Algebraic Identities Ex 4.3 Q13

Answer :

In the given problem, we have to find the value of numbers

(i) Given $(103)^3$

In order to find $(103)^3$ we are using identity $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

We can write $(103)^3$ as $(100+3)^3$

Hence where $a = 100, b = 3$

$$\begin{aligned}(103)^3 &= (100+3)^3 \\ &= (100)^3 + (3)^3 + 3(100)(3)(100+3) \\ &= 1000000 + 27 + 900 \times 103 \\ &= 1000000 + 27 + 92700 \\ &= 1092727\end{aligned}$$

The value of $(103)^3$ is $\boxed{1092727}$

(ii) Given $(98)^3$

In order to find $(98)^3$ we are using identity $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

We can write $(98)^3$ as $(100-2)^3$

Hence where $a = 100, b = 2$

$$\begin{aligned}(98)^3 &= (100-2)^3 \\ &= (100)^3 - (2)^3 - 3(100)(2)(100-2) \\ &= 1000000 - 8 - 600 \times 102 \\ &= 1000000 - 8 - 58800 \\ &= 1000000 - 58808 \\ &= 941192\end{aligned}$$

The value of $(98)^3$ is $\boxed{941192}$

(iii) Given $(9.9)^3$

In order to find $(9.9)^3$ we are using identity $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

We can write $(9.9)^3$ as $(10-0.1)^3$

Hence where $a = 10, b = 0.1$

$$\begin{aligned}(9.9)^3 &= (10-0.1)^3 \\ &= (10)^3 - (0.1)^3 - 3(10)(0.1)(10-0.1) \\ &= 1000 - 0.001 - 3 \times 9.9 \\ &= 1000 - 0.001 - 29.7 \\ &= 1000 - 29.701 \\ &= 970.299\end{aligned}$$

The value of $(9.9)^3$ is $\boxed{970.299}$

(iv) Given $(10.4)^3$

In order to find $(10.4)^3$ we are using identity $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

We can write $(10.4)^3$ as $(10+0.4)^3$

Hence where $a = 10, b = 0.4$

$$\begin{aligned}(10.4)^3 &= (10+0.4)^3 \\ &= (10)^3 + (0.4)^3 + 3(10)(0.4)(10+0.4) \\ &= 1000 + 0.064 + 12 \times 10.4 \\ &= 1000 + 0.064 + 124.8 \\ &= 1000 + 124.864 \\ &= 1124.864\end{aligned}$$

The value of $(10.4)^3$ is $\boxed{1124.864}$

(v) Given $(598)^3$

In order to find $(598)^3$ we are using identity $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

We can write $(598)^3$ as $(600-2)^3$

Hence where $a = 600, b = 2$

$$\begin{aligned}(598)^3 &= (600-2)^3 \\ &= (600)^3 - (2)^3 - 3(600)(2)(600-2) \\ &= 216000000 - 8 - 3600 \times 598 \\ &= 216000000 - 8 - 2152800 \\ &= 216000000 - 2152808 \\ &= 213847192\end{aligned}$$

The value of $(598)^3$ is $\boxed{213847192}$

(vi) Given $(99)^3$

In order to find $(99)^3$ we are using identity $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

We can write $(99)^3$ as $(100-1)^3$

Hence where $a = 100, b = 1$

$$\begin{aligned}(99)^3 &= (100-1)^3 \\ &= (100)^3 - (1)^3 - 3(100)(1)(100-1) \\ &= 1000000 - 1 - 300 \times 99 \\ &= 1000000 - 1 - 29700 \\ &= 1000000 - 29701 \\ &= 970299\end{aligned}$$

The value of $(99)^3$ is $\boxed{970299}$.

********** END **********