

Day 4: Exponent Rules I**Investigation: Exponent Rules**

Complete the following table, using what you know about exponents and the example provided.

Question	Repeated Multiplication	Answer in Exponential Form	Exponent of Answer	Exponents in Original Question
Multiplication Rule				
$2^3 \times 2^5$	$\underbrace{2 \times 2 \times 2}_{2^3} \times \underbrace{2 \times 2 \times 2 \times 2 \times 2}_{2^5}$	2^8	8	3, 5
$5^3 \times 5^5$				
$x^3 \times x^2$				
$\left(\frac{3}{4}\right)^2 \times \left(\frac{3}{4}\right)^5$				

Compare the exponents in the answer and in the original question.

To multiply powers, you _____ the exponents, if the base is the same.

Division Rule

$\frac{10^5}{10^3}$	$\frac{\cancel{10} \times \cancel{10} \times 10 \times 10 \times 10}{\cancel{10} \times \cancel{10} \times \cancel{10}}$	10^2	2	5, 3
$\frac{7^8}{7^5}$				
$\frac{x^6}{x^5}$				

Compare the exponents in the answer and in the original question.

To divide powers, you _____ the exponents, if the base is the same.

Practice

Example 1:

$$2^2 \times 2^5$$

Example 2:

$$y^{11} \div y^7$$

Example 3:

$$\frac{(-2)^3 (8)^5 (-2)^8 (8)}{(-2)^4 (8)^3}$$

Day 4: Exponent Rules I**Investigation: Exponent Rule III**

Complete the following table, using what you know about exponents, the multiplication rule, and the example provided.

Power of a Power Rule				
$(2^3)^4$	$2^3 \times 2^3 \times 2^3 \times 2^3$	2^{12} (from multiplication rule)	12	3, 4
$(3^6)^2$				
$(x^5)^3$				

Compare the exponents in the answer and in the original question.
To raise a power to a power, you _____ the exponents, if the base is the same.

Power of a Power Exponent Rule

Example 1:

$(x^4)^5$

Example 2:

$(2^3)^2$

Example 3:

$(x^5y)^2$

Example 4:

$(xy^2)^2$

Day 4: Exponent Rules I**Practice: Exponent Rules**

Simplify, but do not evaluate

a. $8^3 \times 8^6$	b. $y^3 \times y^4 \times y$	c. $(-6)^2 \times (-6)^4$	d. $2^3 \times 4^2 \times 4 \times 2^5$
e. $5^3 \div 5^2 \times 5^8$	f. $8^4 \times 8^3 \div 8^5$	g. $\left(\frac{3}{2}\right)^2 \times \left(\frac{3}{2}\right)^5$	h. $\frac{2^2 \times 3^2 \times 2^4 \times 3}{2^5 \times 3}$
i. $(5^2)^3$	j. $(a^3b)^2$	k. $\frac{a^3b^6}{ab^2}$	l. $(m^2n)^2$

Find the missing exponent:

m. $10^6 \times 10^x = 10^{10}$	n. $\frac{5^x}{5^3} = 5^2$	o. $3^x \times 3^3 = 3^7$	p. $\frac{(-2)^8}{(-2)^x} = (-2)$
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ANSWERS: a) 8^9 , b) y^8 , c) $(-6)^6$, d) $2^8 \times 4^3$, e) 5^9 , f) 8^2 , g) $(3/2)^7$, h) 2×3^2 , i) 5^6 , j) a^6b^2 , k) a^2b^4 , l) m^4n^2 ,
 m) $x = 4$, n) $x = 5$, o) $x = 4$, p) $x = 7$