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# Dividing Radical Expressions

**Quotient Property of Square Roots**

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \quad b \neq 0$$
  
$$\frac{\sqrt{90}}{\sqrt{10}} = \sqrt{\frac{90}{10}} = \sqrt{9} = 3$$

- 1 Simplify the given radical expressions.
- 2 Calculate the time it takes to travel the dotted path.
- 3 Explain how to simplify  $(-6\sqrt{20}) \div (2\sqrt{5})$ .
- 4 Find the length of the hypotenuse  $c$ .
- 5 Identify the simplified form of the radical expressions.
- + with lots of tips, answer keys, and detailed answer explanations for all of the problems.



The complete package, including all problems, hints, answers, and detailed answer explanations is available for all [sofatutor.com](https://www.sofatutor.com) subscribers.



## Simplify the given radical expressions.

Fill in the blanks.

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

The quotient property of square roots.

3 7 4 12 9 3 49 11 6 7 3 9 8 5

90 9 10 3

$$\frac{\sqrt{90}}{\sqrt{10}} = ?$$

- Use the quotient property of square roots to get  $\sqrt{\frac{a}{b}}$ , where we have that  $a = \dots\dots\dots_1$  and  $b = \dots\dots\dots_2$ .
- Next simplify the fraction to  $\sqrt{c}$  with  $c = \dots\dots\dots_3$ .
- Lastly calculate the square root  $\frac{\sqrt{90}}{\sqrt{10}} = \dots\dots\dots_4$  with  $\dots\dots\dots_5^2 = \dots\dots\dots_6$ .

$$\sqrt{\frac{49}{9}} = ?$$

- Use the quotient property of square roots to get  $\frac{\sqrt{a}}{\sqrt{b}}$ , where  $a = \dots\dots\dots_7$  and  $b = \dots\dots\dots_8$ .
- Simplify the square roots in the numerator and denominator to get  $\sqrt{49} = \dots\dots\dots_9$  and  $\sqrt{9} = \dots\dots\dots_{10}$ .
- Together, we have  $\sqrt{\frac{49}{9}} = \dots\dots\dots_{11} \div \dots\dots\dots_{12}$ .



## Hints for solving these problems

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of 5

### Simplify the given radical expressions.

#### Hint #1

The square root of any square is the squared term itself:

- $\sqrt{4} = \sqrt{2^2} = 2$
  - $\sqrt{16} = \sqrt{4^2} = 4$
  - $\sqrt{25} = \sqrt{5^2} = 5$
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#### Hint #2

You can simplify any fraction by dividing the numerator as well as the denominator by the same value:

$$\frac{16}{8} = \frac{16 \div 8}{8 \div 8} = \frac{2}{1} = 2$$

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## Answers and detailed answer explanations for these problems

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### Simplify the given radical expressions.

**Answer key:** 1: 90 // 2: 10 // 3: 9 // 4: 3 // 5: 3 // 6: 9 // 7: 49 // 8: 9 // 9: 7 // 10: 3 // 11: 7 // 12: 3

Here we study the quotient property of square roots,

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}},$$

or rather

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}.$$

Let's start with

$$\begin{aligned} \frac{\sqrt{90}}{\sqrt{10}} &= \sqrt{\frac{90}{10}} && | \text{ quotient property} \\ &= \sqrt{9} && | \text{ simplifying the fraction} \\ &= 3 && | \text{ because } 3^2 = 9 \end{aligned}$$

Here you see another example:

$$\begin{aligned} \sqrt{\frac{49}{9}} &= \frac{\sqrt{49}}{\sqrt{9}} && | \text{ quotient property} \\ &= \frac{7}{3} && | \text{ because } 7^2 = 49 \text{ and } 3^2 = 9 \end{aligned}$$