Lesson 22: Multiplying and Dividing Expressions with Radicals

Classwork

Exercises 1–5

Simplify as much as possible.

1. $\sqrt{17^2} =$

2. $\sqrt{5^{10}} =$

3. $\sqrt{4x^4} =$

4. Complete parts (a) through (c).

a.   Compare the value of $\sqrt{36}$ to the value of $\sqrt{9} \times \sqrt{4}$.

b. Make a conjecture about the validity of the following statement. For nonnegative real numbers a and b, $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$. Explain.

c. Does your conjecture hold true for $a = -4$ and $b = -9$?

5. Complete parts (a) through (c).

a. Compare the value of $\sqrt{\frac{100}{25}}$ to the value of $\frac{\sqrt{100}}{\sqrt{25}}$.

b. Make a conjecture about the validity of the following statement. For nonnegative real numbers a and b, when $b \neq 0$, $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$. Explain.

c. Does your conjecture hold true for $a = -100$ and $b = -25$?

Exercises 6–17

Simplify each expression as much as possible and rationalize denominators when applicable.

6. $\sqrt{72} =$

7. $\sqrt{\dfrac{17}{25}} =$

8. $\sqrt{32x} =$

9. $\sqrt{\dfrac{1}{3}} =$

10. $\sqrt{54x^2} =$

11. $\dfrac{\sqrt{36}}{\sqrt{18}} =$

12. $\sqrt{\dfrac{4}{x^4}} =$

13. $\dfrac{4x}{\sqrt{64x^2}} =$

14. $\dfrac{5}{\sqrt{x^7}} =$

15. $\sqrt{\dfrac{x^5}{2}} =$

16. $\dfrac{\sqrt{18x}}{3\sqrt{x^5}} =$

17. The captain of a ship recorded the ship's coordinates, then sailed north and then west, and then recorded the new coordinates. The coordinates were used to calculate the distance they traveled, $\sqrt{578}$ km. When the captain asked how far they traveled, the navigator said, "About 24 km." Is the navigator correct? Under what conditions might he need to be more precise in his answer?

Problem Set

Express each number in its simplest radical form.

1. $\sqrt{6} \cdot \sqrt{60} =$

2. $\sqrt{108} =$

3. Pablo found the length of the hypotenuse of a right triangle to be $\sqrt{45}$. Can the length be simplified? Explain.

4. $\sqrt{12x^4} =$

5. Sarahi found the distance between two points on a coordinate plane to be $\sqrt{74}$. Can this answer be simplified? Explain.
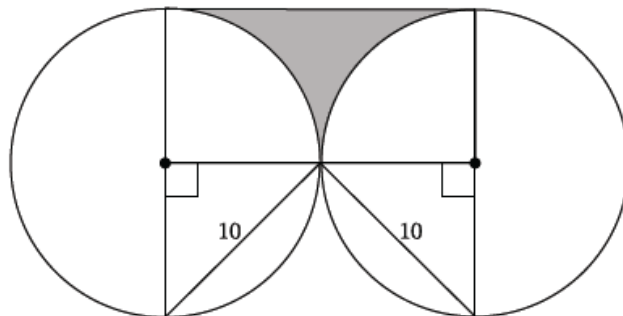
6. $\sqrt{16x^3} =$

7. $\dfrac{\sqrt{27}}{\sqrt{3}} =$

8. Nazem and Joffrey are arguing about who got the right answer. Nazem says the answer is $\dfrac{1}{\sqrt{3}}$, and Joffrey says the answer is $\dfrac{\sqrt{3}}{3}$. Show and explain that their answers are equivalent.
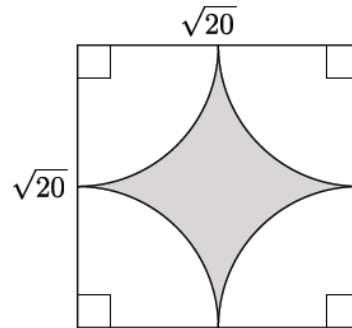
9. $\sqrt{\dfrac{5}{8}} =$

10. Determine the area of a square with side length $2\sqrt{7}$ in.
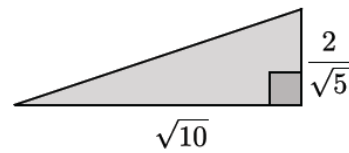
11. Determine the exact area of the shaded region shown below.

12. Determine the exact area of the shaded region shown to the right.

13. Calculate the area of the triangle to the right.

14. $\dfrac{\sqrt{2x^3}\cdot\sqrt{8x}}{\sqrt{x^3}} =$

15. Prove Rule 2 for square roots: $\sqrt{\dfrac{a}{b}} = \dfrac{\sqrt{a}}{\sqrt{b}}$ $(a \geq 0, b > 0)$.

    Let p be the nonnegative number so that $p^2 = a$, and let q be the nonnegative number so that $q^2 = b$.