Discovering Index Number Patterns – NO CALCULATOR

1. Write each of the following in *index form*

   a. 2 x 2 x 2 x 2

   b. 5 x 5 x 5

   c. 3 x 3 x 3 x 3

   d. 2 x 2 x 2 x 2 x 2

   e. 4 x 4 x 4

   f. 6 x 6 x 6 x 6

2. Write down how you would 'say' each of the following and then write in *expanded form*

   a. 3^4

   b. 5^2

   c. 2^6

   d. 7^3

   e. 8^2

3. Write each of the following in *expanded form* and then work out the *actual value*

   a. 2^3 =
   =

   b. 3^2 =
   =

   c. 4^5 =
   =

   d. 5^3 =
   =

   e. 6^4 =
   =

4. Write the following in *index form* and then find the *actual value* of:

   a. Six squared =
   =

   b. Eight squared =
   =

   c. Two cubed =
   =

   d. Four to the power of three
   =
   =

   e. Ten to the power of four
   =
   =

5. Fill in the table and look for patterns in each section!

	Index form	Base	Index	Expanded form	Basic Numeral
3a	2^2				
B	3^3				
C	0^3				
D	6^2				
E	1^7				
F	8				
G	7^3				
H	10^5				
I	6				
J	0^6				

k. Finish the sentences by looking at your answers above

- When the base is 1 the basic numeral will always be…
- When the base is 0 the basic numeral will always be…
- A whole number with no index written, really has an index of …

4a	2^1				
b	3^1				
c	4^1				
d	5^1				
e	What's the pattern?				

	Index form	Base	Index	Expanded form	Basic Numeral
5.a	2^1				
b	2^2				
c	2^3				
d	2^4				
e	2^5				
f	1^2				
g	2^2				
h	3^2				
i	4^2				
j	5^2				
k	6^2				
l	7^2				
m	8^2				
n	9^2				
o	10^2				
p	Explain what the difference is between 5a-e AND 5 f-o:				
q	What makes a number a square number? Where does it get this name from? Shade over the “square numbers” (the ones in the ‘basic numeral’ column)				

	Index form	Base	Index	Expanded form	Basic Numeral
6a	10^1				
b	10^2				
c	10^3				
d	10^4				
e	10^5				
f	10^6				
g	What's the pattern?				
7	Use a calculator for the next questions				
a	3^0				
b	6^0				
c	1000^0				
d	$536{,}783^0$				
e	0^0				
f	5.6^0				
g	$1{,}000{,}000{,}000^0$				
h	What's the pattern?				

$$4^2 = 16$$
$$34^2 = 1156$$
$$334^2 = 111556$$
$$3334^2 = 11115556$$
$$33334^2 = 1111155556$$
$$333334^2 = 111111555556$$
$$etc$$

$$9^2 = 81$$
$$99^2 = 9801$$
$$999^2 = 998001$$
$$9999^2 = 99980001$$
$$99999^2 = 9999800001$$
$$999999^2 = 999998000001$$
$$etc$$

$$7^2 = 49$$
$$67^2 = 4489$$
$$667^2 = 444889$$
$$6667^2 = 44448889$$
$$66667^2 = 4444488889$$
$$666667^2 = 444444888889$$
$$etc$$