

Algebra Review

EXAMPLE 1 Simplifying Radicals

Simplify the expression $\sqrt{20}$.

$$\begin{aligned}\sqrt{20} &= \sqrt{4} \cdot \sqrt{5} && \text{Use product property.} \\ &= 2\sqrt{5} && \text{Simplify.}\end{aligned}$$

EXERCISES

Simplify the expression.

- | | | |
|------------------|------------------|------------------|
| 1. $\sqrt{121}$ | 2. $\sqrt{52}$ | 3. $\sqrt{45}$ |
| 4. $\sqrt{72}$ | 5. $\sqrt{40}$ | 6. $\sqrt{27}$ |
| 7. $\sqrt{80}$ | 8. $\sqrt{50}$ | 9. $\sqrt{243}$ |
| 10. $\sqrt{288}$ | 11. $\sqrt{320}$ | 12. $\sqrt{225}$ |

EXAMPLE 2 Simplifying Radical Expressions

Simplify the radical expression.

a. $5\sqrt{3} - \sqrt{3} - \sqrt{2}$	b. $(2\sqrt{2})(5\sqrt{3})$	c. $(5\sqrt{7})^2$
$= 4\sqrt{3} - \sqrt{2}$	$= 2 \cdot 5 \cdot \sqrt{2} \cdot \sqrt{3}$	$= 5^2\sqrt{7^2}$
	$= 10\sqrt{6}$	$= 25 \cdot 7$
		$= 175$

EXERCISES

Simplify the radical expression.

- | | | |
|--------------------------------|-------------------------------|--|
| 13. $\sqrt{75} + \sqrt{3}$ | 14. $\sqrt{50} - \sqrt{18}$ | 15. $\sqrt{64} - \sqrt{28}$ |
| 16. $\sqrt{44} + 2\sqrt{11}$ | 17. $\sqrt{125} - \sqrt{80}$ | 18. $\sqrt{242} + \sqrt{200}$ |
| 19. $-\sqrt{147} - \sqrt{243}$ | 20. $\sqrt{28} + \sqrt{63}$ | 21. $\sqrt{20} + \sqrt{45} - \sqrt{5}$ |
| 22. $(\sqrt{13})(\sqrt{26})$ | 23. $(3\sqrt{14})(\sqrt{35})$ | 24. $(\sqrt{363})(\sqrt{300})$ |
| 25. $(6\sqrt{2})(2\sqrt{2})$ | 26. $(\sqrt{18})(\sqrt{72})$ | 27. $(\sqrt{21})(\sqrt{24})$ |
| 28. $(\sqrt{32})(\sqrt{2})$ | 29. $(\sqrt{98})(\sqrt{128})$ | 30. $(5\sqrt{4})(2\sqrt{4})$ |
| 31. $(6\sqrt{5})^2$ | 32. $(4\sqrt{2})^2$ | 33. $(8\sqrt{3})^2$ |
| 34. $(2\sqrt{3})^2$ | 35. $(5\sqrt{5})^2$ | 36. $(10\sqrt{11})^2$ |

EXAMPLE 3 Simplifying Quotients with Radicals

Simplify the quotient $\frac{6}{\sqrt{5}}$.

$$\begin{aligned}\frac{6}{\sqrt{5}} &= \frac{6}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} \\ &= \frac{6\sqrt{5}}{\sqrt{5}\sqrt{5}} \\ &= \frac{6\sqrt{5}}{5}\end{aligned}$$

Multiply numerator and denominator by $\sqrt{5}$, to eliminate a radical in the denominator.

EXERCISES

Simplify the quotient.

37. $\frac{4}{\sqrt{3}}$

38. $\frac{5}{\sqrt{7}}$

39. $\frac{2\sqrt{3}}{\sqrt{6}}$

40. $\frac{2\sqrt{3}}{\sqrt{5}}$

41. $\frac{\sqrt{18}}{3\sqrt{2}}$

42. $\frac{4}{\sqrt{8}}$

43. $\frac{16}{\sqrt{24}}$

44. $\frac{\sqrt{5}}{\sqrt{10}}$

45. $\frac{4}{\sqrt{12}}$

46. $\frac{3\sqrt{5}}{\sqrt{20}}$

47. $\frac{9}{\sqrt{52}}$

48. $\frac{\sqrt{12}}{\sqrt{24}}$

49. $\frac{\sqrt{18}}{\sqrt{10}}$

50. $\frac{\sqrt{32}}{\sqrt{5}}$

51. $\frac{\sqrt{27}}{\sqrt{45}}$

52. $\frac{\sqrt{50}}{\sqrt{75}}$

EXAMPLE 4 Solving Quadratic Equations

Solve.

$$x^2 - 5 = 16$$

$$x^2 = 21$$

$$x = \pm\sqrt{21}$$

Add 5 to each side.

Find square roots.

EXERCISES

Solve.

53. $x^2 = 9$

54. $x^2 = 625$

55. $x^2 = 289$

56. $x^2 + 3 = 13$

57. $x^2 - 4 = 12$

58. $x^2 - 7 = 6$

59. $7x^2 = 252$

60. $3x^2 = 192$

61. $6x^2 = 294$

62. $4x^2 + 5 = 45$

63. $2x^2 + 5 = 23$

64. $9x^2 + 7 = 52$

65. $11x^2 + 4 = 48$

66. $6x^2 - 3 = 9$

67. $10x^2 - 16 = -6$

68. $5x^2 - 6 = 29$

69. $8x^2 - 12 = 36$

70. $5x^2 - 61 = 64$

71. $x^2 + 3^2 = 5^2$

72. $7^2 + x^2 = 25^2$

73. $5^2 + 12^2 = x^2$