EXERCISES

For more exercises, see *Extra Skill and Word Problem Practice.*

Practice and Problem Solving

A Practice by Example

Simplify each expression.

Example 1 (page 622) — GO for Help

1. $-3\sqrt{6} + 8\sqrt{6}$
2. $16\sqrt{10} + 2\sqrt{10}$
3. $\sqrt{5} - 3\sqrt{5}$
4. $6\sqrt{7} - 4\sqrt{7}$
5. $15\sqrt{2} - \sqrt{2}$
6. $-5\sqrt{3} - 3\sqrt{3}$

Example 2 (page 622)

Tell whether each pair of expressions can be simplified to like radicals.

7. $\sqrt{2}, \sqrt{32}$
8. $\sqrt{3}, \sqrt{75}$
9. $\sqrt{5}, \sqrt{50}$

Simplify each expression.

10. $\sqrt{18} + \sqrt{2}$
11. $2\sqrt{12} - 7\sqrt{3}$
12. $\sqrt{8} + 2\sqrt{2}$
13. $4\sqrt{5} - 2\sqrt{45}$
14. $3\sqrt{7} - \sqrt{28}$
15. $-4\sqrt{10} + 6\sqrt{40}$

Example 3 (page 623)

16. $\sqrt{2}(\sqrt{8} - 4)$
17. $\sqrt{3}(\sqrt{27} + 1)$
18. $2\sqrt{3}(\sqrt{3} - 1)$
19. $\sqrt{3}(\sqrt{15} + 2)$
20. $\sqrt{2}(3 + 3\sqrt{2})$
21. $\sqrt{6}(\sqrt{6} - 5)$

Example 4 (page 623)

22. $(3\sqrt{2} + \sqrt{3})(\sqrt{2} - 5\sqrt{3})$
23. $(2\sqrt{5} - \sqrt{6})(4\sqrt{5} - 3\sqrt{6})$
24. $(\sqrt{7} - 2)^2$
25. $(2\sqrt{10} + \sqrt{3})^2$
26. $(2\sqrt{11} + 5)(\sqrt{11} + 2)$
27. $(4 - \sqrt{13})(9 + \sqrt{13})$

Example 5 (page 624)

28. $\dfrac{8}{\sqrt{7} - \sqrt{3}}$
29. $\dfrac{-12}{\sqrt{8} - \sqrt{2}}$
30. $\dfrac{48}{\sqrt{6} - \sqrt{18}}$
31. $\dfrac{3}{\sqrt{10} - \sqrt{5}}$
32. $\dfrac{-40}{\sqrt{11} - \sqrt{3}}$
33. $\dfrac{9}{\sqrt{12} - \sqrt{11}}$

Example 6 (page 624)

Find an exact solution for each equation. Find the approximate solution to the nearest tenth.

34. $\dfrac{5\sqrt{2}}{\sqrt{2} - 1} = \dfrac{x}{\sqrt{2}}$
35. $\dfrac{3}{1 + \sqrt{5}} = \dfrac{1 - \sqrt{5}}{x}$
36. $\dfrac{\sqrt{2} - 1}{\sqrt{2} + 1} = \dfrac{x}{2}$

37. The ratio of the length to the width of a painting is $(1 + \sqrt{5}) : 2$. The length is 12 ft. What is the width?

B Apply Your Skills

Simplify each expression.

38. $\sqrt{40} + \sqrt{90}$
39. $3\sqrt{2}(2 + \sqrt{6})$
40. $\sqrt{12} + 4\sqrt{75} - \sqrt{36}$
41. $(\sqrt{3} + \sqrt{5})^2$
42. $\dfrac{\sqrt{13} + \sqrt{10}}{\sqrt{13} - \sqrt{5}}$
43. $(\sqrt{7} + \sqrt{8})(\sqrt{7} + \sqrt{8})$
44. $2\sqrt{2}(-2\sqrt{32} + \sqrt{8})$
45. $4\sqrt{50} - 7\sqrt{18}$
46. $\dfrac{2\sqrt{12} + 3\sqrt{6}}{\sqrt{9} - \sqrt{6}}$

47. **Chemistry** The ratio of the rates of diffusion of two gases is given by the formula $\dfrac{r_1}{r_2} = \dfrac{\sqrt{m_2}}{\sqrt{m_1}}$, where m_1 and m_2 are the masses of the molecules of the gases. Find $\dfrac{r_1}{r_2}$ if $m_1 = 12$ units and $m_2 = 30$ units.