

Chapter 5 Review

- Express each radical as a simplified mixed radical.
 - $\sqrt{54}$
 - $\sqrt{350}$
 - $\sqrt{98x^4}$
 - $\sqrt{363x^5y^3}$, $x \geq 0$, $y \geq 0$
- Express each mixed radical as an equivalent entire radical.
 - $4\sqrt{5}$
 - $23\sqrt{13}$
 - $9x^2\sqrt{x}$, $x \geq 0$
 - $5xy\sqrt{7y}$, $x \geq 0$, $y \geq 0$
- Order each set of numbers from least to greatest.
 - $-2\sqrt{3}$, $\sqrt{50}$, $-\sqrt{14}$, $3\sqrt{5}$
 - $\sqrt{18}$, $\sqrt{2}$, $6\sqrt{2}$, $\sqrt{32}$
 - $-\sqrt{60}$, $-3\sqrt{\frac{5}{2}}$, $-\sqrt{16}$, $-5\sqrt{3}$
 - $4\sqrt{3}$, $\sqrt{12}$, $2\sqrt{6}$, $\sqrt{20}$
- Simplify each expression.
 - $7\sqrt{11} - 3\sqrt{11} + 8\sqrt{11}$
 - $4\sqrt{3x} - 4\sqrt{2} + \sqrt{3x} - \sqrt{2}$
 - $9\sqrt{6} + 12 - \sqrt{6} + 4$
 - $6\sqrt{5} - \sqrt{7y} + 4\sqrt{5} - 3\sqrt{7y}$
 - $3\sqrt{20d} + 5\sqrt{45d}$
 - $\sqrt{10e} - \sqrt{90e} + 4\sqrt{40e}$
 - $5\sqrt{3} + \sqrt{12} - \sqrt{48} + 2\sqrt{75}$
 - $\sqrt{63} + \sqrt{75} - 2\sqrt{28} - 3\sqrt{27}$
- Simplify each expression. Identify any restrictions on the values of the variables.
 - $3\sqrt{x} - \sqrt{4x} + \sqrt{x}$
 - $\sqrt{x^5} + \sqrt{9x^5}$
 - $\sqrt{9x} + \sqrt{x^3} - 4\sqrt{x} - x\sqrt{9x}$
 - $x^2\sqrt{16y} + 3\sqrt{x^4y}$
- Simplify each expression.
 - $\sqrt[3]{56}$
 - $\sqrt[3]{8x^5y}$
 - $\sqrt[3]{5} - \sqrt[3]{625}$
 - $\sqrt[3]{x^3} + 4\sqrt[3]{x} - x\sqrt[3]{27} - \sqrt[3]{64x}$
- Multiply. Express each answer as a mixed radical in simplest form.
 - $(6\sqrt{5})(2\sqrt{3})$
 - $\left(\frac{1}{3}\sqrt{45}\right)(\sqrt{10})$
 - $(3\sqrt{28})\left(\frac{1}{4}\sqrt{14}\right)$
 - $(\sqrt{27x^5})(\sqrt{3x^7})$
- Simplify each expression.
 - $\sqrt{10}(2\sqrt{10} + \sqrt{5})$
 - $\sqrt{15}(3\sqrt{5} - \sqrt{3})$
 - $2\sqrt{2}(1 + \sqrt{2})$
 - $3\sqrt{x}(2\sqrt{x} - \sqrt{2})$
- Multiply using the distributive property. Simplify each expression.
 - $(1 + \sqrt{3})(3 + \sqrt{3})$
 - $(3 + 4\sqrt{7})(5\sqrt{7} + 2)$
 - $(1 + 5\sqrt{2})(1 - 5\sqrt{2})$
 - $(4\sqrt{3} + 3\sqrt{5})^2$
- Multiply and simplify each expression. State any restrictions on the values for the variables.
 - $(\sqrt{x} + 1)(\sqrt{x} - 3)$
 - $(x - \sqrt{5})(x + \sqrt{5})$
 - $(2\sqrt{x} - 1)(\sqrt{x} + 2)$
 - $(2\sqrt{x} + 1)^2$

11. Divide. Express each answer in simplest form.

a) $\frac{\sqrt{20}}{\sqrt{5}}$ b) $\frac{\sqrt{90}}{\sqrt{15}}$ c) $\frac{\sqrt{45x^3}}{\sqrt{5x^7}}, x > 0$ d) $\frac{x\sqrt{18x^3}}{4\sqrt{6x}}, x > 0$

12. Rationalize each denominator. Express each radical in simplest form.

a) $\frac{\sqrt{10}}{\sqrt{3}}$ b) $\frac{8\sqrt{15}}{5\sqrt{2}}$ c) $\frac{25}{\sqrt{75}}$ d) $\frac{5\sqrt{21}}{7\sqrt{70}}$

13. Rationalize each denominator. Simplify.

a) $\frac{\sqrt{3}-1}{\sqrt{3}}$ b) $\frac{6\sqrt{2}+2\sqrt{6}}{3\sqrt{6}}$ c) $\frac{\sqrt{18x}-\sqrt{8x}}{\sqrt{x}}, x > 0$ d) $\frac{2\sqrt{x}+\sqrt{8}}{\sqrt{2x}}, x > 0$
 e) $\frac{4}{\sqrt{3}+1}$ f) $\frac{\sqrt{5}}{\sqrt{5}-5}$ g) $\frac{\sqrt{15}}{\sqrt{2}-\sqrt{3}}$ h) $\frac{2\sqrt{2}-\sqrt{6}}{2\sqrt{6}-\sqrt{5}}$

