

## 9.1 Simplifying Radical Expressions Product DAY ONE Worksheet

**Product Property of Square Roots** The **Product Property of Square Roots** and prime factorization can be used to simplify expressions involving irrational square roots. When you simplify radical expressions with variables, use absolute value to ensure nonnegative results.

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| <b>Product Property of Square Roots</b> | For any numbers $a$ and $b$ , where $a \geq 0$ and $b \geq 0$ , $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ . |
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**Example 1** Simplify  $\sqrt{180}$ .

$$\begin{aligned}\sqrt{180} &= \sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 5} \\ &= \sqrt{2^2 \cdot 3^2 \cdot 5} \\ &= 2 \cdot 3 \cdot \sqrt{5} \\ &= 6\sqrt{5}\end{aligned}$$

Prime factorization of 180

Product Property of Square Roots

Simplify.

Simplify.

**Example 2** Simplify  $\sqrt{120a^2 \cdot b^5 \cdot c^4}$ .

$$\begin{aligned}\sqrt{120a^2 \cdot b^5 \cdot c^4} \\ &= \sqrt{2^3 \cdot 3 \cdot 5 \cdot a^2 \cdot b^5 \cdot c^4} \\ &= \sqrt{2^2} \cdot \sqrt{2} \cdot \sqrt{3} \cdot \sqrt{5} \cdot \sqrt{a^2} \cdot \sqrt{b^4 \cdot b} \cdot \sqrt{c^4} \\ &= 2 \cdot \sqrt{2} \cdot \sqrt{3} \cdot \sqrt{5} \cdot |a| \cdot b^2 \cdot \sqrt{b} \cdot c^2 \\ &= 2|a|b^2c^2\sqrt{30b}\end{aligned}$$

**Exercises**

Simplify each expression. Show all work to earn full credit.

1.  $\sqrt{28}$

2.  $\sqrt{68}$

3.  $\sqrt{60}$

4.  $\sqrt{75}$

5.  $\sqrt{162}$

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

7.  $\sqrt{2} \cdot \sqrt{5}$

8.  $\sqrt{5} \cdot \sqrt{10}$

**9.**  $\sqrt{4a^2}$

**10.**  $\sqrt{9x^4}$

**11.**  $\sqrt{300a^4}$

**12.**  $\sqrt{128c^6}$

**13.**  $4\sqrt{10} \cdot 3\sqrt{6}$

**14.**  $\sqrt{3x^2} \cdot 3\sqrt{3x^4}$

**15.**  $\sqrt{20a^2b^4}$

**16.**  $\sqrt{100x^3y}$

**17.**  $\sqrt{24a^4b^2}$

**18.**  $\sqrt{81x^4y^2}$

**19.**  $\sqrt{150a^2b^2c}$

**20.**  $\sqrt{72a^6b^3c^2}$

**21.**  $\sqrt{45x^2y^5z^8}$

**22.**  $\sqrt{98x^4y^6z^2}$