Mid-Module Review Day 1

Module 1; Lessons 1-5 Review Topics

What we learned: **General statements (These are principles you need to be able to apply!)**

Lesson 1:

- Exponential notation is expressed with a base and an exponent. Write an example in the space below. Label the base and exponent.

  $\text{BASE} \rightarrow 4^{3} \leftarrow \text{EXPONENT}$

- If a negative base is repeated an even number of times, the result will be POSITIVE. $(-3)^4$
- If a negative base is repeated an odd number of times the result will be NEGATIVE. $(-3)^5$

Lesson 2:

- When like bases are multiplied, the exponents are ADDED. $x^4 \cdot x^3$
- When like bases are divided, the exponents are SUBTRACT. $\frac{x^5}{x^3}$

Lesson 3:

- When a power is raised to a power the exponents are MULTIPLIED. $(x^3)^6$
- A number alone has a power of 1 (ONE). 3 $\quad 3^{1}$ $\quad x^{1}$
- Terms within a quantity are all raised to the power expressed on the outside of the quantity. For example, another way to write (12 x 5)^3 would be $12^3 \cdot 5^3$.

Lesson 4:

- Any number raised to the zero power is equal to 1 (ONE). $3^0 \quad x^0$

Lesson 5:

- Negative powers are expressed as fractions or decimals.

$$2^{-3} \rightarrow \frac{1}{2^3} \rightarrow \frac{1}{8} \text{ OR } 0.125$$

8th grade end of module 1 Assessment

Name ______________________________ Date ____________________

1. Enter the value of *n* that makes the equation true.

$$7^6 \bullet 7^n = 7^{18}$$

$\boxed{n=12}$

2. Select **all** expressions equivalent to

$(-4)(-2)=8$

$6(-2)=-12$

$8+-12$

$$(3^{-4} \bullet 3^{6})^{-2}$$

$3^8 \bullet 3^{-12}$

3^{-4}

$\frac{1}{3^4} \rightarrow \frac{1}{81}$

$\boxed{C, D}$

A. $\left(\frac{1}{81} \bullet 729\right)^{-2}$

B. 81

C. $3^8 \bullet 3^{-12}$

D. $\frac{1}{81}$

3. Enter the value of *n* that makes the equation true.

$$(6^n)^3 = 6^{15}$$

$(6^5)^3$

$\boxed{n=5}$

4. Select **all** expressions equivalent to

$$\frac{4^{-8} \bullet 4^7}{4^{-3}}$$

$-8+7$

$\frac{4^{-1}}{4^{-3}} \rightarrow \frac{4^3}{4^1}$

$\rightarrow 4^2$

$\rightarrow 16$

$\boxed{B, D}$

A. $\frac{1}{16}$

B. 16

C. $4^1 \div 4^3$

D. $4^3 \div 4^1$

5. Enter the value of *n* that makes the equation true.

$$\frac{5^6}{5^2} = 5^n$$

$\boxed{n=4}$

6. Enter the value of $8^2 \bullet 8^2$

$\boxed{8^4}$

(4096)

Practice:

The total sales of Amazon have increased significantly since the year 2014. In fact it was reported recently, that sales have doubled each year. It was reported that in 2014 total sales were $~~8~~ 2 million.

a. Assuming that the total sales continues to double each year, for the next four years, determine the total sales for the years 2014, 2015, 2016 and 2017.

b. Assume the growth in sales continues to double each year from 2010 to 2019. Complete the table below using 2014 as year 1 with $~~8~~ 2 million dollars in sales that year.

2^{-1} 2^{0} 2^{1} 2^{2} 2^{3} 2^{4} 2^{5}

Year	-3	-2	-1	0	1	2	3	4	5	6
$ in millions			$\frac{1}{2}$	1	~~8~~ 2	4	8	16	32	

C. Given only the total sales for 2014, and the assumption that the total sales doubles each year, how did you determine the total sales for years 2,3,4,5,and 6?

8th Grade Math Module 1
Mid-Module Test
Exponential Notation and Properties of Integer Exponents

Name: ____________________
Date:________

1) Let n be a whole number.

a. Use the properties of exponent to write an equivalent expression that is a product of unique primes, each raised to an integer power.

$$\frac{10^{18} \cdot 14^{6}}{70^{6}}$$

$$\frac{(2\cdot5)^{18}(2\cdot7)^{6}}{(2\cdot5\cdot7)^{6}} = \frac{2^{18}\cdot5^{18}\cdot2^{6}\cdot7^{6}}{2^{6}\cdot5^{6}\cdot7^{6}} = \frac{2^{24}\cdot5^{18}\cdot7^{6}}{2^{6}\cdot5^{6}\cdot7^{6}} = 2^{18}\cdot5^{12}\cdot7^{0}$$ OK

$2^{24-6}\ 5^{18-6}$

$\rightarrow 2^{18}\cdot5^{12}\cdot1$ ✓

$\rightarrow 2^{18}\cdot5^{12}$ ☆

b. Use the properties of exponents to prove the following identity:

$$\frac{10^{3n} \cdot 14^{n}}{70^{n}} = 2^{3n} \cdot 5^{2n}$$

$$\frac{(2\cdot5)^{3n}\cdot(2\cdot7)^{n}}{(2\cdot5\cdot7)^{n}} \rightarrow \frac{2^{3n}\cdot5^{3n}\cdot2^{n}\cdot7^{n}}{2^{n}\cdot5^{n}\cdot7^{n}} \rightarrow \frac{2^{4n}\cdot5^{3n}\cdot7^{n}}{2^{n}\cdot5^{n}\cdot7^{n}} \rightarrow 2^{3n}\cdot5^{2n}\cdot7^{0}$$

$2^{4n-1n}\cdot5^{3n-1n}\cdot7^{1n-1n}$

$2^{3n}\cdot5^{2n}\cdot1$

$2^{3n}\cdot5^{2n}$

2)

a. Jessica writes $3^4 \cdot 9^3 = 27^7$. Explain her mistake.

3

$3^4 \cdot 9$

$3^4 \cdot (3 \cdot 3)^3$

$3^4 \cdot 3^3 \cdot 3^3$

3^{10}

9

$3 \cdot 3$

b. Find m so that the number sentence below is true:

$$3^4 \cdot 9^2 = 3^4 \cdot 3^m = 3^8$$

$3^4 \cdot 3^m = 3^8$

$m = 4$

c). You write $8^3 \cdot 8^{-9} = 8^{-6}$. Kyle challenges you, "Prove it!" Show directly why your answer is correct without referencing the laws of exponents for integers; in other words, $x^a \cdot x^b = x^{a+b}$ for positive numbers x and integers a and b. (YOU CAN'T TELL ME 3 + -8 = -6…SO THINK ABOUT MOVING NEGATIVE EXPONENT TO MAKE IT POSITIVE – DON'T USE MULTIPLICATION RULE FOR THIS ONE)