R.E.A.L. Math 1010 Supplemental Activity Name: _____
S6 Exponent Review

In groups, follow the instruction below by writing on a large whiteboard or shared poster.

Definition: In an exponential expression the number being raised to a power is called the base and the power is called the exponent.

1. For 3^5 which number is the base? _____ Which number is the exponent? _____

Part A: Multiplying with Exponents

1. Write 2^3 without an exponent.
2. Write 2^4 without an exponent.
3. Without the use of exponents, represent $2^3 \times 2^4$.
4. Now represent this product with the use of only one exponent.

What is the name of the exponent rule that this demonstrates?

How would your group express this rule with words only (no symbols)?

As a group, write this rule in a symbolic form using variables to show that this rule can be used in for bases and exponents of any number.

Use this rule to solve the following equation: $2^5 \times 2^7 = 2^x$

Part B: Dividing with Exponents

1. Write 2^7 without an exponent.
2. Write 2^4 without an exponent.
3. Without the use of exponents, represent 2^7 divided by 2^4.
4. Now represent this quotient written with one exponent.

What is the name of the exponent rule that this demonstrates?

How would your group express this rule with words only (no symbols)?

As a group, determine how to write this rule in symbolic form using variables to show that this rule can be used for bases and exponents of any number.

Part C: Exponentiating Exponents

1. As a group, determine how to write $(2^3)^4$ without the use of exponents.
2. Now express the result with one exponent only.

What is the name of the exponent rule that this demonstrates?

As a group, determine how you would express this rule with words only (no symbols).

As a group, determine how to write this rule in symbolic form using variables to show that this rule can be used for bases and exponents of any number.

Part D: Zero Exponents

1. What is the value of any number divided by itself?
2. Without using exponent rules, what is the value of $\frac{5^7}{5^7}$? What is the value of $\frac{c^{12}}{c^{12}}$?
3. Now apply the quotient rule to simplify $\frac{c^{12}}{c^{12}}$. Therefore $\frac{c^{12}}{c^{12}}$ = c ____ – ____ = c__ = ____
4. It makes sense, then, that if $\frac{c^{12}}{c^{12}}$ = 1 and $\frac{c^{12}}{c^{12}}$ = c^0, then _____ = _____
5. Would this be true for any base raised to the zero power? Why?
6. In small groups fill in the blanks.

Write the exponential expression without exponents and simplify. If necessary leave answers in fraction form.	Simplify each expression using the quotient rule for exponents
Example $\frac{2^4}{2} = \frac{2x2x2x2}{2} = \frac{16}{2} = 8$	$\frac{2^4}{2} = 2^{4-1} = 2^3 = 8$
$\frac{2^4}{2^2}$ = _____ = ____ = ____	$\frac{2^4}{2^2}$ = _____ = ____ = ____
$\frac{2^4}{2^3}$ = _____ = ____ = ____	$\frac{2^4}{2^3}$ = _____ = ____ = ____
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$\frac{2^4}{2^7}$ = _____ = ____ = ____	$\frac{2^4}{2^7}$ = _____ = ____ = ____
$\frac{2^4}{2^8}$ = _____ = ____ = ____	$\frac{2^4}{2^8}$ = _____ = ____ = ____

Part E: Deriving the Meaning of Negative Exponents

In small groups, fill in the blanks and make a list of the following on your whiteboard or shared poster.

$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$

$2^4 =$ _____ $= 16$

$2^3 =$ _____ = _____

$2^2 =$ _____ = _____

$2^1 =$ _____

$2^0 =$ _____

$2^{-1} =$ —

$2^{-2} = \frac{1}{\_\_\_x\_\_\_} = \frac{1}{2^2} = \frac{1}{4}$

$2^{-3} = \frac{1}{\_\_\_\_\_} =$ — = —

$2^{-4} = \frac{1}{\_\_\_\_\_} =$ — = —

As a group, discuss the patterns that you see.

How would these patterns be different if the base were $\frac{1}{2}$ instead of 2?

Which of the above exponents always produces the same number regardless of what the base is?

With your group, define the meaning of a negative exponent.

Understanding Negatives and Exponents

In small groups, express the following without exponents. Compare and contrast what happens when the negative sign is in different positions. Be prepared to explain to the class.

$-3^2 =$

$(-3)^2 =$

$3^{-2} =$

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

$-3^{-2} =$

$-(1/2)^2 =$

$(-1/2)^2 =$

$(1/2)^{-2} =$

$(-1/2)^{-2} =$

$-(1/2)^{-2} =$

As a group, discuss the following questions and be prepared to justify your answers to the class.

Always True, Sometimes True, or False: A negative exponent will change the sign of its base.

Always True, Sometimes True, or False: A negative exponent means to take a reciprocal.

Always True, Sometimes True, or False: A negative exponent tells how many times to divide by its base.