## NUMERICAL APTITUDE - II

We discussed the methods of finding squares and square roots earlier. Now let us look at the methods of finding cubes and cube roots. But as an aspirant one should remember the cubes of first 15 natural numbers.

$$
\begin{array}{rlrrrr}
1^{3}=1 & 2^{3}=8 & 3^{3}=27 & 4^{3}=64 & 5^{3}=125 \\
6^{3}=216 & 7^{3}=343 & 8^{3}=512 & 9^{3}=729 & 10^{3}=1000 \\
11^{3}=1331 & 12^{3}=1728 & 13^{3}=2197 & 14^{3}=2744 & 15^{3}=3375
\end{array}
$$

The cube of a two digit number can be found by using $(a+b)^{3}=a^{3}+3 a^{2} b+3 a b^{2}+b^{3}$. For this take the first digit of the two digit number as ' a ' and the second digit as ' b '. Then get $b^{3}, 3 a b^{2}, 3 a^{2} b$ and $a^{3}$ respectively and treat that these are values obtained in addition.
E.g 1: Find the value of $24^{3}$ ?

Sol: $\quad$ Take $\mathrm{a}=2$ and $\mathrm{b}=4$

$$
\begin{aligned}
24^{3} & =2^{3}\left|3 \times 2^{2} \times 4\right| 3 \times 2 \times 4^{2} \mid 4^{3} \\
& =8|48| 96 \mid 64 \\
& =8|48| 96 \mid 4 \\
& =8|48| 2 \mid 4 \\
& =8|8| 2 \mid 4=13824
\end{aligned}
$$

## CUBE ROOT OF A PERFECT CUBE:

Step I: Arrive at the units digit of cube root based on the units digit of the cube by using the following table.

| Units digit of a cube | o | 1 | 4 | 5 | 6 | 9 | 2 | 8 | 3 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Units digit of the cube <br> root | 0 | 1 | 4 | 5 | 6 | 9 | 8 | 2 | 7 | 3 |

Step II: After arriving at the units digit, strike off the last 3 digits of the number. Then find the perfect cube immediately less than or equal to left out
value and get its cube root. Then prefix this value to the units digit arrived in Step I to get the cube root of the given number.
E.g 2: Find the value of $\sqrt[3]{148877}$ ?

Sol: Step I: The perfect cube has 7 in the units place. So its cube root will have 3 in the units place.

Step II: After striking off the last three digits of 148877 (148877) the value left out
is 148 . The perfect cube immediately less than or equal to 148 is 125
and

$$
\sqrt[3]{125}=5
$$

Prefix 5 to the units digit 3 to get the cube root value 53 .

$$
\Rightarrow \quad \sqrt[3]{148877}=53
$$



1. $\sqrt[3]{778688}=$ ?
1) 94
2) 92
3) 102
4) 106
5) 82

ANSWER: 2
The given cube 778688 has 8 in the units place. So its cube root will have 2 in its units
place.
Now erasing the last three digits (688) of the given number then the left out value will be
778.

The perfect cube which is immediately less than or equal to 778 is 729 and $\sqrt[3]{729}=9$.

Now prefix 9 to the unit digit 2 to get the cube root of the given perfect cube i.e.

$$
\sqrt[3]{778688}=92
$$

2. $\sqrt[3]{205379}=$ ?
1) 57
2) 59
3) 54
4) 58
5) 56

ANSWER: 2
The given cube 205379 has 9 in units place. So its cube root will have 9 in units place.

Now erasing the last three digits (379) of the number, the left out value will be 205 .

The perfect cube immediately less than or equal to 205 is 125 and $\sqrt[3]{125}=5$
Now prefix 5 to the unit digit 9 to get the cube root of the given perfect cube i.e.

$$
\sqrt[3]{205379}=59
$$

3. $3328 \div \sqrt[3]{?}=256$

4. $\sqrt[3]{12167} \times \sqrt{?}=621$
1) 841
2) 27
3) 625
4) 29
5) None
of these
ANSWER: 5
The perfect cube 12167 has 7 in units place. So its cube root will have 3 in its units place.

