

$$105. \frac{500k}{\frac{1}{\sqrt{k^2+1}} + \frac{k^2}{\sqrt{k^2+1}}} = \frac{500k}{\frac{1+k^2}{\sqrt{k^2+1}}} = \frac{500k\sqrt{k^2+1}}{1+k^2}$$

$$107. \sqrt{3}(1 - \sqrt{6}) = \sqrt{3} - \sqrt{3} \cdot \sqrt{6}$$

Distributive Property

$$= \sqrt{3} - \sqrt{9 \cdot 2}$$

Multiplication Property of Radicals

$$= \sqrt{3} - 3\sqrt{2}$$

Simplify radicals.

$$109. (3 - \sqrt{2})(3 + \sqrt{2}) = 9 - 2 = 7$$

Multiplying the number by its conjugate yields the difference of two squares. Squaring a square root eliminates the radical.

Mid-Chapter Quiz for Chapter 5

$$1. \sqrt{225} = 15 \text{ because } 15 \cdot 15 = 225$$

$$2. \sqrt[4]{\frac{81}{16}} = \frac{3}{2} \text{ because } \frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2} \cdot \frac{3}{2} = \frac{81}{16}$$

$$3. 64^{1/2} = \sqrt{64} = 8 \text{ because } 8 \cdot 8 = 64$$

$$4. (-27)^{2/3} = \sqrt[3]{(-27)^2} = (\sqrt[3]{-27})^2 = (-3)^2 = 9$$

$$5. \sqrt{27x^2} = \sqrt{9 \cdot 3 \cdot x^2} = 3|x|\sqrt{3}$$

$$6. \sqrt[4]{81x^6} = \sqrt[4]{81 \cdot x^4 \cdot x^2} = 3|x|\sqrt[4]{x^2} = 3|x|\sqrt{x}$$

$$7. \sqrt{\frac{4u^3}{9}} = \frac{\sqrt{4 \cdot u^2 \cdot u}}{\sqrt{9}} = \frac{2|u|\sqrt{u}}{3}$$

$$8. \sqrt[3]{\frac{16}{u^6}} = \frac{\sqrt[3]{16}}{\sqrt[3]{u^6}} = \frac{\sqrt[3]{16}}{u^2} = \frac{\sqrt[3]{8 \cdot 2}}{u^2} = \frac{2\sqrt[3]{2}}{u^2}$$

$$9. \sqrt{200y} - 3\sqrt{8y} = \sqrt{100 \cdot 2y} - 3\sqrt{4 \cdot 2y} \\ = 10\sqrt{2y} - 6\sqrt{2y} \\ = 4\sqrt{2y}$$

$$10. 6x\sqrt[3]{5x^2} + 2\sqrt[3]{40x^4} = 6x\sqrt[3]{5x^2} + 2\sqrt[3]{8 \cdot 5 \cdot x^3 \cdot x} \\ = 6x\sqrt[3]{5x^2} + 4x\sqrt[3]{5x}$$

$$11. \sqrt{8}(3 + \sqrt{32}) = 3\sqrt{8} + \sqrt{256} \\ = 3\sqrt{4 \cdot 2} + \sqrt{2^8} \\ = 6\sqrt{2} + 2^4 \\ = 6\sqrt{2} + 16$$

$$12. (\sqrt{50} - 4)\sqrt{2} = \sqrt{100} - 4\sqrt{2} \\ = \sqrt{10^2} - 4\sqrt{2} \\ = 10 - 4\sqrt{2}$$

$$13. (\sqrt{6} + 3)(4\sqrt{6} - 7) = \sqrt{6} \cdot 4\sqrt{6} - 7\sqrt{6} + 12\sqrt{6} - 21 \\ = 24 + 5\sqrt{6} - 21 \\ = 3 + 5\sqrt{6}$$

$$14. (9 + 2\sqrt{3})(2 + 7\sqrt{3}) = 18 + 63\sqrt{3} + 4\sqrt{3} + 2\sqrt{3} \cdot 7\sqrt{3} \\ = 18 + 67\sqrt{3} + 14(3) \\ = 18 + 67\sqrt{3} + 42 \\ = 60 + 67\sqrt{3}$$

$$15. \frac{\sqrt{7}}{1 + \sqrt{3}} \cdot \frac{1 - \sqrt{3}}{1 - \sqrt{3}} = \frac{\sqrt{7}(1 - \sqrt{3})}{1 - (\sqrt{3})^2} = \frac{\sqrt{7}(1 - \sqrt{3})}{1 - 3} = \frac{\sqrt{7}(1 - \sqrt{3})}{-2}$$

