

Do Now:

The mean, the median, and the mode of the five numbers below are all equal. What number does A represent?

1.8 1.6 2.1 1.7 A

NOTES

The factors of a power, such as 7^4 , can be grouped in different ways. Notice the relationship of the exponents in each product.

$$7 \cdot 7 \cdot 7 \cdot 7 = 7^4$$

$$(7 \cdot 7 \cdot 7) \cdot 7 = 7^3 \cdot 7^1 = 7^4$$

$$(7 \cdot 7) \cdot (7 \cdot 7) = 7^2 \cdot 7^2 = 7^4$$

MULTIPLYING POWERS WITH THE SAME BASE

Words	Numbers	Algebra
To multiply powers with the same base, keep the base and _____ the exponents.		

Use the laws of exponents to simplify this expression:

Mention HW and not to simplify completely.

$$8^{21} \cdot 8^9$$

Use the laws of exponents to simplify this expression:

$$n^5 \cdot n^3$$

Find the value of the variable.

$$6^3 \cdot 6^a = 6^{18}$$

Notice what occurs when you divide powers with the same base.

$$\frac{5^5}{5^3} = \frac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5 \cdot 5} = \frac{\cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot 5 \cdot 5}{\cancel{5} \cdot \cancel{5} \cdot \cancel{5}} = 5 \cdot 5 = 5^2$$

DIVIDING POWERS WITH THE SAME BASE

Words

To divide powers with the same base, keep the base and _____ the exponents.

Numbers

Algebra

Use the laws of exponents to simplify this expression:

$$x^{21} \div x^7$$

Find the value of the variable.

$$7^b \cdot 7^4 = 7^2$$

With telescopes we can see 100 quintillion (10^{20}) stars. It is estimated that about 1 trillionth (10^{-12}) of these stars have planets similar to Earth. Find the estimated number of Earth-like planets.



Consider a rule for raising a power to a power. For example:

$$(2^2)^3$$

RAISING A POWER TO A POWER

Words

Numbers

Algebra

To raise a power to a power,
keep the base and
_____ the exponents.

Use the laws of exponents to simplify this expression:

$$\left(4^{10}\right)^{15}$$

Find the value of the variable.

$$(9^7)^f = 9^{49}$$

Find the value of the variable.

$$\left(5^3 \cdot 5^z\right)^4 = 5^{60}$$