Algebra: Simplifying Radical Expressions

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DIRECTIONS

Simplify each radical expression. Factor the radicand into a product containing the largest perfect-square (or perfect-cube) factor, then take that factor out of the radical. Assume all variables represent nonnegative real numbers.

1. Simplify:

$$\sqrt{32}$$

Answer: _____

2. Simplify:

$$\sqrt{48}$$

Answer: _____

3. Simplify:

$$\sqrt{72}$$

Answer: _____

4. Simplify:

$$\sqrt{80}$$

Answer: _____

5. Simplify:

$$\sqrt{x^5}$$

Answer: _____

6. Simplify:

$$\sqrt{9x^2}$$

Answer: _____

7. Simplify:

$$\sqrt{8x^3}$$

Answer: _____

8. Simplify:

$$\sqrt{50x^2y}$$

Answer: _____

9. Simplify:

$$\sqrt{45a^2b^3}$$

Answer: _____

10. Simplify:

$$\sqrt[3]{16}$$

Answer: _____

Answer Key & Solutions

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TEACHER NOTES

Items 1–4: numeric square roots — factor out the largest perfect square. Items 5–6: variables only. Items 7–9: mixed numerical and variable radicands. Item 10: cube root — factor out the largest perfect cube.

1. Simplify: √32

Answer: $4\sqrt{2}$

$32 = 16 \cdot 2 \rightarrow \sqrt{32} = 4\sqrt{2}$.

2. Simplify: √48

Answer: $4\sqrt{3}$

$48 = 16 \cdot 3 \rightarrow \sqrt{48} = 4\sqrt{3}$.

3. Simplify: √72

Answer: $6\sqrt{2}$

$72 = 36 \cdot 2 \rightarrow \sqrt{72} = 6\sqrt{2}$.

4. Simplify: √80

Answer: $4\sqrt{5}$

$80 = 16 \cdot 5 \rightarrow \sqrt{80} = 4\sqrt{5}$.

5. Simplify: √(x^5)

Answer: $x^2\sqrt{x}$

$x^5 = x^4 \cdot x \rightarrow \sqrt{(x^5)} = x^2\sqrt{x}$.

6. Simplify: √(9x²)

Answer: 3x

Both 9 and x^2 are perfect squares: $\sqrt{(9x^2)} = 3x$.

7. Simplify: √(8x³)

Answer: $2x\sqrt{(2x)}$

$8x^3 = 4x^2 \cdot 2x \rightarrow \sqrt{(8x^3)} = 2x\sqrt{(2x)}$.

8. Simplify: √(50x²y)

Answer: $5x\sqrt{(2y)}$

$50x^2y = 25x^2 \cdot 2y \rightarrow \sqrt{(50x^2y)} = 5x\sqrt{(2y)}$.

9. Simplify: √(45a²b³)

Answer: $3ab\sqrt{(5b)}$

$45a^2b^3 = 9a^2b^2 \cdot 5b \rightarrow \sqrt{(45a^2b^3)} = 3ab\sqrt{(5b)}$.

10. Simplify: ³√16

Answer: $2\sqrt[3]{2}$

$16 = 8 \cdot 2 \rightarrow \sqrt[3]{16} = 2\sqrt[3]{2}$.