

Perform Operations with Radical Expressions

(11-1, 11-2)

Simplify each expression.

1. $5\sqrt{48}$ $\sqrt{24 \cdot 2}$ 1. $20\sqrt{3}$

$5 \cdot \sqrt{16} \cdot \sqrt{3}$ $\sqrt{2 \cdot 2 \cdot 2 \cdot 2}$
 $5 \cdot 4 \cdot \sqrt{3}$ $\sqrt{4 \cdot 3 \cdot 2 \cdot 2}$

2. $\sqrt{108x^7y^{10}}$ 2. $6x^3y^5\sqrt{3x}$

$\sqrt{36} \cdot \sqrt{3}$
 $6\sqrt{3}$

3. $\sqrt{2h^2} \cdot \sqrt{90h}$ $\sqrt{h^2} \cdot \sqrt{h} = \sqrt{h^3}$ 3. $6h\sqrt{5h}$

$\sqrt{2} \cdot 3 \cdot \sqrt{5} \cdot \sqrt{2} = 3 \cdot 2 \cdot \sqrt{5}$

4. $\sqrt{\frac{68}{25}} = \frac{\sqrt{68}}{\sqrt{25}} = \frac{\sqrt{68}}{5}$ 4. $\frac{2\sqrt{17}}{5}$

$\sqrt{68}$
 $\sqrt{4} \cdot \sqrt{17}$
 $2\sqrt{17}$

5. $\sqrt{\frac{60w^2w^7}{48w^5}}$ 5. $\frac{w^3\sqrt{5w}}{2}$

$\sqrt{\frac{10w^2w^7}{8w^5}} = \sqrt{\frac{10w^7}{8w^5}} = \sqrt{\frac{5w^7}{4}}$

$= \frac{\sqrt{5w^7}}{\sqrt{4}} = \frac{w^3\sqrt{5w}}{2}$

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

$\frac{6\sqrt{3}}{\sqrt{3}} = \frac{6\sqrt{3}}{3} = 2\sqrt{3}$

7. $4\sqrt{17} - 9\sqrt{17} + 1\sqrt{17}$ 7. $-4\sqrt{17}$

$4 - 9 + 1$
 $-5 + 1$
 -4

$$8. \quad \sqrt{18} - \sqrt{128} - \sqrt{2}$$

$$\begin{array}{c} \sqrt{9} \cdot \sqrt{2} \quad \sqrt{2} \cdot \sqrt{64} \quad \sqrt{2} \\ \downarrow \qquad \qquad \downarrow \qquad \qquad \downarrow \\ 3\sqrt{2} - 8\sqrt{2} - 1\sqrt{2} \end{array}$$

$$8. \quad \underline{-6\sqrt{2}}$$

$$9. \quad \sqrt{5}(2\sqrt{3} + 4\sqrt{5})$$

$$2\sqrt{15} + 4\sqrt{25}$$

$$\begin{array}{c} \sqrt{5} \cdot \sqrt{3} \quad + \quad 4 \cdot \sqrt{5} \\ \downarrow \qquad \qquad \downarrow \\ \sqrt{5} \cdot \sqrt{3} \quad + \quad 4 \cdot 5 \end{array}$$

$$9. \quad \underline{20 + 2\sqrt{15}}$$

$$10. \quad (\sqrt{3} + 2\sqrt{11})(5\sqrt{3} - 3\sqrt{11})$$

$$5\sqrt{9} - 3\sqrt{33} + 10\sqrt{33} - 6\sqrt{121}$$

$$\begin{array}{c} 5 \cdot 3 \quad - 3\sqrt{33} + 10\sqrt{33} \quad - 6 \cdot 11 \\ 15 \qquad \qquad + 7\sqrt{33} \qquad \qquad - 66 \end{array}$$

$$\underline{-51 + 7\sqrt{33}}$$

$$10. \quad \underline{-51 + 7\sqrt{33}}$$

$$11. \quad (8 + \sqrt{3})(8 - \sqrt{3})$$

$$64 - 8\sqrt{3} + 8\sqrt{3} - \sqrt{9}$$

$$64 - \sqrt{9}$$

$$64 - 3$$

$$\underline{61}$$

$$11. \quad \underline{61}$$

$$12. \quad (5 - \sqrt{2})^2$$

$$(5 - \sqrt{2})(5 - \sqrt{2})$$

$$25 - 5\sqrt{2} - 5\sqrt{2} + \sqrt{4}$$

$$25 - 10\sqrt{2} + 2$$

$$\underline{27 - 10\sqrt{2}}$$

$$12. \quad \underline{27 - 10\sqrt{2}}$$