

LESSON

5

# Simplifying Square Roots

**Review It!**

When you simplify square roots, remember this word:

**factor** a number (or term) that divides evenly into another number (or term)

$3 \times 4 = 12$   
 $\uparrow \quad \uparrow$   
 3 and 4 are factors of 12.

The square root of a product is the product of the square roots of the factors.  
 Simplify:  $\sqrt{24}$

Step 1 List all the different factor pairs of 24.

$1 \times 24, 2 \times \underline{\quad}, 3 \times 8, 4 \times 6$

The factors are 1, 2, 3, 4, 6, 8,  $\underline{\quad}$ , and 24.

THINK  $2 \times ? = 24$

Step 2 Choose the factor that is the greatest perfect square.

The greatest perfect square is  $\underline{\quad}$ .

REMEMBER A perfect square is an integer times itself.

Step 3 Simplify.

$\sqrt{24} = \sqrt{4 \times 6} = \sqrt{4} \times \sqrt{6} = 2\sqrt{6}$

THINK This is a perfect square.

So,  $\sqrt{24} = \underline{\quad}$ .

**Try It!**

List all the factors of each number.

**Ask Yourself**

1. 30  
 1, 30  
 2, 15  
 3, 10  
 5, 6
2. 99  
 1, 99  
 3, 33  
 9, 11
3. 50  
 1, 50  
 2, 25  
 5, 10
4. 18  
 1, 18  
 2, 9  
 3, 6

1.  
 What is the greatest factor of 30?  
 15, or 30?

Find the factor that is the greatest perfect square.

5. 32  
16
6. 75  
25
7. 45  
9
8. 28  
4

5.  
 Which is a perfect square?  
 16, or 8?

Write each expression in simplest form.

9.  $\sqrt{40}$  —  $\sqrt{50}$  —  
 $2\sqrt{10}$  —  $5\sqrt{2}$  —
13.  $\sqrt{42}$  —  $\sqrt{8}$  —  
 $\sqrt{42}$  —  $2\sqrt{2}$  —
17.  $\sqrt{32}$  —  $\sqrt{75}$  —  
 $4\sqrt{2}$  —  $5\sqrt{3}$  —

9.  
 What factor is a perfect square?  
 2, 4, or 10?

Solve.

21. The length of a walkway is  $\sqrt{27}$  feet. What is the simplest form of  $\sqrt{27}$ ?  $3\sqrt{3}$
22. The side of a playground is  $\sqrt{60}$  meters. What is the simplest form of  $\sqrt{60}$ ?  $2\sqrt{15}$

21.  
 What are the factors of 27?  
 10 and 17, or 9 and 3?

**On Your Own!**

Circle the best answer for each question.

Simplify each expression.

1.  $\sqrt{200}$

- A.  $2\sqrt{10}$   
 B.  $10\sqrt{2}$   
 C. 50  
 D. 100

2.  $\sqrt{13}$

- A.  $\sqrt{13}$   
 B.  $4\sqrt{2}$   
 C. 6  
 D. 6.5

3.  $\sqrt{80}$

- A. 40  
 B.  $5\sqrt{4}$   
 C.  $4\sqrt{5}$   
 D.  $2\sqrt{20}$

4.  $\sqrt{48}$

- A. 24  
 B.  $3\sqrt{16}$   
 C.  $2\sqrt{12}$   
 D.  $4\sqrt{3}$

5.  $\sqrt{90}$

- A.  $3\sqrt{10}$   
 B.  $2\sqrt{45}$   
 C.  $10\sqrt{3}$   
 D.  $45\sqrt{2}$

6.  $\sqrt{44}$

- A.  $11\sqrt{4}$   
 B.  $11\sqrt{2}$   
 C.  $4\sqrt{11}$   
 D.  $2\sqrt{11}$

7. The length of the side of a square field is
- $\sqrt{300}$
- ft. What is the simplest form for the length?

- A.  $3\sqrt{10}$  ft  
 B.  $10\sqrt{3}$  ft  
 C. 150 ft  
 D. 900 ft

8. The length of the side of a square playground is
- $\sqrt{288}$
- ft. What is the simplest form for the length?

- A. 144 ft  
 B.  $12\sqrt{2}$  ft  
 C. 12 ft  
 D.  $2\sqrt{12}$  ft

9. Part A Simplify each expression.

$$\begin{array}{r} \sqrt{250} \quad 2\sqrt{90} \\ \sqrt{25 \cdot 10} \quad 2\sqrt{9 \cdot 10} \\ 5\sqrt{10} \quad 2 \cdot 3\sqrt{10} \\ \underline{\hspace{1cm}}; \underline{\hspace{1cm}} \quad 6\sqrt{10} \end{array}$$

- Part B Which expression has the greater value?

$2\sqrt{90}$

10. Part A Simplify each expression.

$$\begin{array}{r} \sqrt{180} \quad 3\sqrt{45} \\ \sqrt{36 \cdot 5} \quad 3\sqrt{9 \cdot 5} \\ 6\sqrt{5} \quad 3 \cdot 3\sqrt{5} \\ \underline{\hspace{1cm}}; \underline{\hspace{1cm}} \quad 9\sqrt{5} \end{array}$$

- Part B Which expression has the greater value?

$3\sqrt{45}$



Fill in the blanks.

11. 9 and 8 are
- factors
- of 72.

12. 81 is a
- perfect square
- .

13. A number that divides evenly into another number is a
- factor
- .