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Part I: Exponential Form Review

	Vocabulary	Labelled Example
Base	Big number	$2^3$ Exponential Notation (Form) $2 \cdot 2 \cdot 2 = 8$
Exponent	small number	
Expression	variable, number, operation	
Equivalent	equal to each other	

• Write each of these expressions in exponential form.

a)  $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

b)  $(-6) \cdot (-6) \cdot (-6)$

c)  $x \cdot x \cdot x \cdot x \cdot x$

d) 9

$3^7$        $(-6)^3$

$x^5$

9 or  $3^2$

• Determine the value of each of these expressions.

a)  $2^4$

b)  $(-3)^4$

c)  $-3^2$

d)  $n^3$  for  $n = 5$

$5^3 = 5 \cdot 5 \cdot 5 = 125$

$2 \cdot 2 \cdot 2 \cdot 2 = 16$

$(-3) \cdot (-3) \cdot (-3) \cdot (-3) = 81$

$-3^2 \rightarrow -1 \cdot 3^2 = -9$

• Simplify each expression

a)  $(7^3 - 4) + 3^5$

$(343 - 4) + 243 = 582$

$339 + 243 = 582$

b)  $18 - 3^2 \cdot 6$

$18 - 9 \cdot 6 = -36$

$18 - 54 = -36$

• Application

To find the sum of the first  $n$  positive numbers you can use the formula  $\frac{1}{2}(n^2 + n)$

1) What is the sum of the first 7 positive numbers?

$1, 2, 3, 4, 5, 6, 7$

$\frac{1}{2}(7^2 + 7)$

$\frac{1}{2}(19+7)$   
 $\frac{1}{2}(56) = 28$

2) What is the sum of the first 30 positive numbers?

$\frac{1}{2}(30^2 + 30) = 465$

$(5 \cdot 6)$

## Part II: Basic Exponent Rules

- Complete the following Tables. Look for patterns and generalization you can make concerning exponents.

$2^x$	$5^x$	$10^x$
$2^4 = 16$	$5^4 = 625$	$10^4 =$
$2^3 = 8$	$5^3 = 125$	$10^3 =$
$2^2 = 4$	$5^2 = 25$	$10^2 =$
$2^1 = 2$	$5^1 = 5$	$10^1 =$
$2^0 = 1$	$5^0 = 1$	$10^0 =$
$2^{-1} = 1/2$	$5^{-1} = 1/5$	
$2^{-2} = 1/4$	$5^{-2} = 1/25$	
$2^{-3} = 1/8$	$5^{-3} = 1/125$	

- What can you say about any nonzero number to the power of zero?

Ex:  $6^0$  or  $x^0$

Always 1

- What would happen if we extend the pattern in the tables?

### RULES:

For every nonzero number  $x$ ,  $x^0 =$

Always 1

For every nonzero number  $x$ ,  $x^{-a} =$

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

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

- Examples: Simplify

1)  $6^{-3} = \frac{1}{6^3}$  2)  $h^0 = 1$  3)  $g^{-2} = \frac{1}{g^2}$  4)  $3xy^4$  5)  $(-4.6)^0 = 1$  6)  $\frac{1}{y^{-5}} = y^5$  7)  $\frac{4}{m^{-2}} = 4m^2$

- Evaluate for  $a = 3, b = -2$

1)  $4a^2b^{-3} = 4 \cdot (3)^2 \cdot \frac{1}{(-2)^3} = \frac{36}{-8} = -\frac{9}{2}$  2)  $a^{-3} = \frac{1}{a^3} = \frac{1}{3^3} = \frac{1}{27}$  3)  $b^{-2} = \frac{1}{b^2} = \frac{1}{(-2)^2} = \frac{1}{4}$

- Write using negative exponents

1)  $\frac{1}{100} = \frac{10^{-2}}{1} = 10^{-2}$  2)  $\frac{1}{32} = \frac{1}{2^5} = 2^{-5}$  3)  $\frac{1}{n^4} = n^{-4}$  4)  $\frac{1}{a^3b^7} = a^{-3}b^{-7}$