$$= \frac{\sqrt{7} - \sqrt{21}}{-2} = \frac{\sqrt{21} - \sqrt{7}}{2}$$

$$16. \frac{6\sqrt{2}}{2\sqrt{2} - 4} \cdot \frac{2\sqrt{2} + 4}{2\sqrt{2} + 4} = \frac{6\sqrt{2}(2\sqrt{2} + 4)}{(2\sqrt{2})^2 - 4^2} = \frac{12(\sqrt{2})^2 + 24\sqrt{2}}{8 - 16}$$

$$= \frac{24 + 24\sqrt{2}}{-8} = \frac{24(1 + \sqrt{2})}{-8} = -3(1 + \sqrt{2})$$

$$= -3 - 3\sqrt{2}$$

$$17. 4 \div (\sqrt{6} + 3) = \frac{4}{\sqrt{6} + 3} \cdot \frac{\sqrt{6} - 3}{\sqrt{6} - 3} = \frac{4(\sqrt{6} - 3)}{(\sqrt{6})^2 - 3^2} = \frac{4(\sqrt{6} - 3)}{6 - 9}$$

$$= \frac{4(\sqrt{6} - 3)}{-3}$$

$$= \frac{4}{3}(3 - \sqrt{6})$$

$$18. (4\sqrt{2} - 2\sqrt{3}) \div (\sqrt{2} + \sqrt{6}) = \frac{4\sqrt{2} - 2\sqrt{3}}{\sqrt{2} + \sqrt{6}} \cdot \frac{\sqrt{2} - \sqrt{6}}{\sqrt{2} - \sqrt{6}} = \frac{4\sqrt{2} \cdot \sqrt{2} - 4\sqrt{2} \cdot \sqrt{6} - 2\sqrt{3} \cdot \sqrt{2} + 2\sqrt{3} \cdot \sqrt{6}}{(\sqrt{2})^2 - (\sqrt{6})^2}$$

$$= \frac{4(2) - 4\sqrt{12} - 2\sqrt{6} + 2\sqrt{18}}{2 - 6} = \frac{8 - 4\sqrt{4 \cdot 3} - 2\sqrt{6} + 2\sqrt{9 \cdot 2}}{-4} = \frac{8 - 8\sqrt{3} - 2\sqrt{6} + 6\sqrt{2}}{-4}$$

$$= \frac{2(4 - 4\sqrt{3} - \sqrt{6} + 3\sqrt{2})}{-4} = \frac{4 - 4\sqrt{3} - \sqrt{6} + 3\sqrt{2}}{-2} = \frac{1}{2}(4\sqrt{3} + \sqrt{6} - 3\sqrt{2} - 4)$$

19. $1 + \sqrt{4}$, conjugate $= 1 - \sqrt{4}$

$$\text{product} = (1 + \sqrt{4})(1 - \sqrt{4})$$

$$= 1^2 - (\sqrt{4})^2$$

$$= 1 - 4$$

$$= -3$$

20. $\sqrt{10} - 5$, conjugate $= \sqrt{10} + 5$

$$\text{product} = (\sqrt{10} - 5)(\sqrt{10} + 5)$$

$$= (\sqrt{10})^2 - 5^2$$

$$= 10 - 25$$

$$= -15$$

21. $\sqrt{5^2 + 12^2} = \sqrt{25 + 144}$

$$= \sqrt{169}$$

$$= 13$$

$$13 \neq 17$$

$$\sqrt{5^2 + 12^2} \neq 17$$

22. $C = \sqrt{2^2 + 2^2}$

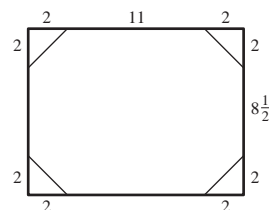
$$= \sqrt{4 + 4} = \sqrt{8}$$

Equation:

$$P = 2(7) + 2(4\frac{1}{2}) + 4(\sqrt{8})$$

$$= 14 + 9 + 8\sqrt{2}$$

$$= 23 + 8\sqrt{2} \text{ inches}$$



Section 5.4 Solving Radical Equations

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|---------------------|--------------------------------|----------------|------------------|----------------------------|----------------|
| 1. (a) $x = -4$ | $\sqrt{-4} - 10 \neq 0$ | Not a solution | 3. (a) $x = -60$ | $\sqrt[3]{-60 - 4} \neq 4$ | Not a solution |
| (b) $x = -100$ | $\sqrt{-100} - 10 \neq 0$ | Not a solution | (b) $x = 68$ | $\sqrt[3]{68 - 4} = 4$ | A solution |
| (c) $x = \sqrt{10}$ | $\sqrt{\sqrt{10}} - 10 \neq 0$ | Not a solution | (c) $x = 20$ | $\sqrt[3]{20 - 4} \neq 4$ | Not a solution |
| (d) $x = 100$ | $\sqrt{100} - 10 = 0$ | A solution | (d) $x = 0$ | $\sqrt[3]{0 - 4} \neq 4$ | Not a solution |