DO NOW Aim: *How can I use exponents to represent repeated multiplication?*

Date: 9/9/19

Write each expression using exponents.

Jordyn

1. $4 \cdot 4 \cdot 4 \cdot 4 =$ Erin I. $$4^4$$	2. $\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} =$ Miguel $$\left(\frac{3}{4}\right)^6$$	3. $b \cdot b \cdot b \cdot b \cdot c \cdot c \cdot c \cdot c \cdot c \cdot c =$ $$b^4 c^6$$
4. Evaluate 7^3. Prince $$7 \cdot 7 \cdot 7$$ $$49 \cdot 7 = \boxed{343}$$	5. Evaluate $(-2)^4$. Jane $$(-2)(-2)(-2)(-2)$$ $$4 \cdot 4 = \boxed{16}$$	6. ~~Evaluate 2·3²·4².~~

Lesson 1-2 Multiplying Exponents   Date _____

Multiplying and Dividing Exponents

Aim: *What conclusions can be drawn when multiplying or dividing exponents with like bases?*

simplify

Warm Up: What is another way you can abbreviate each expression?

(a) $3 + 3 + 3 + 3 + 3$

Repeated Addition 3×5

(b) $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

Repeated Multiplication 3^5

Exercise 1- For the following expressions, name the constant, coefficient, base, variable, & exponent:

Expression	Constant	Coefficient	Base	Variable	Exponent
$6x^2 - 5$	-5	6	x	x	2
4^2	4^2		4		2
$10x^3 + 1$	1	10	x	x	3
$1y^2$		1	y	y	2

plain # no variable | # mult. w/var | # w/exponent |

Multiplying Exponents Discovery

Exercise 2- For the following expressions, simplify by expanding & re-write in exponential form

Expression	Expanded Form	Exponential Form
$3^2 \cdot 3^4$	$(3 \cdot 3) \cdot (3 \cdot 3 \cdot 3 \cdot 3)$	3^6
$x^5 \cdot x^3$	$(x \cdot x \cdot x \cdot x \cdot x) \cdot (x \cdot x \cdot x)$	x^8
$5^6 \cdot 5^4$		5^{10}

RULE: When multiplying terms with like _bases_, you **keep** the base and _ADD_ the exponents.

Problem Set: Simplify the following expressions completely.

(1) $x^4 \cdot x^3$ x^7	(2) $k^5 \cdot k^1$ K^6	(3) $(\frac{1}{7})^6 \cdot (\frac{1}{7})^2$ $(\frac{1}{7})^8$
(4) $4y^3 \cdot 8y^2$ $32y^5$	(5) $4^2 \cdot 4^{10} \cdot 4^{-3}$ 4^9	(6) $x^3(x^{13} + y^2)$ $x^{16} + x^3 \cdot y^2$

Lesson 1-3 Dividing Exponents

Dividing Exponents Discovery

Exercise 2- For the following expressions, simplify by expanding then re-write in exponential form

Expression	Expanded Form	Exponential Form
$\dfrac{5^6}{5^2}$	$\dfrac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5}$	5^4
$\dfrac{x^5}{x^2}$	$\dfrac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x}$	x^3
$\dfrac{x^7 y^{10}}{x^4 y^6}$	$x^3 y^4$	

RULE: When dividing terms with like _bases_, you **keep** the base and _subtract_ the exponents. ✱ Divide coefficient

Problem Set: Simplify the following expressions completely.

(7) $\dfrac{6^8}{6^1} = 6^7$	(8) $\dfrac{5^{10}}{5^2}$ 5^8	(9) $\dfrac{3x^9}{3x^6} = 1x^3$
(10) $\dfrac{x^5 y^4}{x^2 y^1}$ $x^3 y^3$	(11) $\dfrac{a^6 b^1}{a^4 b^1}$ $a^2 b^0 = \boxed{a^2}$	(12) $\dfrac{6m^5 n^4}{2m^2 n^4}$ $3m^3 n^0$

5

Putting it all together: Simplify the following expressions completely.

(13) $2^7 \cdot 2^1 \cdot 2^{-3}$	(14) $\dfrac{a^4 b c^6}{a^4 b c^5}$	(15) $y^4(x^8 + y^3)$
2^5	$a^0 b^0 c^1 = c$	
(16) $\underline{2}r^4 n^3 \cdot \underline{3}rn^2$	(17) $\dfrac{8a^9 b^5}{12 a^3 b^4}$ $\dfrac{2}{3}a^6 b^1$	(18) $\dfrac{8^{16} \cdot 8^5}{8^{12}}$
$6r^5 n^5$	$\dfrac{8 \div 4}{12 \div 4} \cdot \dfrac{2}{3}$	

(19) Jack and Jill simplify the following expression $\dfrac{m^3}{m^7}$, below are their responses:

$\quad\quad\quad\quad$ **Jack:** $\quad m^4$ $\quad\quad\quad\quad\quad\quad\quad$ **Jill:** $\quad m^{-4}$

Determine which student got the correct answer & *explain* the mistake made by the other student.

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$\quad$ *Aim: What conclusions can be drawn when multiplying or dividing exponents with like bases?*

$\quad\quad$ Simplify each exponential expression using the laws of exponents. Show all work.

1. $f^{10} \cdot f^{13} =$	**2.** $5x^{94} \times 5x^{78} =$	**3.** $\dfrac{(-5)^{16}}{(-5)^7} =$
4. $\dfrac{12x^5}{3x^4} =$	**5.** $(2x^2)(4x^3 y^2) =$	**6.** $(-3a^2 b)(6ab^4 c) =$
7. $(-2x^2 z)(-4y^2 z)(-3xyz) =$	**8.** $\dfrac{21 d^{18} e^5}{7 d^{11} e^3} =$	**9.** $\dfrac{-16 w^7 r^2}{-4wr} =$

6