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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 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.

| $a^m + b^m$ | basis | divide | $a^{(m-n)}$ | subtract | $a^m - b^m$ | $a^{m \times p}$ |

| multiply | $a^{(m+n)}$ | add | numerator | $a^m \div b^m$ | $a^m \times b^m$ | factor |

| denominator |

1   For the power of products rule, raise each _____ ₁ to the given power:

$$(a \times b)^m = \underline{\hspace{6cm}}_2$$

2   To raise powers, _____ ₃ the exponents and keep the _____ ₄ :

$$(a^m)^p = \underline{\hspace{6cm}}_5$$

3   How to raise a quotient to a power? You have to raise the _____ ₆ as well as the _____ ₇ by the given power:

$$\left(\frac{a}{b}\right)^m = \underline{\hspace{6cm}}_8$$

Hints for solving these problems

1
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:

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:

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:

Answers and detailed answer explanations for these problems

1
of 5

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]¹: numerator **or** denominator // 8: $a^m \div b^m$

¹Each 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, $\left(a^m\right)^p = a^{m \times p}$, 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.

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