111. $(QR)(a + 1) = 2a^2 - 2$
113. $P(2a + 3) = 4a^2 + 12a + 5$ 115. $4x^3 - 240x^2 + 3500x$

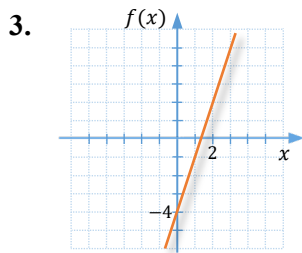
P3 Exercises

1. False; When dividing powers with the same bases, we subtract exponents. So, the quotient will be a fourth-degree polynomial.
3. $4x^2 - 3x + 1$ 5. $2xy - 6$ 7. $-3a^3 + 5a^2 - 4a$ 9. $8 - \frac{9}{x} + \frac{3}{2x^2}$

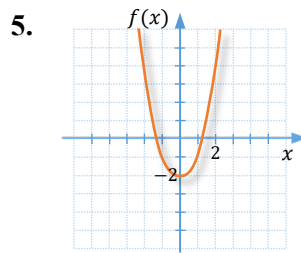
11. $\frac{2b}{a} + \frac{5}{3} + \frac{3c}{a}$ 13. Long; $y + 5$ 15. Synthetic; $t - 4$ R -21
17. Long; $2a^2 - a + 2$ R 6 19. Long; $2z^2 - 4z + 1$ R -10
21. Long; $3x + 1$ R $-3x - 7$ 23. Long; $3k^2 + 4k + 1$
25. Long; $\frac{5}{4}t + 1$ R -5 27. Synthetic; $p^2 + p + 1$
29. Synthetic; $y^3 - 2y^2 + 4y - 8$ R 32 31. $Q(x) = 2x^2 - x + 6$; $R(x) = 4$
33. $\left(\frac{f}{g}\right)(x) = 3x - 2$; $D_{\frac{f}{g}} = \mathbb{R} \setminus \{0\}$ 35. $\left(\frac{f}{g}\right)(x) = x - 6$; $D_{\frac{f}{g}} = \mathbb{R} \setminus \{-6\}$
37. $\left(\frac{f}{g}\right)(x) = x + 1$; $D_{\frac{f}{g}} = \mathbb{R} \setminus \left\{\frac{3}{2}\right\}$ 39. $\left(\frac{f}{g}\right)(x) = 4x^2 - 10x + 25$; $D_{\frac{f}{g}} = \mathbb{R} \setminus \left\{-\frac{5}{2}\right\}$
41. $\left(\frac{R}{Q}\right)(x) = \frac{x-2}{2x}$ 43. $\left(\frac{R}{P}\right)(x) = \frac{1}{x+2}$, $x \neq 2$ 45. $\left(\frac{R}{Q}\right)(0) = DNE$
47. $\left(\frac{R}{P}\right)(-2) = DNE$ 49. $\left(\frac{P}{R}\right)(a) = a + 2$ 51. $\frac{1}{2}\left(\frac{Q}{R}\right)(x) = \frac{x}{x-2}$
53. a. $L = 3x - 2$ b. 10 m

P4 Exercises

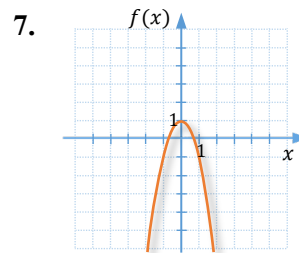
1. False; it's the shape of a basic parabola with a vertex at $(0, 3)$.



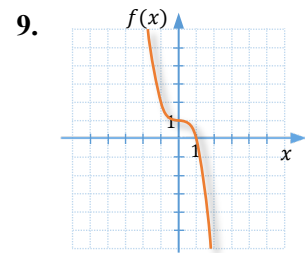
Domain: $\mathbb{R}$
Range: $\mathbb{R}$



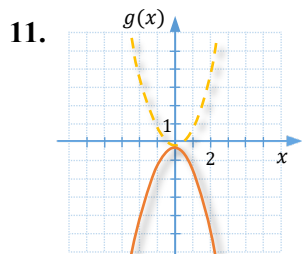
Domain: $\mathbb{R}$
Range: $[-2, \infty)$



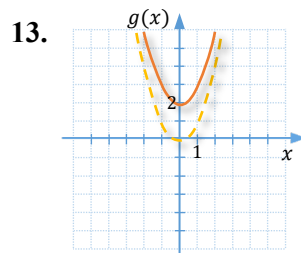
Domain: $\mathbb{R}$
Range: $(-\infty, 1]$



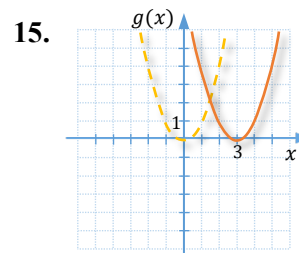
Domain: $\mathbb{R}$
Range: $\mathbb{R}$



reflect over x -axis



translation: 2 up



translation: 3 to the right