

DO NOW

Simplify:

$$\begin{aligned}
 & 5\sqrt{27} - \sqrt{108} + 2\sqrt{75} \\
 & 5\sqrt{9}\sqrt{3} - \sqrt{36}\sqrt{3} + 2\sqrt{25}\sqrt{3} \\
 & 5(3)\sqrt{3} - 6\sqrt{3} + 2(5)\sqrt{3} \\
 & 15\sqrt{3} - 6\sqrt{3} + 10\sqrt{3} \\
 & 9\sqrt{3} + 10\sqrt{3} \\
 & \boxed{19\sqrt{3}}
 \end{aligned}$$

Page 1

1.7 Multiplying Radicals

Product Property for Square Roots
Recall - If $a \geq 0$ and $b \geq 0$, then $\sqrt{ab} = \sqrt{a}\sqrt{b}$

Steps: 1. Multiply coefficients.

2. Multiply radicands.

3. Simplify LAST

$$(a\sqrt{x})(b\sqrt{y}) = ab\sqrt{xy}$$

Page 2

Examples:

$$\begin{aligned}
 1. & \sqrt{2x} \times \sqrt{2x} \\
 & \sqrt{4x^2} \text{ or } (\sqrt{2x})^2 \\
 & \boxed{2x} \quad \boxed{2x} \\
 2. & 3\sqrt{6(5\sqrt{2})} \\
 & (3 \cdot 5)(\sqrt{6} \cdot \sqrt{2}) \\
 & 15\sqrt{12} \\
 & 15\sqrt{4}\sqrt{3} \\
 & 15(2)\sqrt{3} \\
 & \boxed{30\sqrt{3}} \\
 3. & 6\sqrt{5(2\sqrt{15})} \\
 & (6 \cdot 2)(\sqrt{5}\sqrt{15}) \\
 & 12\sqrt{75} \\
 & 12\sqrt{25}\sqrt{3} \\
 & 12(5)\sqrt{3} \\
 & \boxed{60\sqrt{3}} \\
 4. & (3\sqrt{8})(5\sqrt{2}) \\
 & 15\sqrt{16} \\
 & 15(4) \\
 & \boxed{60}
 \end{aligned}$$

Page 3

$$\begin{aligned}
 5. & (\sqrt{3x})(\sqrt{6x}) \\
 & \sqrt{18x^2} \\
 & \sqrt{18}\sqrt{x^2} \\
 & \sqrt{9}\sqrt{2}\sqrt{x^2} \\
 & \sqrt{9}\sqrt{x^2}\sqrt{2} \\
 & \boxed{3x\sqrt{2}} \\
 6. & (5\sqrt{8c^5})(7\sqrt{3c^2}) \\
 & 35\sqrt{24c^7} \\
 & 35\sqrt{24}\sqrt{c^7} \\
 & 35\sqrt{4}\sqrt{6}\sqrt{c^6}\sqrt{c} \\
 & 35\sqrt{4}\sqrt{c^6}\sqrt{6c} \\
 & 35(2)c^3\sqrt{6c} \\
 & \boxed{70c^3\sqrt{6c}}
 \end{aligned}$$

Page 4

Dividing Radicals

Steps: 1. Divide coefficients.
2. Divide radicands.
3. Simplify LAST

$$\frac{a\sqrt{x}}{b\sqrt{y}} = \frac{a}{b}\sqrt{\frac{x}{y}}$$

****Special Case:**
If the numbers don't divide evenly
→ simplify FIRST!

Examples:

$$\begin{aligned}
 1. & \sqrt{72} \div \sqrt{8} \\
 & \frac{\sqrt{72}}{\sqrt{8}} \\
 & \sqrt{9} \\
 & \boxed{3} \\
 2. & \frac{8\sqrt{48}}{4\sqrt{2}} \\
 & \frac{2\sqrt{24}}{\sqrt{2}} \\
 & \frac{2\sqrt{4}\sqrt{6}}{2(2)\sqrt{6}} \\
 & \frac{4\sqrt{6}}{4\sqrt{6}} \\
 & \boxed{1} \\
 3. & \frac{\sqrt{72a^5}}{\sqrt{2a^3}} \\
 & \sqrt{36a^2} \\
 & \boxed{6a} \\
 4. & \sqrt{\frac{3}{4}} \\
 & \frac{\sqrt{3}}{\sqrt{4}} \\
 & \frac{\sqrt{3}}{2} \\
 & \boxed{\frac{\sqrt{3}}{2}} \\
 5. & \sqrt{\frac{8}{49}} \\
 & \frac{\sqrt{8}}{\sqrt{49}} \\
 & \frac{\sqrt{4}\sqrt{2}}{7} \\
 & \frac{2\sqrt{2}}{7} \\
 & \boxed{\frac{2\sqrt{2}}{7}} \\
 6. & \frac{21\sqrt{40}}{\sqrt{5}} \\
 & \frac{21\sqrt{8}}{1\sqrt{5}} \\
 & \frac{21\sqrt{4}\sqrt{2}}{21(2)\sqrt{2}} \\
 & \frac{42\sqrt{2}}{42\sqrt{2}} \\
 & \boxed{1}
 \end{aligned}$$

Page 5

Page 6

$$7. \frac{\sqrt{300z^8}}{\sqrt{6z^3}}$$

$$\sqrt{50z^5}$$

$$\sqrt{50}\sqrt{z^5}$$

$$\sqrt{25}\sqrt{2}\sqrt{z^4}\sqrt{z}$$

$$\sqrt{25}\sqrt{z^4}\sqrt{2z}$$

$$\boxed{5z^2\sqrt{2z}}$$

$$8. \frac{3\sqrt{54}}{6\sqrt{3}}$$

$$\frac{1}{2}\sqrt{18}$$

$$\frac{\sqrt{18}}{2}$$

$$\frac{\sqrt{9}\sqrt{2}}{2}$$

$$\boxed{\frac{3\sqrt{2}}{2}}$$

HOMEWORK

Worksheet - HW 1.7

Multiplying and Dividing Radicals