01

Identify the largest four-digit number which is a perfect cube.

$21^3 = 9261$ and $22^3 = 10643$

Hence 9261 is the largest four digit perfect cube

02

The product of 1815 and m is a square number. Find the smallest possible value of m.

$1815 \times m = 3 \times 5 \times 11 \times 11 \times m$

The smallest possible value of m is 15

03 The number of students in Woodlands Primary School in the year 2012 was a square number. The number of students there in the year 2013 was also a square number and it was 101 more than the number of students in 2012. What was the number of students in the year 2013 ?

Make a list of square numbers.

Given, $n^2 - (n-1)^2 = 101$

$(2n - 1) = 101$

$2n = 102$

$n = 51$

In 2013 = $51^2 = 2601$

In 2012 = $50^2 = 2500$

$\therefore 2601 - 2500 = 101$

04 If $1^3 + 2^3 + ... + 9^3 = 2025$, find the closest value of $(0.11)^3 + (0.22)^3 + ... + (0.99)^3$.

Given $1^3 + 2^3 + 3^3 + \text{---------} + 9^3 = 2025$

$(0.11)^3 + (0.22)^3 + (0.33)^3 + \text{-----} + (0.99)^3 = (0.11)^3 + (0.11 \times 2)^3 + (0.11 \times 3)^3 + \text{---} + (0.11) \times 9^3$

$= (0.11)^3 + (0.11)^3 \times 2^3 + (0.11)^3 \times 3^3 + \text{---} + (0.11)^3 \times 9^3$

$= (0.11)^3\ [1^3 + 2^3 + 3^3 + \text{---} + 9^3] = 0.001331 \times 2025$

$= 2.695275 = 2.7$

05 Observe the following pattern.

$$1^3 = 1$$

$$1^2 + 2^3 = (1 + 2)^2$$

$$1^3 + 2^3 + 3^3 = (1 + 2 + 3)^2$$

Write the next three rows and calculate the value of $1^3 + 2^3 + 3^3 + \ldots\ldots + 9^3 + 10^3$ by given pattern.

$$1^3 + 2^3 + 3^3 + \text{-----} + 10^3$$

$$= (1 + 2 + 3 + \text{----} + 10)^2$$

$$= 55^2$$

$$= 3025$$