Name: _____ Date: Aug 23 Hour: __Alg 1_____

Unit 1A Day 5: Simplifying Terms: The Quotient Rule of Exponents

*Focus Question: How do I divide when the terms have the **same base**?*

A. Use of expanded form

1. *Write each of the following in expanded form. Then write the answer in exponential form.*

Problem	*Expanded Form*	*Exponential Form*
$\frac{2^6}{2^4}$	$\frac{2\cdot2\cdot2\cdot2\cdot2\cdot2}{2\cdot2\cdot2\cdot2}$	2^2
a) $\frac{3^5}{3^2}$	$\frac{3\cdot3\cdot3\cdot3\cdot3}{3\cdot3}$	3^3
b) $\frac{4^8}{4^3}$	$\frac{4\cdot4\cdot4\cdot4\cdot4\cdot4\cdot4\cdot4}{4\cdot4\cdot4}$	4^5
c) $5^7 \div 5$		
d) $\frac{x^9}{x^4}$		
e) $y^4 \div y^1$	$\frac{y\cdot y\cdot y\cdot y}{y}$	y^3

2. Finish the following equation to express the **Quotient Rule of Exponent** (assume $a\neq0$).

$$\frac{a^m}{a^n} = a^{m-n}$$

the terms are being divided

3. Why can the base not equal zero?

b/c you can NOT ÷ by zero

4. *Let's practice without writing expanded form. BUT STILL SHOW WORK*

Problem	***Work***	***Final Answer***
$\frac{7^8}{7^2}$	7^{8-2}	7^6 or 117,649 ← Prefer this one
$4^3 \div 4^{-7}$	4^{3--7}	4^{10} or 1,048,576
$\frac{x^9}{x^3}$	x^{9-3}	x^6
$m^1 \div m^{-7}$	m^{1--7}	m^8
$\frac{b^{20}}{b^4}$	b^{20-4}	b^{16}

B. Challenge Problems: Simplify each expression

7) $\frac{10p^4}{6p}$

$\frac{10}{6} \cdot \frac{p^4}{p^1}$

$\frac{5}{3} p^{4-1}$

$\frac{5p^3}{3}$ or $\frac{5}{3}p^3$

18) $\frac{18x^8y^8}{10x^3}$

$\frac{18}{10} \cdot \frac{x^8}{x^3} \cdot y^8$

$\frac{9}{5} x^{8-3} y^8$

$\frac{9}{5}x^5y^8$ or $\frac{9x^5y^8}{5}$

16) $\frac{4y^4}{14yx^8}$

$\frac{4}{14} \cdot \frac{y^4}{y} \cdot \frac{1}{x^8}$

$\frac{2}{7} y^{4-1} \cdot \frac{1}{x^8}$

$\frac{2y^3}{7x^8}$

C. Dividing in Scientific Notation

$6\times10^7 \div 2\times10^3$

$\frac{6\times10^7}{2\times10^3}$

3×10^4 or 30,000

$\frac{4\times10^4}{8\times10^7}$

$.5\times10^{-3}$

$5\times10^{-1}\times10^{-3}$

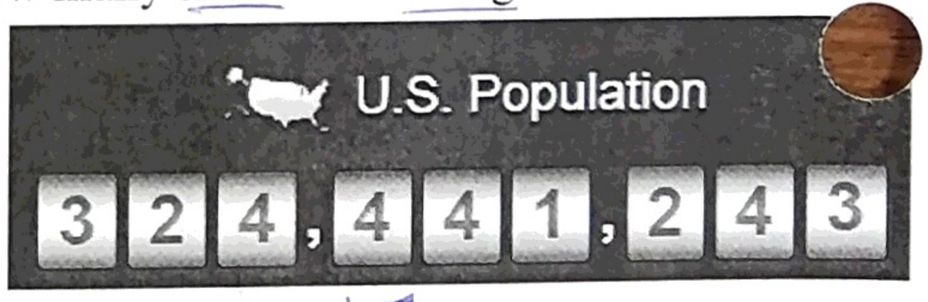
5×10^{-4} or 0.0005

$\frac{8.1\cdot10^5}{9\cdot10^2}$

Word Problems: For each problem indicate how you know to divide. **Then answer the question in both scientific notation and standard form.**

4. There are 1.5×10^{10} pieces of pizza eaten every year in America. How many slices does a single American eat?

slices per person



round

3.24×10^8

$\frac{1.5\times10^{10}}{3.24\times10^8}$

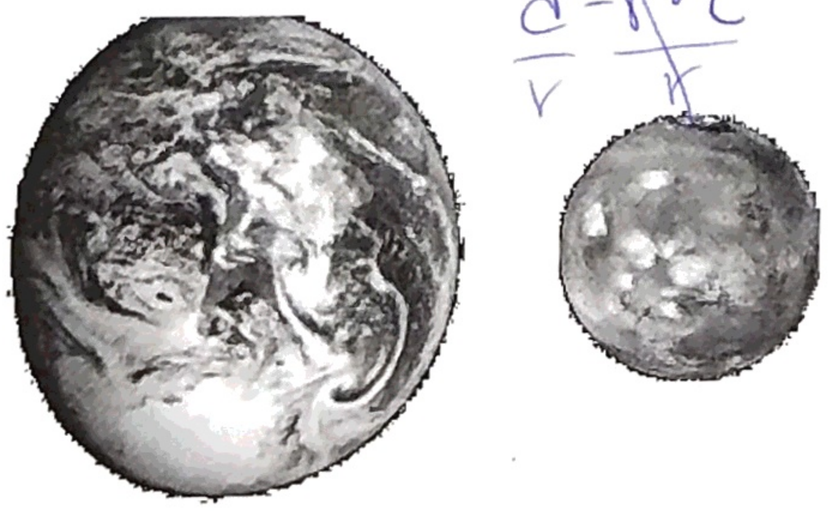
$\frac{1.5}{3.24} \times 10^{10-8}$

0.46×10^2

$4.6\times10^{-1}\times10^2$

4.6×10^1 pieces or 46 pieces

5. A space shuttle must travel 1.75×10^4 miles per hour to stay in orbit. Mars is 1.4×10^8 miles from earth. How long would it take to get to Mars?



$\frac{d}{r} = \frac{r \cdot t}{r}$

$\frac{1.4\times10^8}{1.75\times10^4}$

0.8×10^4

$8\cdot10^{-1}\times10^4$

$8\cdot10^3$ hours or 8000 hours

$\approx$ 333 days