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# Powers of Products and Quotients

**POWER OF PRODUCT**

$a = 2$   
 $b = 5$   
 $m = 3$

$$(a \times b)^m = a^m \times b^m$$
$$(2 \times 5)^3 = 2^3 \times 5^3$$
$$= (2 \times 5) \times (2 \times 5) \times (2 \times 5)$$

- 1 Determine the missing term.
- 2 Prove that  $(2 \times 5)^3 = 2^5 \times 3^5$  using the power of products rule.
- 3 Complete the following examples.
- 4 Determine which terms are equal.
- 5 Rewrite each term using the power of a product, power, and quotient rules.
- + 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.



## Determine the missing term.

Fill in the blank.



Charlotte's playing a game; she needs to figure out the power rules for products as well as quotients.

1 For the power of products rule, raise each .....<sup>1</sup> to the given power:

$$(a \times b)^m = \text{.....}^2$$

2 To raise powers, .....<sup>3</sup> the exponents and keep the .....<sup>4</sup>:

$$(a^m)^p = \text{.....}^5$$

3 How to raise a quotient to a power? You have to raise the .....<sup>6</sup> as well as the .....<sup>7</sup> by the given power:

$$\left(\frac{a}{b}\right)^m = \text{.....}^8$$



## Hints for solving these problems

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of 5

### Determine the missing term.

#### Hint #1

$$(2 \times 3)^2 = (2 \times 3)(2 \times 3) = 2 \times 2 \times 3 \times 3$$

An example using the power of products rule:

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#### Hint #2

$$\left(\frac{2}{3}\right)^2 = \left(\frac{2}{3}\right) \times \left(\frac{2}{3}\right) = \frac{2 \times 2}{3 \times 3}$$

An example using the power of quotients rule:

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#### Hint #3

$$(3^2)^3 = (3^2) \times (3^2) \times (3^2)$$

If you raise a power to a power, you can write it as a product:

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## Answers and detailed answer explanations for these problems

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### Determine the missing term.

**Answer key:** 1: factor // 2:  $a^m \times b^m$  // 3: multiply // 4: basis // 5:  $a^{m \times p}$  // [6+7]!: numerator **or** denominator // 8:  $a^m \div b^m$

**Each answer can only be used once. You can answer them in whatever order you want.**

Let's start with the power of products rule:

$$(a \times b)^m = a^m \times b^m.$$

This means that you have to raise each factor to the same power.

To raise a power to a power,  $(a^m)^p = a^{m \times p}$ , keep the basis and multiply the exponents.

Let's look at the power of quotients rule:

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}.$$

Here we raise the numerator as well as the denominator by the power.