

# **Concept: The Exponent Rules**

Name:

> You should have completed Exponents - Section 3 Part A: The Exponent Rules before beginning this handout.

Warm Up

Complete the following. Show all your steps.

(a) 
$$2^3 \times 2^6 =$$

(b) 
$$4^9 \div 4^7 =$$

(c) 
$$4^{15} \div 4^5 =$$

(d) 
$$(2^2)^4 =$$

(e) 
$$(3^4)^3 =$$

f) 
$$(4ab)^3 =$$

#### **COMPUTER COMPONENT**

**Instructions:** In **LIMATH X** follow the **Content Menu** path:

**Exponents > The Exponent Rules** 

NOTE: Use the Menu button in order to get to the lesson where you left off.

- Work through all Sub Lessons of the following Lessons in order:
  - A Power with Exponent Zero
  - A Power with a Negative Exponent
  - Summary of Exponent Rules
  - Powers with Rational Bases
  - Example Questions

 $\underline{Additional\ Required\ Materials} \hbox{:}\ Scientific\ calculator$ 

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.





#### **NOTES:**

#### **Exponent Rule 5**

When calculating a power with exponent \_\_\_\_\_:

> The base \_\_\_\_\_\_ equal \_\_\_\_\_ because we cannot \_\_\_\_\_ by \_\_\_\_.

$$\mathbf{x}^0 = \underline{\phantom{a}}$$

Practice:

$$4^0 =$$

## **Exponent Rule 6**

When calculating a power with a \_\_\_\_\_ exponent:

➤ When there is a negative exponent, we need to create a fraction and put the exponential expression in the denominator and make the exponent positive. For example,

$$x^{-a} = \frac{1}{x}$$

Practice:

$$4^{-7} =$$

## **Summary of Rules for Exponents**

Match the Rules:

$$x^{0} \qquad x^{m-n}, \quad x\neq 0$$

$$x^{m} \qquad x^{m} \qquad x^$$





# **Exponent Rule 7**

When raising a \_\_\_\_\_\_ base to an exponent:

raise \_\_\_\_\_ the \_\_\_\_ and to the exponent

$$(\frac{x}{y})^2 =$$
\_\_\_\_\_

Practice:

$$\left(\frac{3}{5}\right)^4 =$$

#### **OFF COMPUTER EXERCISES**

1. Simplify. Remember to use the Rules for Exponents.

(a) 
$$(2^5)^3 =$$

(b) 
$$(-14)^0 =$$

(c) 
$$2^5 \times 2^4 \div 2^3 =$$

(d) 
$$3^8 \div 3^2 \times 3^3 =$$





(e) 
$$(6^0)^4 =$$

(f) 
$$(16m^5) \div (8m^3) =$$

(g) 
$$2^4 \div 2^5 =$$

(h) 
$$3^3 - 2^4 =$$

(i) 
$$5^2 \div 5^{-3} =$$

$$(j)$$
  $(z^4)^5 \div (z^1)^4 =$ 





- 2. A colony of cells triples every hour. The current population is 243 cells. *Complete the chart below in order to determine:* 
  - (a) The cell population 3 hours from now.
  - (b) The cell population 4 hours ago.
  - (c) The equation involving P (population) and T (time) that represents the information.

Time (hours) (T)	Population (P)	Population as a Power of 3
-4		
-3	9	
-2		
-1		
0	243	
1		$243 \times 3^{1}$
2		$243 \times 3^2$
3		
4		





3. Write each as a power with a positive exponent.

Example:  $3^{-6} = \frac{1}{3^{6}}$ 

(a) 
$$2^{-3} =$$

(b) 
$$(-3)^{-2} =$$

(c) 
$$-5^{-3} =$$

(d) 
$$6^{-2} =$$

4. Evaluate.

(a) 
$$(-2)^{-3} =$$

(b) 
$$-2^{-4} =$$

(c) 
$$8^0 =$$

(d) 
$$(3)^{-2} =$$

(e) 
$$(4^{-3})^{-2} =$$

(f) 
$$15c^{-0} =$$

(g) 
$$(15c)^{-0} =$$

(h) 
$$5^{-1} =$$



(i) 
$$(9)^{-3} \div (9)^{-6} =$$

(j) 
$$4w^2 \times 5w^6 =$$

5. Evaluate. Remember the rule to follow when the base is a rational number.

Example 1: 
$$(\frac{1}{9})^2 = \frac{1^2}{9^2} = \frac{1}{81}$$

Example 2: 
$$\left(\frac{3}{4}\right)^{-2} = \frac{1}{\left(\frac{3}{4}\right)^2} = \frac{1}{\left(\frac{9}{16}\right)} = 1 \div \frac{16}{9} = \frac{16}{9}$$

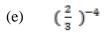
(a) 
$$(\frac{2}{5})^2$$

(b) 
$$(\frac{1}{4})^3$$

(c) 
$$(\frac{1}{5})^{-3}$$

(d) 
$$(\frac{1}{6})^{-1}$$





(f) 
$$(\frac{4}{5})^{-2}$$

6.	Review the rules of exponents and decide which one you found most difficult. Explain why it was more difficult. <i>Give examples to support your answer</i> .		

