

## ALG 1 – Unit 7 – Multiplication Properties of Exponents

Target: I can simplify expressions using exponent rules

Use the chart below to answer the following questions.

$2^1$	$2^2$	$2^3$	$2^4$	$2^5$	$2^6$	$2^7$	$2^8$	$2^9$	$2^{10}$
2	4	8	16	32	64	128	256	512	1024

- Evaluate  $2^2 \cdot 2^3$ . What power of 2 is this equal to?  $2^5$
- Evaluate  $2^4 \cdot 2^5$ . What power of 2 is this equal to?  $2^9$
- Evaluate  $2^3 \cdot 2^7$ . What power of 2 is this equal to?  $2^{10}$
- What do you think  $x^4 \cdot x^7$  would be?  $x^{11}$
- What do you do with the exponents? Using your idea, what do you think  $a^m \cdot a^n$  would be?  $a^{m+n}$

### Multiplying Powers with the Same Base

For every nonzero number  $a$  and integers  $m$  and  $n$ ,  $a^m \cdot a^n = a^{m+n}$

Examples: Simplify the following expressions.

I do:

a.  $3^8 \cdot 3^5 = \boxed{3^{13}}$

We do:

b.  $x^{-4} \cdot x^2 = x^{-2} = \boxed{\frac{1}{x^2}}$

You do:

c.  $c^2 \cdot c^4 \cdot c = \boxed{c^7}$

d.  $(8y^7)(7y^5)$   
 $= \boxed{56y^{12}}$

e.  $(2x^3y^4)(5x^3y^8)$   
 $= 10x^6y^{12} = \boxed{\frac{10}{y^{12}}}$

f.  $(10a^3b)(2a^{-1}b^{-2}) = 20a^2b^{-1}$   
 $= \boxed{\frac{20a^2}{b}}$

Error Analysis: Find the error in the following problem. Give the correct answer.

a.

$$(3x^2)(-2x^4) = 3(-2)x^2 \cdot 4$$

$$= -6x^8$$

add  
the  
exponents

correct answer =  $\boxed{-6x^6}$

b.

$$x^6 \cdot x^1 \cdot x^3 = x^6 + 3$$

$$= x^9$$

exponent of 1

correct answer =  $\boxed{x^{10}}$

Simplify. Your answer should contain only positive exponents.

$$1) 2m^2 \cdot 2m^3 = \boxed{4m^5}$$

$$2) m^4 \cdot 2m^{-3} = \boxed{2m}$$

$$5) 2k^4 \cdot 4k = \boxed{8k^5}$$

$$6) 2x^3y^{-3} \cdot 2x^{-1}y^3 = 4x^2y^0 = \boxed{4x^2}$$

$$9) 4a^3b^2 \cdot 3a^{-4}b^{-3} = 12a^{-1}b^{-1} = \boxed{\frac{12}{ab}}$$

$$10) x^2y^{-4} \cdot x^3y^2 = x^5y^{-2} = \boxed{\frac{x^5}{y^2}}$$

Error Analysis:

a)  $4a^2 \cdot 3a^5 = (4+3)a^{2+5} = 7a^7$

multiply 4 · 3

Correct answer =  $\boxed{12a^7}$

b)  $3^4 \cdot 2^2 = 6^{4+2}$

these powers don't have the same base... so you can't add their exponents

Correct answer =  $3^4 \cdot 2^2 = 81 \cdot 4 = \boxed{324}$

HOMEWORK

Simplify each expression.

$$13) 7v^3 \cdot 10u^3v^5 \cdot 8uv^3 = \boxed{560u^4v^11}$$

$$14) 9xy^2 \cdot 9x^5y^2 = \boxed{81x^6y^4}$$

$$15) 6m^3n^3 \cdot 8m^2n^3 = \boxed{48m^5n^6}$$

$$16) 6x^2 \cdot 6x^3y^4 = \boxed{36x^5y^4}$$

$$17) 3ab^0 = \boxed{3a}$$

$$18) 5x^{-4} = \boxed{\frac{5}{x^4}}$$

$$19) \frac{1}{x^{-7}} = \boxed{x^7}$$

$$21) \frac{5^{-2}}{p} = \boxed{\frac{1}{25p}}$$

$$22) a^{-4}c^0 = \boxed{\frac{1}{a^4}}$$

$$23) \frac{3x^{-2}}{y} = \boxed{\frac{3}{x^2y}}$$

$$25) x^{-5}y^{-7} = \boxed{\frac{1}{x^5y^7}}$$

$$26) x^{-5}y^7 = \boxed{\frac{y^7}{x^5}}$$

$$27) \frac{8}{2c^{-3}} = \boxed{4c^3}$$

$$29) \frac{6a^{-1}c^{-3}}{d^0} = \boxed{\frac{6}{ac^3}}$$

$$30) 2^{-3}x^2z^{-7} = \boxed{\frac{x^2}{8z^7}}$$

$$31) 9^0y^7t^{-11} = \boxed{\frac{y^7}{t^{11}}}$$