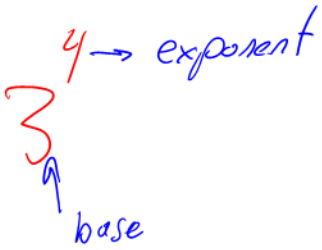
MBF3C Chapter 7 – Exponents **Name:** Mr. Hagen

7.1 Exponent Rules

Learning Goal: We are learning to work with exponents and their laws.

1. Write each expression as a single power, then evaluate.

The law: The Product law states when you multiply the same bases, you add exponents.



a) $3^2 \times 3^2$

$3\times3 \times 3\times3$

$= 3^{2+2} = 3^4 = 81$

b) $2^5 \times 2^2$

c) $(-5)^3 \times (-5)^1$

$= (-5)^{4} = 625$

d) $(-1)^2 \times (-1)^3 \times (-1)^5$

e) $\left(-\frac{1}{4}\right)^{2} \times \left(-\frac{1}{4}\right)^{3}$

$= \left(-\frac{1}{4}\right)^{5}$

f) $\left(\frac{2}{5}\right) \times \left(\frac{2}{5}\right)^2 \times \left(\frac{2}{5}\right)$

2. Write each expression as a single power, then evaluate.

The law: Quotient Law: when dividing same bases, you subtract exponents

a) $5^6 \div 5^3$

$= 5^{6-3} = 5^3 = 125$

b) $8^4 \div 8^2$

c) $2^{10} \div 2^8$

$= 2^2 = 4$

d) $\dfrac{(-3)^7}{(-3)^4}$

e) $\dfrac{(-5)^8}{(-5)^6} \times (-5)^2$ division

① Divided ② Multiplied

$= (-5)^2 \times (-5)^2 = (-5)^4 = 625$

f) $\dfrac{4^6}{4^4} \times 4^2$

3. Write each expression as a single power, then evaluate.

The law: Power Law. When an exponent is raised to another exponent, multiply them.

a) $(3^2)^3$

b) $(2^4)^2 = 2^{4 \times 2} = 2^8 = 256$

c) $[(-3)^2]^2$

d) $\left(\frac{1}{3^2}\right)^3 = \frac{1}{3^6}$

e) $[(-1)^5]^6$

f) $\left(\frac{1}{4^2}\right)^2 = \frac{1}{4^4}$

4. Show ~~two~~ one ways of evaluating each expression.

a) $5^2 \times 5^3$

$= 5^5$

$= 3125$

b) $\frac{2^5}{2^3} \times \frac{2^8}{2^4}$

$= 2^2 \times 2^4 = 2^6$

c) $\frac{4^4}{4^3} \times 4^2$

d) $\frac{3^5 \times 3^3}{3^2 \times 3^2}$

5. a) Write 7^6 as a product of two powers in ~~two~~ one ways.

$7^3 \times 7^3 = 7^6$

b) Write 5^3 as a quotient of two powers in ~~two~~ one ways.

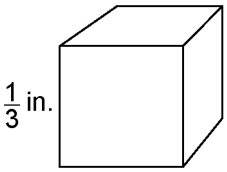
$5^7 \div 5^4 = 5^3$

c) Write 3^{16} as a power of a power in ~~two~~ one ways.

$(3^2)^8 = 3^{16}$

6. The volume of a cube is given by the formula $V = s^3$, where s represents the side length of the cube. Calculate the volume of each cube.

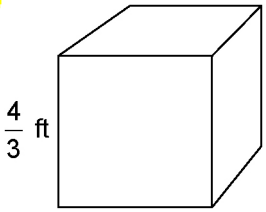
a)



$V = \left(\frac{1}{3}\right)^3 = \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27}$

$= \frac{1^3}{3^3} = \frac{1}{27}$

b)



7. Simplify each expression. Then, use a calculator to evaluate. Round your answers to two decimal places.

a) $6^{4.2} \times 6^{3.1}$

$= 6^{7.3} = 479186.01$

b) $3^{2.9} \times 3^{1.1}$

c) $(2)^{4.6} \times (2)^{3.1}$

$= 2^{7.7}$

$= 207.94$

d) $(4)^{2.3} \times (4)^{1.5}$

8. The probability of tossing a coin and getting heads is $\frac{1}{2}$. So, the probability of tossing two coins and getting two heads is $\left(\frac{1}{2}\right) \times \left(\frac{1}{2}\right)$ or $\left(\frac{1}{2}\right)^2$.

a) Write the probability of tossing two coins and getting two heads as a fraction.

$\frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$

b) What is the probability of tossing four coins and getting four heads?

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^4 = \frac{1}{16}$

9. Use exponent rules to simplify each expression.

a) $(4x^3)(2x^4)$

$= 8x^7$

b) $\dfrac{-12a^5b^3}{3a^2b}$

c) $(m^2n^3)^5$

d) $\left(\dfrac{k^5n^4}{k^2h^2}\right)^3$

$= (k^3h^2)^3$

$= k^9h^6$

Success Criteria:

- **I can simplify exponents by using the Product Law, Quotient Law, and the Power Law.**