

## Mathematics 9

## Section 2.2 - Powers of Ten and the Zero Exponent

We have looked at exponents and how to deal with them on a general basis. There are however, several special circumstances that need to be addressed.

Zero Exponent Law

WHENEVER WE HAVE AN EXPONENT OF ZERO, THE ANSWER WILL ALWAYS BE 1.

$$x^0 = 1$$

Ex  $6^0 = 1$   $(-9)^0 = 1$   $(-5)^0 = 1$   $-5^0 = -1$

Powers of Ten

Small and large numbers alike can be broken down into various their basic components depending on their place value. Each of these individual numbers can then be written as a POWER OF 10.

Number in Words	Standard Form	Power
One billion	1 000 000 000	$10^9$
One hundred million	100 000 000	$10^8$
Ten million	10 000 000	$10^7$
One million	1 000 000	$10^6$
One hundred thousand	100 000	$10^5$
Ten thousand	10 000	$10^4$
One thousand	1 000	$10^3$
One hundred	100	$10^2$
Ten	10	$10^1$
One	1	$10^0$

## Example

WRITE 58072 USING POWERS OF 10

TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
5	8	0	7	2

$$58072 = 50000 + 8000 + 000 + 70 + 2$$

$$58072 = (5 \times 10000) + (8 \times 1000) + (7 \times 10) + (2 \times 1)$$

$$58072 = (5 \times 10^4) + (8 \times 10^3) + (7 \times 10^1) + (2 \times 10^0)$$

\* # of zeros in standard form gives you the exponent on the 10. \*

## Practice:

Write the following numbers as powers of 10

a)  $4861 \rightarrow \underline{(4 \times 10^3) + (8 \times 10^2) + (6 \times 10^1) + (1 \times 10^0)}$

b)  $63021 \rightarrow \underline{(6 \times 10^4) + (3 \times 10^3) + (2 \times 10^1) + (1 \times 10^0)}$

Write numbers represented by the following powers of 10

a)  $(9 \times 10^3) + (7 \times 10^2) + (8 \times 10^1) + (2 \times 10^0) \rightarrow \underline{9782}$

b)  $(7 \times 10^4) + (4 \times 10^3) + (1 \times 10^2) + (9 \times 10^0) \rightarrow \underline{70419}$

★ A NUMBER WRITTEN WITHOUT AN EXPONENT HAS AN EXPONENT OF 1.

$$4 = 4^1 \quad -7 = -7^1 \quad (-2) = (-2)^1$$

P. 61 #4a, 5b, 6, 8ace, 9cd, 10, 13

<p>Homework: pg.</p>
----------------------