

Intermediate Algebra Review

Simplify

1. $\left(\frac{2x^{-1}y^5z^4}{3x^4y^{-2}z^{-2}}\right)^{-2}$

2. $(3x - y)(x + 2y) - (3x - y)(5x - 7y)$

3. $\frac{x+1}{4x^2-4x+1} + \frac{3}{2x^2+5x-3}$

4. $\frac{r^2-16}{r^3-64} \div \frac{r^2+2r-8}{r^2+4r+16}$

5. $\frac{3xy^4}{6x^2y^3} \cdot \frac{2x^2y^4}{x^5y^7}$

6. $\frac{\frac{6}{x+1} - \frac{1}{x}}{\frac{2}{x} - \frac{4}{x+1}}$

7. $\frac{x^{-1} + y^{-1}}{y^{-1} - x^{-1}}$

8. $\sqrt{25x^4y^2}$

9. $\left(\frac{y^{-3/5}}{y^{1/5}}\right)^{2/3}$

10. $\sqrt[3]{\frac{108x^3y^6}{2y^3}}$

11. $\sqrt[3]{\frac{y^7}{2x^2}}$

12. $(\sqrt{x} - \sqrt{3y})(\sqrt{x} + \sqrt{5y})$

13. $2\sqrt{54m^3} + 5\sqrt{96m^3}$

Factor:

14. $12x^3 + 61x^2 + 5x$

15. $(x+1)^3 - 8$

16. $a^2 + 6ab + 9b^2 - 4c^2$

17. $4x(2x-1) + 3(2x-1)^2$

Solve:

18. $\left| \frac{x-3}{2} \right| - 4 \leq -2$

19. $|5-3x| = \frac{1}{2}$

20. $|x-1| = |2x-4|$

21. $|2x-1| - 4 \geq 8$

22. $3x + y = 8$
 $x - 2y = 5$

23. $\frac{1}{2}x - \frac{1}{3}y = 2$
 $\frac{1}{4}x + \frac{2}{3}y = 6$

24. $xy = -3$
 $x + y = -2$

25. $x - 2y + z = 7$
 $-2x - y - z = 7$
 $3x - 2y + 2z = 15$

26. $\sqrt{3x+4} = \sqrt{5x+12}$

27. $\sqrt{x} + 3 = \sqrt{3x+9}$

28. Solve by completing the square: $x^2 - 18 = 7x$

29. $x^2 = \frac{5}{6}x + \frac{25}{6}$

30. $-2x^2 + 3x + 6 = 0$

31. $\left(2x - \frac{1}{2}\right)^2 = 4$

32. $\log_5(x+2) = 3$

33. $2^{2x+3} = 32$

34. $\ln(x+1) - \ln(x-2) = \ln 4$

35. $\log_3 x + \log_3(2x+1) = 1$

36. $10.9^{x+1} = 492$ (round answer to 3 significant digits)

37. $x^2 - y^2 = 4$
 $2x + 2y = 8$

38. $2x^2 + 3y^2 = 6$
 $5x^2 + 4y^2 = 15$

39. $m(2m-7) = 3m^2 + 3$

40. $(r+4)(r-6) < 0$

41. $\frac{3t+7}{t-3} \leq 0$

42. $\frac{1}{x-2} - \frac{3x}{x^2-4} = \frac{2}{x+2}$

43. $p^4 - p^2 - 20 = 0$ (find real and non-real solutions)

44. $-5 \leq \frac{x+1}{4} \leq -2$

Graph

45. $\frac{x^2}{9} - \frac{y^2}{16} = 1$

46. $x^2 + 4y^2 = 36$

47. $x^2 + y^2 + 4x - 6y = 3$
48. $x^2 + 4x - y - 1 = 0$
49. $y = |x + 3|$
50. Find the distance between (1, 5) and (-2, 3).
51. Find the slope of the line $3x - 4y = 5$.
52. Find an equation of the line...
- through (-1, 4) with slope 3.
 - through (2, 5) and (-1, -3).
 - parallel to $2x + 3y = 6$ and containing (2, 2).
 - perpendicular to $x = 7$ and containing (0, 4).
53. Given $f(x) = 3x^2 - 1$, $g(x) = \sqrt{x} - 4$
- find $f(-2)$.
 - state the domain and range of $f(x)$.
 - find $g(4)$.
 - find $f(g(x))$.
54. Given right triangle with right angle C. If $a = 6$, $b = 9$, find the exact value of c .
55. The sum of two numbers is 76 and their difference is 52. Find the numbers.
56. Bill purchased 5 cassettes and two CD's for \$65. Last week he bought 3 cassettes and 4 CD's for \$81. Find the price of a cassette and a CD if the prices were the same for the two purchases.
57. Elise is preparing 15 liters of 25% saline solution. How much 40% solution and how much 10% solution should she mix to get 15 liters of the 25% solution?
58. Sally finds that she can fly her plane 400 miles with the wind in the same time that it takes her to fly 300 miles against the wind. If the speed of the wind is 20 mph, find the speed of the plane in still air.
59. In a sample of 85 bulbs, 3 were found to be defective. At this rate, how many defective bulbs should be found in 510 bulbs?
60. An inlet pipe can fill a tank in 12 hours. A second pipe operating alone can fill the tank in 15 hours. If both pipes are used, find how long it takes to fill the tank.

