[11-09-08B-L]

5.4 Exercises

Simplify. Assume that all variables represent positive real numbers. See Examples 1 and 2.

1. $\sqrt{36} + \sqrt{100}$
2. $\sqrt{25} + \sqrt{81}$
3. $4\sqrt{12} - 7\sqrt{27}$
4. $3\sqrt{32} - 2\sqrt{8}$
5. $6\sqrt{18} + \sqrt{32} - 2\sqrt{50}$
6. $5\sqrt{8} - 3\sqrt{72} + 3\sqrt{50}$
7. $2\sqrt{63} - 2\sqrt{28} + 3\sqrt{7}$
8. $6\sqrt{27} - 2\sqrt{48} + \sqrt{75}$
9. $2\sqrt{5} - 3\sqrt{20} - 4\sqrt{45}$
10. $5\sqrt{54} + 2\sqrt{24} - 2\sqrt{96}$
11. $2\sqrt{40} + 6\sqrt{90} - 3\sqrt{160}$
12. $5\sqrt{28} - 3\sqrt{63} + 2\sqrt{112}$
13. $3\sqrt{2x} - \sqrt{8x} - \sqrt{72x}$
14. $4\sqrt{18k} - \sqrt{72k} + 4\sqrt{50k}$
15. $9\sqrt{3r} - 2\sqrt{12r} + 5\sqrt{27r}$
16. $-\sqrt{20z} + 2\sqrt{125z} - 3\sqrt{45z}$
17. $7q\sqrt{10} - 2q\sqrt{40} + 8q\sqrt{90}$
18. $3a\sqrt{7} + 2a\sqrt{28} - 5a\sqrt{63}$
19. $3\sqrt{72m^2} + 2\sqrt{32m^2} - 3\sqrt{18m^2}$
20. $9\sqrt{27p^2} - 4\sqrt{108p^2} - 2\sqrt{48p^2}$
21. $\sqrt[3]{54} - 2\sqrt[3]{16}$
22. $5\sqrt[3]{81} - 4\sqrt[3]{24}$
23. $2\sqrt[3]{27x} + 2\sqrt[3]{8x}$
24. $6\sqrt[3]{128m} - 3\sqrt[3]{16m}$
25. $\sqrt[3]{x^2y} - \sqrt[3]{8x^2y}$
26. $3\sqrt[3]{x^2y^2} - 2\sqrt[3]{64x^2y^2}$
27. $3x\sqrt[3]{xy^2} - 2\sqrt[3]{8x^4y^2}$
28. $6q^2\sqrt[3]{5q} - 2q\sqrt[3]{40q^4}$
29. $5\sqrt[4]{32} + 3\sqrt[4]{162}$
30. $2\sqrt[4]{512} - 4\sqrt[4]{32}$
31. $2\sqrt[4]{32a^3} + 5\sqrt[4]{2a^3}$
32. $-\sqrt[4]{16r} + 5\sqrt[4]{r}$
33. $3\sqrt[4]{x^5y} - 2x\sqrt[4]{xy}$
34. $2\sqrt[4]{m^9p^6} - 3m^2p\sqrt[4]{mp^2}$
35. $\dfrac{3}{\sqrt{2}} - \dfrac{\sqrt{2}}{2}$
36. $\dfrac{5}{\sqrt{6}} - \dfrac{\sqrt{6}}{2}$
37. $\dfrac{2\sqrt{5}}{3} + \dfrac{1}{\sqrt{5}}$
38. $\dfrac{4\sqrt{3}}{3} + \dfrac{2}{\sqrt{3}}$
39. $\sqrt{7} - \dfrac{1}{\sqrt{7}}$
40. $\sqrt{2} - \dfrac{1}{\sqrt{2}}$
41. $\dfrac{\sqrt{32}}{3} + \dfrac{2\sqrt{2}}{3} - \dfrac{1}{\sqrt{8}}$
42. $\dfrac{\sqrt{27}}{2} - \dfrac{3\sqrt{3}}{2} + \dfrac{2}{\sqrt{27}}$
43. $\sqrt{\dfrac{3}{5}} - \dfrac{2\sqrt{15}}{3} + \dfrac{1}{\sqrt{15}}$
44. $\sqrt{\dfrac{5}{8}} - 2\sqrt{18} + \dfrac{3}{\sqrt{18}}$
45. $3\sqrt{x} + \dfrac{2}{\sqrt{x}} + \sqrt{\dfrac{1}{x}}$
46. $\dfrac{5}{\sqrt{p}} - 2\sqrt{\dfrac{4}{p}} + \sqrt{p}$
47. $\dfrac{4}{\sqrt{y^3}} - 3\sqrt{y} + \sqrt{\dfrac{16}{y}}$
48. $\dfrac{9}{\sqrt{z^3}} + 2\sqrt{z} - \sqrt{\dfrac{1}{z}}$
49. $2\sqrt[3]{3} - \dfrac{5}{\sqrt[3]{9}}$
50. $-\sqrt[3]{5} + \dfrac{1}{\sqrt[3]{25}}$
51. $3\sqrt[3]{\dfrac{m^5}{9}} - 2m\sqrt[3]{\dfrac{m^2}{72}}$
52. $2a\sqrt[3]{\dfrac{a}{5}} - 6\sqrt[3]{\dfrac{a^4}{40}}$

