

### 5-5 Homework Part 1

#### Operations with Radical Expressions

**Example 1:** Simplify  $2\sqrt{50} + 4\sqrt{500} - 6\sqrt{125}$ .

$$\begin{aligned}
 2\sqrt{50} + 4\sqrt{500} - 6\sqrt{125} &= 2\sqrt{5^2 \cdot 2} + 4\sqrt{10^2 \cdot 5} - 6\sqrt{5^2 \cdot 5} \\
 &= 2 \cdot 5 \cdot \sqrt{2} + 4 \cdot 10 \cdot \sqrt{5} - 6 \cdot 5 \cdot \sqrt{5} \\
 &= 10\sqrt{2} + 40\sqrt{5} - 30\sqrt{5} \\
 &= 10\sqrt{2} + 10\sqrt{5}
 \end{aligned}$$

Factor using squares.  
Simplify square roots.  
Multiply.  
Combine like radicals.

**Example 2:** Simplify  $\sqrt[3]{-6a^5b^7}$ .

$$\begin{aligned}
 \sqrt[3]{-6a^5b^7} &= \sqrt[3]{(-2)^3 \cdot 2 \cdot a^3 \cdot a^2 \cdot (b^2)^3 \cdot b} \\
 &= -2ab^2 \sqrt[3]{2a^2b}
 \end{aligned}$$

#### Exercises

Simplify.

1.  $3\sqrt{2} + \sqrt{50} - 4\sqrt{8}$

$$\begin{aligned}
 &\sqrt{25}\sqrt{2} \quad \sqrt{4}\sqrt{2} \\
 &3\sqrt{2} + 5\sqrt{2} - 4 \cdot 2\sqrt{2} \\
 &3\sqrt{2} + 5\sqrt{2} - 8\sqrt{2} \\
 &0\sqrt{2} \\
 &\boxed{0}
 \end{aligned}$$

2.  $\sqrt{20} + \sqrt{125} - \sqrt{45}$

$$\begin{aligned}
 &\sqrt{4}\sqrt{5} \quad \sqrt{25}\sqrt{5} \quad \sqrt{9}\sqrt{5} \\
 &2\sqrt{5} + 5\sqrt{5} - 3\sqrt{5} \\
 &\boxed{4\sqrt{5}}
 \end{aligned}$$

3.  $\sqrt{300} - \sqrt{27} - \sqrt{75}$

$$\begin{aligned}
 &\sqrt{100}\sqrt{3} \quad \sqrt{9}\sqrt{3} \quad \sqrt{25}\sqrt{3} \\
 &10\sqrt{3} - 3\sqrt{3} - 5\sqrt{3} \\
 &\boxed{2\sqrt{3}}
 \end{aligned}$$

4.  $5\sqrt{54}$

$$\begin{aligned}
 &\sqrt{9}\sqrt{6} \\
 &5 \cdot 3 \cdot \sqrt{6} \\
 &\boxed{15\sqrt{6}}
 \end{aligned}$$

5.  $\sqrt[4]{32a^9b^{20}}$

$$\begin{aligned}
 &\sqrt[4]{2^4 \cdot 2^1 \cdot a^8 \cdot a \cdot b^{20}} \\
 &\boxed{2a^2b^5\sqrt[4]{2a}}
 \end{aligned}$$

6.  $\sqrt{75x^4y^7}$

$$\begin{aligned}
 &\sqrt{25 \cdot 3x^4y^6y} \\
 &\boxed{5x^2y^3\sqrt{3y}}
 \end{aligned}$$

## 6-5 Homework Part 2

## Operations with Radical Expressions

## Exercises

Simplify.

1.  $5\sqrt{54}$

$$5 \cdot \sqrt{9} \sqrt{6}$$

$$5 \cdot 3 \sqrt{6}$$

$$15\sqrt{6}$$

2.  $\sqrt[4]{32a^9b^{20}}$

$$\sqrt[4]{2^4 \cdot 2a^8 ab^{20}}$$

$$2a^2b^5\sqrt[4]{2a}$$

3.  $\sqrt{75x^4y^7}$

$$\sqrt{25 \cdot 3x^4y^6}$$

$$5x^2y^3\sqrt{3y}$$

4.  $4\sqrt{50x^5}$

$$4\sqrt{25 \cdot 2x^4 \cdot x}$$

$$4 \cdot 5 \cdot x^2 \sqrt{2x}$$

$$20x^2\sqrt{2x}$$

5.  $\sqrt[4]{64a^4b^4}$

$$\sqrt[4]{2^4 a^4 b^4}$$

$$\sqrt[4]{2^4 \cdot 2^2 a^4 b^4}$$

$$2ab^2\sqrt[4]{4}$$

6.  $\sqrt[3]{-8d^2f^5}$

$$\sqrt[3]{(-2)^3 d^2 f^3 f^2}$$

$$-2f\sqrt[3]{d^2 f^2}$$

7.  $\sqrt{\frac{36}{125}} = \frac{\sqrt{36}}{\sqrt{125}} = \frac{6}{\sqrt{25 \cdot 5}} = \frac{6}{5\sqrt{5}}$

$$\frac{6}{5\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{6\sqrt{5}}{25}$$

$$5 \cdot \sqrt{25}$$

$$5 \cdot 5$$

8.  $\sqrt{\frac{a^6b^3}{98}} = \frac{\sqrt{a^6b^3}}{\sqrt{98}} = \frac{\sqrt{a^4b^2b}}{\sqrt{49 \cdot 2}}$

$$= \frac{a^3b\sqrt{b} \cdot \sqrt{2}}{7\sqrt{2} \cdot \sqrt{2}} = \frac{a^3b\sqrt{2b}}{14}$$

$$7 \cdot \sqrt{4}$$

$$7 \cdot 2 =$$

9.  $\sqrt[3]{\frac{p^5q^3}{40}} = \frac{\sqrt[3]{p^5q^3}}{\sqrt[3]{40}} = \frac{\sqrt[3]{p^3p^2q^3}}{\sqrt[3]{8 \cdot 5}}$

$$= \frac{pq\sqrt[3]{p^2} \cdot \sqrt[3]{5}}{2\sqrt[3]{5} \cdot \sqrt[3]{5}}$$

$$= \frac{pq\sqrt[3]{5p^2}}{10}$$

10.  $\sqrt{\frac{25r^2t}{36}}$

$$\frac{\sqrt{25r^2t}}{\sqrt{36}} = \frac{5r\sqrt{t}}{6}$$

11.  $\sqrt{\frac{2g^3}{5z}} = \frac{\sqrt{2g^3}}{\sqrt{5z}} = \frac{\sqrt{2g^2g}}{\sqrt{5z}}$

$$= \frac{g\sqrt{2g} \cdot \sqrt{5z}}{\sqrt{5z} \cdot \sqrt{5z}} = \frac{g\sqrt{10gz}}{5z}$$

12.  $\sqrt{\frac{8x^3}{45y^5}} = \frac{\sqrt{8x^3}}{\sqrt{45y^5}} = \frac{\sqrt{4 \cdot 2x^2x}}{\sqrt{9 \cdot 5y^4y}}$

$$= \frac{2x\sqrt{2x} \cdot \sqrt{5y}}{3y\sqrt{5y} \cdot \sqrt{5y}}$$

$$= \frac{2x\sqrt{10xy}}{15y^3}$$