61. Mary invested part of \$20,000 in a mutual fund paying 7% simple interest yearly, and the rest in a CD that pays 9% simple interest yearly. At the end of one year she had earned \$1550. Find the amount invested at each rate.
62. The diagonal of a rectangle is 10" long. If the width of the rectangle is 5 inches, find the length of the rectangle.
63. The recommended dosage, d , of an antibiotic is directly proportional to a person's weight, w . If Carmen weighs 132 pounds and is given 2376 mg of antibiotic, find the recommended dose for Bill, who is 172 pounds.
64. Given $f(x) = 3x - 5$, find $f^{-1}(x)$.
65. Find i^{82} .
66. Expand and simplify: $(2x + 3)^5$.
67. Expand and find the sum: $\sum_{i=1}^6 (2i - 3)$
68. Write the next five terms of an arithmetic sequence with first term -8 and difference 3.
69. Write the next five terms of a geometric sequence with first term -4 and ratio -1/2.
70. A ball is thrown upward with an initial speed of 32 feet per second. Its height h in feet after t seconds is given by $h(t) = -16t^2 + 32t$. Find the maximum height of the ball.

Intermediate Algebra - Solutions to Review

1. $\frac{9x^{10}}{4y^{14}z^{12}}$

2. $(3x - y)(9y - 4x)$
or $-12x^2 + 31xy - 9y^2$

3. $\frac{x(x+10)}{(2x-1)^2(x+3)}$

4. $\frac{1}{r-2}$

5. $\frac{1}{x^4y^2}$

6. $\frac{5x-1}{-2x+2}$

7. $\frac{y+x}{x-y}$

8. $5x^2|y|$

9. $\frac{1}{y^{8/15}}$

10. $3xy\sqrt[3]{2}$

11. $\frac{y^2\sqrt[3]{4xy}}{2x}$

12. $x + \sqrt{5xy} - \sqrt{3xy} - y\sqrt{15}$
(assumes $x, y \geq 0$)

13. $26m\sqrt{6m}$

14. $x(12x+1)(x+5)$

15. $(x-1)(x^2+4x+7)$

16. $(a+3b+2c)(a+3b-2c)$

17. $(2x-1)(10x-3)$

18. $(-1, 7]$

19. $3/2, 11/6$

20. $3, 5/3$

21. $(-\infty, -\frac{11}{2}] \cup [\frac{13}{2}, \infty)$

22. $(3, -1)$

23. $(8, 6)$

24. $(-3, 1), (1, -3)$

25. $(31, -15, -54)$

26. no solution

27. $0, 9$

28. $-2, 9$

29. $5/2, -5/3$

30. $\frac{3 \pm \sqrt{57}}{4}$

31. $5/4, -3/4$

32. 123

33. 1

34. 3

35. 1

36. 1.56

37. $(5/2, 3/2)$

38. $(\sqrt{3}, 0), (-\sqrt{3}, 0)$

39. $\frac{-7 \pm \sqrt{37}}{2}$

40. $(-4, 6)$

41. $[-7/3, 3)$

42. $3/2$

43. $\pm\sqrt{5}, \pm 2i$

44. $[-21, -9]$

45. Hyperbola

46. Ellipse

47. Circle $(x+2)^2 + (y-3)^2 = 4^2$

48. Parabola $y = (x+2)^2 - 5$

Intermediate Algebra – Solutions to Review Continued

49. "v-shape" $V(-3,0)$ 50. $\sqrt{13}$ 51. $\frac{3}{4}$
52. a. $y = 3x + 7$ b. $8x - 3y = 1$ c. $2x + 3y = 10$ d. $y = 4$
53. a. 11 b. domain $(-\infty, \infty)$; range $[-1, \infty)$ c. -2 d. $3x - 24\sqrt{x} + 47$
54. $3\sqrt{13}$ 55. The numbers are 64 and 12
56. cassette costs \$7; CD \$15 57. $7\frac{1}{2}$ liters of each
58. 140 mph in still air 59. 18 bulbs
60. $6\frac{2}{3}$ hours together 61. \$12500 @ 7%; \$7500 @ 9%
62. length = $5\sqrt{3}$ in 63. 3096 mg
64. $f^{-1}(x) = \frac{x+5}{3}$ 65. -1
66. $32x^5 + 240x^4 + 720x^3 + 1080x^2 + 810x + 243$
67. 24
68. -5, -2, 1, 4, 7
69. 2, -1, $\frac{1}{2}$, $-\frac{1}{4}$, $\frac{1}{8}$
70. 16 feet