Now erasing the last three digits (167) the left out value will be 12.
The perfect cube less than or equal to 12 is 8 and $\sqrt[3]{8}=2$
Prefix 2 to the units digit 3 to get the cube root of perfect cube i.e. $\sqrt[3]{12167}=$ 23
: $\sqrt[3]{12167} \times \sqrt{?}=621$
$\therefore \sqrt{?}=\frac{621}{23}=27$
$\therefore \quad ?=27^{2}=2^{2}|2 \times 2 \times 7| 7^{2}$

$$
=4|28| 49
$$

$$
=4|\underset{4}{28}| 9
$$

$$
=4|2| 9
$$

$$
=729
$$


5. $8^{3} \times 3^{3}-21^{3}=$ ?

1) 18833
2) 18333
3) 13383
4) 13833
5) 

None of these
ANSWER: 5

$$
\begin{aligned}
8^{3 \times} \times 3^{3} & =(8 \times 3)^{3}=24^{3} \\
(24)^{3} & =2^{3}\left|3 \times 2^{2} \times 4\right| 3 \times 2 \times 4^{2} \mid 4^{3} \\
& =8|48| 96 \mid 64 \\
& =8|48| \underset{6}{96} \mid 4 \\
& =8|\underset{10}{48}| 2 \mid 4 \\
& =8|8| 2 \mid 4 \\
& =13824
\end{aligned}
$$

$$
\begin{aligned}
(21)^{3} & =2^{3}\left|3 \times 2^{2} \times 1\right| 3 \times 2 \times 1^{2} \mid 1^{3} \\
& =8|12| 6 \mid 1 \\
& =8_{1}|2| 6 \mid 1 \\
& =9261
\end{aligned}
$$

$\therefore 24^{3}-21^{3}=13824-9261=4563$
6. $(?)^{3} \div 32=54$

1) 18
2) 2744
3) 1728
4) 12
5) None of these

ANSWER: 4
$(?)^{3} \div 32=54$
$\therefore(?)^{3} 32 \times 54=32 \times 2 \times 27=64 \times 27$
$\therefore ?=\sqrt[3]{64 \times 27}=4 \times 3=12$
7. $\sqrt[3]{42875}-?=21$

1) 18
2) 13
3) 15
4) 11
5) None of these

ANSWER: 5
The perfect cube 42875 has 5 in the units place, so its cube root will have 5 in its units
place.
Erasing the last three digits (875), the left out value will be 42.
The perfect cube immediately less than or equal to 42 is 27 and $\sqrt[3]{27}=3$
Prefixing 3 to the units digit 5 will give the cube root of the number i.e. $\sqrt[3]{42875}=35$
: $\sqrt[3]{42875}-?=21$
$\Rightarrow 35-$ ? $=21$
$\therefore$ ? $=35-21=14$
8. $\sqrt[3]{74088}=$ ?

1) 36
2) 38
3) 42
4) 44
5) 46

ANSWER: 3
The perfect cube 74088 has 8 in the units place, so its cube root will have 2 in its units
place.
Erasing the last three digits (o88), the left out value will be 74 .
The perfect cube immediately less than or equal to 74 is 64 and $\sqrt[3]{64}=4$
Prefixing 4 to the unit digit 2 will give the cube root of the number i.e. $\sqrt[3]{74088}=42$
9. $\sqrt[3]{1.3} \times \sqrt[3]{1.69} \times 2.197 \div 1.69=$ ?

1) 1.3
2) 1.69
3) 2.197
4) 1
5) None of these

ANSWER: 2
$\sqrt[3]{1.3} \times \sqrt[3]{1.69}=\sqrt[3]{1.3 \times 1.69}=\sqrt[3]{2.197}=1.3$
$\therefore \sqrt[3]{1.3} \times \sqrt[3]{1.69} \times 2.197 \div 1.69=1.3 \times 2.197 \div 1.69$

$$
=\frac{1.3 \times 2.197}{1.69}=1.69
$$

