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Exponents and Multiplication – Product of Powers Property



WORDS/HOUR
 $1024 = 2^{10}$

HOURS LEFT
 $16 = 2^4$

$$2^4 \times 2^{10} = 2^{14}$$
$$= 16,384$$
$$= 1.6384 \times 10^4$$

- 1 Describe how to multiply powers with the same base according to the Power of Products Property.
- 2 Find out the number of words Ethan has to write by using the Product of Powers Rule.
- 3 Determine how many words Ethan will be able to write in the next 16 hours.
- 4 Using the Product of Powers Property, identify the base-exponent pair(s) that are factors of the displayed base-exponent.
- 5 Find out how many animals Ethan has seen by using the Product of Powers Property.
- 6 Simplify the given products of powers by using the Product of Powers Property.
- + 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.



Describe how to multiply powers with the same base according to the Power of Products Property.

Fill in the blanks.

b^n multiply a^{n+m} exponents add base a^m $(a + b)^n$
exponents

The Product of Power Rule can only be used for powers with the same _____¹.

To multiply those powers, we _____² the _____³.

So we have $a^n \times$ _____⁴ = _____⁵



Hints for solving these problems

1
of 6

Describe how to multiply powers with the same base according to the Power of Products Property.

Hint #1

$$a^n = \underbrace{a \times \cdots \times a}_{n \text{ times}}$$

You can write each power as a product.

Hint #2

$$2^7 \times 2^3 = 2^{10}$$

Here is an example for the rule.



Answers and detailed answer explanations for these problems

1
of 6

Describe how to multiply powers with the same base according to the Power of Products Property.

Answer key: 1: base // 2: add // 3: exponents // 4: a^m // 5: a^{n+m}

We've illustrated the Product of Powers Property below. You can use this property when multiplying numbers with the same base raised to an exponent.

$$\begin{aligned} a^n \times a^m &= \underbrace{a \times \cdots \times a}_n \times \underbrace{a \times \cdots \times a}_m \\ &= \underbrace{a \times \cdots \times a}_{n+m} \\ &= a^{n+m} \end{aligned}$$

We can only apply this rule if we have two powers with the same base, for example a .

You multiply two powers with the same base, a^n and a^m , by adding the exponents a^{n+m} , while keeping the base the same.

Let's check this with a few examples:

- $2^2 \times 2^3 = (2 \times 2) \times (2 \times 2 \times 2) = 2^{2+3} = 2^5$
- $4^3 \times 4^1 = (4 \times 4 \times 4) \times (4) = 4^{3+1} = 4^4$
- $5^2 \times 5^4 = (5 \times 5) \times (5 \times 5 \times 5 \times 5) = 5^{2+4} = 5^6$