

# 10-2 Reteaching

## Simplifying Radicals

You can remove perfect-square factors from a radicand.

### Problem

What is the simplified form of  $\sqrt{80n^5}$ ?

In the radicand, factor the coefficient and the variable separately into perfect square factors, and then simplify. Factor 80 and  $n^5$  completely and then find paired factors.

**Solve**  $80 = 8 \cdot 10 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$   
 $= (2 \cdot 2)(2 \cdot 2) \cdot 5 = (2 \cdot 2)^2 \cdot 5$

$$\sqrt{80} = \sqrt{4^2 \cdot 5} = \sqrt{4^2} \cdot \sqrt{5}$$

$$= 4 \cdot \sqrt{5} = 4\sqrt{5}$$

$$n^5 = n \cdot n \cdot n \cdot n \cdot n$$

$$= (n \cdot n) \cdot (n \cdot n) \cdot n = (n \cdot n)^2 \cdot n$$

$$\sqrt{n^5} = \sqrt{(n \cdot n)^2 \cdot n}$$

$$= n^2 \cdot \sqrt{n} = n^2\sqrt{n}$$

$$\sqrt{80n^5} = 4 \cdot n^2 \sqrt{(5 \cdot n)^2} = 4n^2\sqrt{5n}$$

**Check**  $\sqrt{80n^5} \stackrel{?}{=} 4n^2\sqrt{5n}$

$$\frac{\sqrt{80n^5}}{\sqrt{5n}} \stackrel{?}{=} \frac{4n^2\sqrt{5n}}{\sqrt{5n}}$$

$$\sqrt{16n^4} = 4n^2$$

$$4n^2 = 4n^2 \checkmark$$

Solution: The simplified form of  $\sqrt{80n^5}$  is  $4n^2\sqrt{5n}$ .

### Exercises

Simplify each radical expression.

1.  $\sqrt{100n^3}$

2.  $\sqrt{120b^4}$

3.  $\sqrt{66t^5}$

4.  $\sqrt{32x}$

5.  $\sqrt{525c^7}$

6.  $\sqrt{86t^2}$

7.  $\sqrt{50g^3}$

8.  $\sqrt{54h^6}$

9.  $\sqrt{35y}$

Factor 80 completely.

Find pairs of factors.

Use the rule  $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ .

The square root of a number squared is the number:  $\sqrt{a^2} = a$ .

Factor  $n^5$  completely.

Find pairs of factors.

Separate the factors.

Remove the perfect square.

Combine your answers.

Check your solution.

Divide both sides by  $\sqrt{5n}$ .

Simplify.

## Problem

What is the simplified form of  $\sqrt{\frac{27t^4}{48t^2}}$ ?

Begin by cancelling the common factors in the numerator and denominator. Simplify the numerator and denominator separately when the denominator is a perfect square. Remember that the radical is not simplified if there is a radical in the denominator. Multiply to remove the radical from the denominator.

**Solve**

$$\begin{aligned}\sqrt{\frac{27t^4}{48t^2}} &= \sqrt{\frac{3 \cdot 3 \cdot 3 \cdot t \cdot t \cdot t}{3 \cdot 4 \cdot 4 \cdot t \cdot t \cdot t}} \\ &= \sqrt{\frac{\cancel{3} \cdot 3 \cdot 3 \cdot \cancel{t} \cdot \cancel{t} \cdot \cancel{t}}{\cancel{3} \cdot 4 \cdot 4 \cdot \cancel{t} \cdot \cancel{t} \cdot \cancel{t}}} \\ &= \frac{\sqrt{(3 \cdot 3)}}{\sqrt{(4 \cdot 4)t}} = \frac{\sqrt{3^2}}{\sqrt{4^2 t}} \\ &= \frac{3}{4\sqrt{t}} \\ &= \frac{3(\sqrt{t})}{4\sqrt{t}(\sqrt{t})} \\ &= \frac{3\sqrt{t}}{4\sqrt{t} \cdot t} = \frac{3\sqrt{t}}{4\sqrt{t}2} = \frac{3\sqrt{t}}{4t}\end{aligned}$$

Factor the numerator and denominator completely.

Cancel the common factors.

Find pairs of factors. These are the perfect-square factors.

Simplify the numerator and denominator separately to remove the perfect-square factors.  $\sqrt{3^2} = 3$  and  $\sqrt{4^2 t} = 4\sqrt{t}$

Multiply the numerator and denominator by  $\sqrt{t}$  to remove  $\sqrt{t}$  from the denominator.

Remove the perfect-square factor from the denominator.

Solution: The simplified form of  $\sqrt{\frac{27t^4}{48t^2}}$  is  $\frac{3\sqrt{t}}{4t}$ .

## Exercises

Simplify each radical expression.

10.  $\sqrt{\frac{49}{81}}$

11.  $\sqrt{\frac{18x^4}{200}}$

12.  $\sqrt{\frac{28s}{s^3}}$

13.  $\sqrt{\frac{25a^5}{9a^7}}$

14.  $\sqrt{\frac{40b^4}{12b^3}}$

15.  $\sqrt{\frac{48}{6b^6}}$

16.  $\sqrt{\frac{50z^3}{4a^2}}$

17.  $\sqrt{\frac{t^5}{64}}$

18.  $\sqrt{\frac{32t}{t}}$