M9 - 3.0 - Exponents Notes

$2^3 \times 2^2 = 2^{3+2} = 2^5$ Add Exponents

$\frac{3^5}{3^2} = 3^{5-2} = 3^3$ Subtract Exponents

$\left(\frac{4^2}{4^{-3}}\right)^2$

$(2^2)^3 = 2^{2\times 3} = 2^6$ Multiply Exponents

$(3 \times 4)^2 =$
$(3^1 \times 4^1)^2$
$3^2 \times 4^2$ OR $(3 \times 4)^2 = 12^2$ Give it an Exponent of 1

$(4^5)^2$
4^{10}

$\frac{12^3}{3^3} =$
$\left(\frac{12}{3}\right)^3$ OR $\frac{12^3}{3^3} =$
$\frac{(3^1 \times 4^1)^3}{3^3}$
$\frac{3^3 \times 4^3}{3^3}$
4^3
$(4)^3$
4^3

$\left(\frac{3}{5}\right)^2 =$
$\left(\frac{3^1}{5^1}\right)^2$
$\frac{3^2}{5^2} = \frac{9}{25}$

$(2x)^3 =$		
$(2^1x^1)^3$		
2^3x^3		
$8x^3$	$(2x)^3$	$8x^3$
Pick an x *value**	$(2(3))^3$	$8(3)^3$
Sub into $x^* = 3$	6^3	8×27
question/answer	216	216
Must be equal!		

$-2^2 = -2^2 = -2 \times 2 = -4$ $\quad -(-2^2) = 4$ $\quad -(2)^2 = -4$

$(-2)^3 = (-2) \times (-2) \times (-2) = -8$ $\quad -(-2)^3 = 8$ $\quad (-2^2) = -4$

$(-2)^4 = (-2) \times (-2) \times (-2) \times (-2) = 16$ $\quad -(-2)^4 = -16$

Step 1 ——— ⟵ Over

$5^{-2} = \frac{1}{5^2}$ $\quad \frac{1}{3^{-2}} = \frac{3^2}{1}$ $\quad 3a^{-2} = \frac{3}{a^2}$ $\quad 3^{-3}a^{-2} = \frac{1}{3^3a^2} = \frac{1}{27a^2}$ $\quad (2x)^{-3} = \frac{1}{(2x)^3} = \frac{1}{2^3x^3} = \frac{1}{8x^3}$

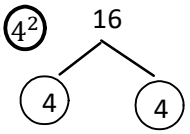
$\frac{2}{(3x)^{-2}} =$
$\frac{2(3x)^2}{1}$
$2(3^2x^2)$
$2(9x^2)$
$18x^2$

$\left(\frac{5^1}{3^1}\right)^{-2} = \frac{5^{-2}}{3^{-2}} = \frac{3^2}{5^2}$
OR
$\left(\frac{5}{3}\right)^{-2} = \left(\frac{3}{5}\right)^2 = \frac{3^2}{5^2}$

$\frac{2x^5y^{-2}}{z^{-3}} = \frac{2x^5z^3}{y^2}$ $\quad \frac{5^2}{5^5} = 5^{2-5} = 5^{-3} = \frac{1}{5^3}$

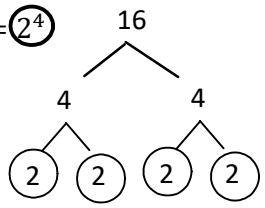
$\frac{5^2}{5^{-3}} = 5^2\ 5^3 = 5^{2+3} = 5^5$
OR
$\frac{5^2}{5^{-3}} = 5^{2-(-3)} = 5^5$

$\frac{5^{-2}}{5^3} = \frac{1}{5^3 5^2} = \frac{1}{5^{3+2}} = \frac{1}{5^5}$
OR
$\frac{5^{-2}}{5^3} = \frac{1}{5^{3-(-2)}} = \frac{1}{5^5}$

$16 = 4^2$ 

Change of Base

OR

$16 = 2^4$ 

4^3
$(4)^3$
$(2^2)^3$
2^6

$4^3 \times 8^2$
$(2^2)^3 \times (2^3)^2$
$2^6 \times 2^6$
2^{12}

6^3
$(3 \times 2)^3$
$(3^1 \times 2^1)^3$
$3^3 \times 2^3$

64^3 $\quad 64^3$ $\quad 64^3$
$(8^2)^3$ $\quad (4^3)^3$ $\quad (2^6)^3$
8^6 $\quad 4^9$ $\quad 2^{18}$

$\frac{2^3 \times 2^4}{2^5} =$
$\frac{2^{3+4}}{2^5}$
$\frac{2^7}{2^5}$
2^{7-5}
$2^2 = 4$

$\frac{3^4 \times 3^{-3}}{9} =$
$\frac{3^1}{3^2}$
3^{1-2}
$3^{-1} = \frac{1}{3^1}$

$\frac{4^2 \times 16^3}{128^2} =$
$\frac{((2^2)^2 \times (2^4)^3)}{(2^7)^2}$
$\frac{2^4 \times 2^{12}}{2^{14}}$
$\frac{2^{16}}{2^{14}}$
$2^{(16-14)} = 2^2 = 4$

$\frac{(2x^3y^2)(6xy^4)}{(4x^3y)} =$
$\frac{12x^4y^6}{4x^3y}$
$3xy^5$

$\frac{(8x^3y^2)^2(6xy^4)^{-2}}{(4x^3y)} =$
$\frac{(8x^3y^2)^2}{(4x^3y)(6xy^4)^2}$
$\frac{64x^6y^4}{(4x^3y)(36x^2y^8)}$
$\frac{64x^6y^4}{144x^5y^9} = \frac{4x}{9y^5}$