Prescribed Learning Outcomes for Exponents:

1. Represent repeated multiplication with exponents.

Exponents are ways of expression that can shorten for repeated multiplication of the same thing by itself. (Red is the **base** and the blue is the **exponent.**)

Ex: 4 ^2

 = 4x4

1. Describe how powers represent repeated multiplication.

**Powers** represents repeated multiplication of the same factor.

Here is an example. You multiply the times the number of the power.

Ex: 4 ^7

= 4x4x4x4x4x4x4

(This means multiply four seven times.)

=16384

1. Demonstrate the difference between the exponent and the base by building models of a given power

Difference between 2^3 and 3^2

2^3 = 2x2x2 3^2=3x3



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1. Demonstrate the difference between two given powers in which the exponent and the base are interchanged by using repeated multiplication

Ex: 5 ^3= 5x5x5=125 5 ^2= 5x5=25

1. Evaluate powers with integral bases (excluding base 0) and whole number exponents.

4^6/4^6=^6 -^6= 0=4^0=1

When you evaluate the exponent is 0, your answer will always be 1. On the other hand, when the base is 0, it becomes 0.

1. Explain the role of parentheses in powers by evaluating a given set of powers

For this rule, there are many different ways to show, but this is the easiest.

Finding (-2) ^4

You use the BEDMAS rule. The first, you must calculate the brackets regardless the integers. Then you calculate the exponent.

**Ex**: (-2) ^4= (-2) (-2) (-2) (-2) = 16

This is not negative because of the integers rule.

If you multiply evenly, it is +

If you multiply oddly, it is -.

1. Explain the exponent laws for multiplying powers with the same base

When you are multiplying the same base, you add the exponent first. But when you divide exponent, you subtract exponent.

Ex:2^2x2^3=2^5=32

4^6/2^4=2^2=4

1. Explain the exponent laws for raising a product and quotient to an exponent

When you raise an entire expression to a power:

Ex:(*2a)*4  =  (2*a*)(2*a*)(2*a*)(2*a*)  =  (2 • 2 • 2 • 2)(*a • a • a • a*) = (24)(*a*4) = 16*a*4

Same as multiplying. But you would minus the exponent.

 EX: 4^5 / 4 ^3= ^5-^3=^2=4 ^2= 16

1. Explain the exponent laws for dividing powers with the same base

When dividing powers with the same base, you substract the exponent first.

Ex: 4^5/4^2=^5-^2=^3

After that, you place it beside the base.

 Ex: 4^3

At the end, you multiply the power.

 Ex: 4x4x4=64

1. Explain the law for powers with an exponent of zero.

It is the same thing as the question 5.

 Ex: 5 ^5x5 ^5= 5 ^0= 1

1. Use patterns to show that a power with an exponent of zero is equal to one.

2 ^5x2^5=1

3^5x3^5=1

4^9x4^9=1

10009^123456789x10009^123456789= 1

12. I can apply the laws of exponents.

1. (5)^3= (5) (5) (5)= 125

2. 6^2= 6x6= 36

3. (-8^3)= -1x 8x8x8= -512

13. I can identify the error in a simplification of an expression involving powers.

Wrong: (-3)^2x(2^3)=(-9)x(8)= -72

Right: (-3)^2x(2^3)=(9)x(8)=72

14. Use the order of operations on expressions with powers.

5^2\*5^1=^2-^1=^1=5^1=5

15. Determine the sum and difference of two powers.

5^4x5^3=^4+^3=^7=5^7=78,125

16. Identify the error in applying the order of operations in an incorrect solution.

5^3x4(5^4)= 5^3x20^4=125x160,000= 20,000,000

5^3x4(5^4)= 125x4(625)=125x2,500=312,500

17. Use powers to solve problems (measurement problems)

What is the volume and surface area of a cube with an edge length of 150.

Volume=150^3=3,375,000

Surface=6x150^2=6x22,500=135,000

(6 equals the sides of the cube and 150^2 is the length.)

18. Use powers to solve problems (growth problems)

A colony of bacteria double every hour. There are 50 bacteria now. How many will there be after each amount of time?

50x2=100

50x2x2= 200