The Power of Powers

Activity One

Aarif comes across the term 10^3. He asks his teacher what it means.

I'll do this one step at a time.
10 x 10 = 100.

10^3 is a short way of writing "10 to the power of 3". That means 10 x 10 x 10.
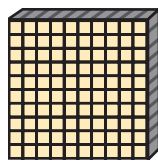
100 x 10 = 1 000.
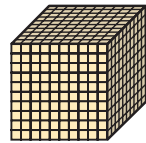
So 10^3 = 1 000.

1. Aarif decides to investigate other powers of 10.
   He draws up a table, starting with 10 to the power of 5.

Power of 10	10^5	10^4	10^3	10^2
Value			1 000	

Copy and complete Aarif's table.

2. a. Predict what the following powers of 10 would equal:

      i. 10^8 ii. 10^1 iii. 10^0

   b. Explain how you made your predictions.

Activity Two

Jessica likes using a place value house to help her say the number for each power of 10.

Trillions			Billions			Millions			Thousands			Ones		
h	t	o	h	t	o	h	t	o	h	t	o	h	t	o
										1	0	0	0	0

10^4 is ten thousand.

So for 10^4, the 1 has a place value of tens of thousands.

1. a. On your first place value house, show these powers of 10:
    i. 10^6 ii. 10^{11} iii. 10^9 iv. 10^0
   b. Write in words how you would say each number that you wrote in the house for question 1a.

2. a. Find these numbers:
    i. 100 to the power of 3 or 100^3
    ii. 1 000 to the power of 2 or $1\,000^2$
    iii. 10 000 to the power of 2 or $10\,000^2$
    v. 100 to the power of 4 or 100^4.
   b. Explain why some of these answers are the same.
   c. What place value does the 1 have in each of the following?
    i. $1\,000^3$ ii. $10\,000^3$ iii. 100^4

3. How many tens are in each of the following?
   a. 10^3 b. 10^6 c. 10^1 d. 10^4
   e. 100^2 f. 100^3

4. How many hundreds are in each of the following?
   a. 10^3 b. 100^2 c. 10^6
   d. $1\,000^2$ e. 100^3