Work the following problems.

53. If the lengths of the sides of a triangle are $2\sqrt{45}$, $\sqrt{75}$, and $3\sqrt{20}$ centimeters, find the perimeter.
54. A rectangular yard has a length of $\sqrt{192}$ meters and a width of $\sqrt{48}$ meters. What is the perimeter?
55. Find the perimeter of a lot with sides measuring $3\sqrt{18}$, $2\sqrt{32}$, $4\sqrt{50}$, and $5\sqrt{12}$ yards.
56. What is the perimeter of a triangle with sides measuring $3\sqrt{54}$, $4\sqrt{24}$, and $\sqrt{80}$ meters?
57. Find decimal approximations for $\sqrt{3}$ and $\sqrt{12}$. Do the approximations suggest that $\sqrt{12} = 2\sqrt{3}$?
58. Find decimal approximations for $2\sqrt{7}$ and $14/\sqrt{7}$. Do the approximations suggest that $14/\sqrt{7} = 2\sqrt{7}$?

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1. 16 **3.** $-13\sqrt{3}$ **5.** $12\sqrt{2}$ **7.** $5\sqrt{7}$ **9.** $-16\sqrt{5}$ **11.** $10\sqrt{10}$
13. $-5\sqrt{2x}$ **15.** $20\sqrt{3r}$ **17.** $27q\sqrt{10}$ **19.** $17m\sqrt{2}$ **21.** $-\sqrt[3]{2}$ **23.** $10\sqrt[3]{x}$
25. $-\sqrt[3]{x^2y}$ **27.** $-x\sqrt[3]{xy^2}$ **29.** $19\sqrt[4]{2}$ **31.** $9\sqrt[4]{2a^3}$ **33.** $x\sqrt[4]{xy}$ **35.** $\sqrt{2}$
37. $13\sqrt{5}/15$ **39.** $6\sqrt{7}/7$ **41.** $7\sqrt{2}/4$ **43.** $-2\sqrt{15}/5$ **45.** $(3x\sqrt{x} + 3\sqrt{x})/x$ or $3\sqrt{x}(x + 1)/x$ **47.** $(4\sqrt{y} - 3y^2\sqrt{y} + 4y\sqrt{y})/y^2$ or $\sqrt{y}(4 - 3y^2 + 4y)/y^2$ **49.** $\sqrt[3]{3}/3$
51. $2m\sqrt[3]{3m^2}/3$ **53.** $12\sqrt{5} + 5\sqrt{3}$ centimeters **55.** $37\sqrt{2} + 10\sqrt{3}$ yards **57.** $\sqrt{3} \approx 1.732$ and $2\sqrt{3} \approx 3.464$; also, $\sqrt{12} \approx 3.464$, suggesting (but not really proving) that $\sqrt{12} = 2\sqrt{3}$
59. $-12p^3 + 6p$ **61.** $15a^2 + 11ab - 14b^2$ **63.** $25x^2 - 10xy + y^2$ **65.** $49r^2 - 4s^2$
67. $4x - 5$