Children Science Section
For School Students

Fun with Mathematics:

Do you know that all the cubic numbers can be expressed as difference of two square numbers? If it is so, how to prove it?

Let $\mathbf{a}^3$ is a cubic number where **a** is any positive integer.

Let us now assume $a^3 = x^2 - y^2$

Or $a^2.a = (x+y)(x-y)$

From this equation, we can equate

$x+y = a^2$ -------(1)

$x-y = a$---------(2)

Now adding eqn. (1) and (2), we get

$2X = a^2+a = a(a+1)$

$X = a(a+1)/2$------(3)

Similarly, subtracting (2) from (1), we get

$Y = a(a-1)/2$ -----(4)

Eqn. (3) and (4) determine value X and Y wrt. a. Now let us verify it with numerical examples.

a	x	y	Example	Remarks
0	0	0	$0^3=0=0^2-0^2=0-0$	
1	1	0	$1^3=1=1^2-0^2=1-0$	The formula $a^3 = x^2 - y^2$ is valid.
2	3	1	$2^3=8=3^2-1^2=9-1$	
3	6	3	$3^3=27=6^2-3^2=36-9$	
4	10	6	$4^3=64=10^2-6^2=100-36$	
5	15	10	$5^3=125=15^2-10^2=225-100$	
6	21	15	$6^3=216=21^2-15^2=441-225$	
7	28	21	$7^3=343=28^2-21^2=784-441$	
8	36	28	$8^3=512=36^2-28^2=1296-784$	
9	45	36	$9^3=729=45^2-36^2=2025-1296$	
10	55	45	$10^3=1000=55^2-45^2=3025-2025$	

and so on.

The above true table shows certain special features. When the value of a is gradually increased with the increment of 1, the value of x is also increases, and the increments are in AP. The value of y is also increases accordingly as shown in the table. You can see there that the same number as that of the values of x are appearing there but with a shift of one house. Is not really interesting?

(To be continued)

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