14. Solve each radical equation.

a) $\sqrt{x+3}=7$ b) $\sqrt{5x}=4$ c) $3\sqrt{5-3x}=0$ d) $\sqrt{-2x}=24$
 e) $\sqrt{7x}+1=15$ f) $\sqrt{y^2+1}-y=1$ g) $8-\sqrt{1+v}=5$ h) $-5=2-\sqrt{2x+15}$
 i) $\sqrt{4-3m}=m$ j) $\sqrt{x^2-1}=2\sqrt{x+1}$ k) $n-\sqrt{n}=4$ l) $\sqrt{3x^2+2}=2x+1$
 m) $\sqrt{x+5}=\sqrt{2x-3}$ n) $\sqrt{y^2-1}=2\sqrt{y+1}$ o) $\sqrt{3x+4}=\sqrt{x-2}$ p) $\sqrt{2p^2-3}=\sqrt{5p}$
 q) $\sqrt{w}+1=\sqrt{w+4}$ r) $\sqrt{2x+4}-\sqrt{x}=2$ s) $\sqrt{y+12}-2=\sqrt{y}$ t) $\sqrt{x-5}-\sqrt{x+10}=-3$
 u) $\sqrt{3+\sqrt{x}}=4$ v) $2=\sqrt{\sqrt{8x}-4}$

Answers

1. a) $3\sqrt{6}$ b) $5\sqrt{14}$ c) $7x^2\sqrt{2}$ d) $11x^2y\sqrt{3xy}$ 2. a) $\sqrt{80}$ b) $\sqrt{6877}$ c) $\sqrt{81x^5}$ d) $\sqrt{175x^2y^3}$
 3. a) $-\sqrt{14}, -2\sqrt{3}, 3\sqrt{5}, \sqrt{50}$ b) $\sqrt{2}, \sqrt{18}, \sqrt{32}, 6\sqrt{2}$ c) $-5\sqrt{3}, -\sqrt{60}, -3\sqrt{\frac{5}{2}}, -\sqrt{16}$ d) $\sqrt{12}, \sqrt{20}, 2\sqrt{6}, 4\sqrt{3}$
 4. a) $12\sqrt{11}$ b) $5\sqrt{3x}-5\sqrt{2}$ c) $16+8\sqrt{6}$ d) $10\sqrt{5}-4\sqrt{7y}$ e) $21\sqrt{5d}$ f) $6\sqrt{10e}$ g) $13\sqrt{3}$ h) $-\sqrt{7}-4\sqrt{3}$
 5. a) $2\sqrt{x}, x \geq 0$ b) $4x^2\sqrt{x}, x \geq 0$ c) $-\sqrt{x}-2x\sqrt{x}, x \geq 0$ d) $7x^2\sqrt{y}, x \in \mathbb{R}, y \geq 0$
 6. a) $2\sqrt[3]{7}$ b) $2x\sqrt[3]{x^2y}$ c) $-4\sqrt[3]{5}$ d) $-2x$
 7. a) $12\sqrt{15}$ b) $5\sqrt{2}$ c) $\frac{21}{2}\sqrt{2}$ d) $9x^6$ 8. a) $20+5\sqrt{2}$ b) $15\sqrt{3}-3\sqrt{5}$ c) $2\sqrt{2}+4$ d) $6x-3\sqrt{2x}, x \geq 0$
 9. a) $6+4\sqrt{3}$ b) $146+23\sqrt{7}$ c) -49 d) $93+24\sqrt{15}$
 10. a) $x-2\sqrt{x}-3, x \geq 0$ b) $x^2-5, x \in \mathbb{R}$ c) $2x+3\sqrt{x}-2, x \geq 0$ d) $4x+4\sqrt{x}+1, x \geq 0$
 11. a) 2 b) $\sqrt{6}$ c) $\frac{3}{x^2}$ d) $\frac{x^2\sqrt{3}}{4}$ 12. a) $\frac{\sqrt{30}}{3}$ b) $\frac{4\sqrt{30}}{5}$ c) $\frac{5\sqrt{3}}{3}$ d) $\frac{\sqrt{30}}{14}$
 13. a) $\frac{3-\sqrt{3}}{3}$ b) $\frac{2+2\sqrt{3}}{3}$ c) $\sqrt{2}$ d) $\frac{x\sqrt{2}+2\sqrt{x}}{x}$ e) $2\sqrt{3}-2$ f) $\frac{-1-\sqrt{5}}{4}$ g) $-\sqrt{30}-3\sqrt{5}$ h) $\frac{8\sqrt{3}+2\sqrt{10}-12-\sqrt{30}}{19}$
 14. a) $x=46$ b) $x=\frac{16}{5}$ c) $x=\frac{5}{3}$ d) $x=-288$ e) $x=28$ f) $y=0$ g) $v=8$ h) $x=17$ i) $m=1$ j) $x=1, 5$
 k) $n=\frac{9+\sqrt{17}}{2}$ l) $x=-2+\sqrt{5}$ m) $x=8$ n) $y=1, y=5$ o) no solution p) $p=3$ q) $w=\frac{9}{4}$ r) $x=0, x=16$
 s) $y=4$ t) $x=6$ u) $x=169$ v) $x=8$