

Name: _____

Date: _____

Square Root Division Algebra 1

In the last lesson we learned how to multiply and simply square roots. In this lesson we will concentrate on division problems involving square roots. The first exercise will illustrate a very important property of square roots concerning division.

Exercise #1: Perform the following division using square roots in two different ways.

(a) $\frac{\sqrt{36}}{\sqrt{4}}$ by first evaluating the square roots

(b) $\frac{\sqrt{36}}{\sqrt{4}}$ by first doing the division

DIVISION PROPERTY OF SQUARE ROOTS

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}} \quad \text{where } a \geq 0 \text{ and } b > 0$$

This property allows us to divide square roots as well as take square roots of fractions. The next two exercises will illustrate these two skills.

Exercise #2: Evaluate each of the following division problems.

(a) $\sqrt{\frac{1}{4}}$

(b) $\sqrt{\frac{4}{9}}$

(c) $\sqrt{\frac{16}{25}}$

(d) $\sqrt{\frac{81}{4}}$

Exercise #3: Evaluate each of the following division problems.

(a) $\frac{\sqrt{45}}{\sqrt{5}}$

(b) $\frac{\sqrt{75}}{\sqrt{3}}$

(c) $\frac{\sqrt{3}}{\sqrt{12}}$

(d) $\frac{\sqrt{20}}{\sqrt{5}}$

Oftentimes, the result of a division problem with square roots is an irrational number that must be written in ***simplest radical form***. In the last lesson we learned how to simplify square roots. The following exercise combines that skill with division of square roots.

Exercise #4: Perform each of the following division problems. State your answer in *simplest radical form*.

(a) $\frac{\sqrt{48}}{\sqrt{2}}$

(b) $\frac{\sqrt{54}}{\sqrt{3}}$

(c) $\frac{\sqrt{270}}{\sqrt{6}}$

(d) $\frac{\sqrt{96}}{\sqrt{3}}$

Exercise #5: Which of the following is an example of an *irrational* number?

(1) $\sqrt{25}$

(3) $\sqrt{\frac{4}{9}}$

(2) $-\frac{5}{3}$

(4) $\sqrt{20}$

Rationalizing Denominators – In general, fractions are only considered simplified if their denominators are rational numbers. Some fractions originally have irrational numbers in their denominators. To rewrite the fraction in an equivalent form without an irrational number in the denominator is called ***rationalizing the denominator***. This process is illustrated in the next exercise.

Exercise #6: Write each of the following fractions in simplest form by first rationalizing the denominator.

(a) $\frac{1}{\sqrt{2}}$

(b) $\frac{4}{\sqrt{3}}$

(c) $\frac{20}{\sqrt{5}}$

(d) $\frac{12}{\sqrt{3}}$

(e) $\sqrt{\frac{2}{3}}$

(f) $\sqrt{\frac{4}{5}}$

(g) $\sqrt{\frac{3}{7}}$

(h) $\sqrt{\frac{1}{5}}$

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Square Root Division Algebra 1 Homework

Skills

For problems 1 through 4, perform the division and express your final answer as a rational number.

1. $\frac{\sqrt{72}}{\sqrt{2}}$

2. $\frac{\sqrt{300}}{\sqrt{3}}$

3. $\frac{\sqrt{100}}{\sqrt{4}}$

4. $\frac{\sqrt{45}}{\sqrt{5}}$

For problems 5 through 8, evaluate without a calculator.

5. $\sqrt{\frac{16}{81}}$

6. $\sqrt{\frac{1}{100}}$

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

8. $\sqrt{\frac{9}{64}}$

For problems 9 through 16, perform each division and leave your answer in *simplest radical form*.

9. $\frac{\sqrt{96}}{\sqrt{3}}$

10. $\frac{\sqrt{96}}{\sqrt{2}}$

11. $\frac{\sqrt{40}}{\sqrt{5}}$

12. $\frac{\sqrt{72}}{\sqrt{6}}$

13. $\frac{\sqrt{36}}{\sqrt{2}}$

14. $\frac{\sqrt{135}}{\sqrt{5}}$

15. $\frac{\sqrt{400}}{\sqrt{10}}$

16. $\frac{\sqrt{150}}{\sqrt{2}}$

For problems 17 through 24, write each expression in its simplest form by rationalizing the denominator.

17. $\frac{1}{\sqrt{5}}$

18. $\frac{4}{\sqrt{2}}$

19. $\frac{3}{\sqrt{6}}$

20. $\frac{30}{\sqrt{5}}$

21. $\frac{12}{\sqrt{6}}$

22. $\frac{12}{\sqrt{8}}$

23. $\sqrt{\frac{1}{2}}$

24. $\sqrt{\frac{4}{3}}$

Reasoning

25. Which of the following is an example of an irrational number? Explain your choice.

(1) $\frac{4}{5}$

(3) $\sqrt{10}$

(2) $\sqrt{\frac{25}{4}}$

(4) $-\sqrt{\frac{1}{4}}$

26. Joanna claims that whenever two irrational numbers are divided the answer is an irrational number. Prove that Joanna is wrong using the irrational numbers $\sqrt{75}$ and $\sqrt{3}$. Explain your answer.