Exponential Relations – Day 2: Negative and Zero Exponents

Finding Patterns with Your Calculator

1. Fill in the blanks below using your calculator.

$2^5 =$ 32	$4^5 =$ 1024	$10^5 =$ 100,000
$2^4 =$ 16	$4^4 =$ 256	$10^4 =$ 10,000
$2^3 =$ 8	$4^3 =$ 64	$10^3 =$ 1,000
$2^2 =$ 4	$4^2 =$ 16	$10^2 =$ 100
$2^1 =$ 2	$4^1 =$ 4	$10^1 =$ 10
$2^0 =$ 1	$4^0 =$ 1	$10^0 =$ 1

Verify your answers by checking with two other people.
Put checkmarks beside your values to indicate you performed this check.

2. Explain, in words, what is happening to your values (the blanks you filled in) as you move down the column.

Column 1: Numbers are being cut in half.
Column 2: Cut into quarters (divided by 4)
Column 3: Divided by 10

3. What do you notice about the values of the powers with zero exponents?

They all equal 1.

4. Write your answer from #3 as a rule.

If exponent is 0, number is always 1.

$n^0 = 1$

5. Extend your powers to have exponents of -1, -2 and -3. Express each of these as a whole number or fraction. **NO DECIMALS ALLOWED**!

$2^{-1} = \frac{1}{2}$

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

$2^{-3} = \frac{1}{8}$

$4^{-1} = \frac{1}{4}$

$4^{-2} = \frac{1}{16}$

$4^{-3} = \frac{1}{64}$

$10^{-1} = \frac{1}{10}$

$10^{-2} = \frac{1}{100}$

$10^{-3} = \frac{1}{1000}$

6. What do you notice about the values of the powers with negative exponents?

Take the negative away from exponent and put in on the bottom of a fraction with 1 on top.

7. Write your answer from #6 as a rule.

8. **Without a calculator**, evaluate each power. Express answers as whole numbers of fractions. No decimals allowed! Check your answers with two other groups.

Power Form	5^0	$(-3)^0$	4^{-4}	10^{-3}	2^{-5}	$(-7)^{-1}$	$(-6)^{-2}$
Evaluated	1	1	$\frac{1}{4^4} = \frac{1}{256}$	$\frac{1}{10^3} = \frac{1}{1000}$	$\frac{1}{2^5} = \frac{1}{32}$	$\frac{1}{-7} = \frac{1}{-7}$	$\frac{1}{(-6)^2} = \frac{1}{36}$