SpeedLabs

MATHS

ICSE 8th

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CUBE AND CUBE ROOT

1. Show that 189 is not a perfect cube.

Ans. Resolving 189 into prime factors, we get:

3	189
3	63
3	21
7	7
	1

$189 = \underline{3 \times 3 \times 3} \times 7$

Making triplets, we find that one triplet is formed and we are left with one more factor.

Thus, 189 cannot be expressed as a product of triplets.

Hence, 189 is not a perfect cube.

2. Show that 216 is a perfect cube. Find the number whose cube is 216.

Ans. Resolving 216 into prime factors, we get:

2	216
2	108
2	54
3	27
3	9
3	3
	1

$216 = \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}$

$= (2 \times 3) \times (2 \times 3) \times (2 \times 3)$

$= (6 \times 6 \times 6)$

$= 6^3$

Thus, 216 is a perfect cube.

And, 6 is the number whose cube is 216.

3. What is the smallest number by which 3087 may be multiplied so that the product is a perfect cube?

Ans. Writing 3087 as a product of prime factors, we have:

3	3087
3	1029
7	343
7	49
7	7
	1

$3087 = 3 \times 3 \times \underline{7 \times 7 \times 7}$

Hence, to make it a perfect cube, it must be multiplied by 3.

4. What is the smallest number by which 392 may be divided so that the quotient is a perfect cube?

Ans. Writing 392 as a product of prime factors, we have:

2	392
2	196
2	98
7	49
7	7
	1

$392 = \underline{2 \times 2 \times 2} \times 7 \times 7$

Clearly, to make it a perfect cube, it must be divided by (7×7), i.e., 49.

5. Find the cube of each of the following :

(i) (-7)

Ans. $(-7)^3$

$= (-7) \times (-7) \times (-7)$

$= -343$

(ii) $\left(1\frac{2}{3}\right)^3$

Ans. $= \left(\frac{5}{3}\right)^3$

$= \frac{5^3}{3^3}$

$= \frac{(5\times5\times5)}{(3\times3\times3)}$

$= \frac{125}{27}$

(iii) $(0.06)^3$

Ans. $= \left(\frac{6}{100}\right)^3$

$= \left(\frac{3}{50}\right) = \frac{3^3}{50^3}$

$= \frac{(3\times3\times3)}{(50\times50\times50)}$

$= \frac{27}{125000}$

6. Find out if the following are perfect cubes.

(i) 250

Ans. Resolving 250 as the product of prime factors

2	250
5	125
5	25
5	5
	1

$250 = 2 \times \underline{5 \times 5 \times 5}$

Since 2 does not exist in product of triples.

Therefore,

250 is not a perfect cube.

(ii) 5832

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

Ans. Resolving 5832 as the product of prime factors

$5832 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

Since, they are grouped in triples.

Therefore,

5832 is a perfect cube.

7. Find the smallest number by which 1944 must be multiplied so that the product is a perfect cube.

2	1944
2	972
2	486
3	243
3	81
3	27
3	9
3	3
	1

Ans. Resolving 1944 as the product of prime factors

$1944 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3$

In order to make 1944 a perfect cube,

it must be multiplied by 3.

8. Find the smallest number by which 4394 must be divided so that the quotient is a perfect cube.

2	4394
13	2197
13	169
13	13
	1

Ans. Resolving 4394 as the product of primes

$4394 = 2 \times 13 \times 13 \times 13$

In order to make 4394 a perfect cube, it must be divided by 2,

so that the quotient is 2197.

9. Evaluate the cube root:

(i) $\sqrt[3]{216}$

2	216
2	108
2	54
3	27
3	9
3	3
	1

Ans. By prime factorization, we have

$216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$= (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

Therefore, $\sqrt[3]{216} = (2 \times 3) = 6$

(ii) $\sqrt[3]{-2744}$

2	2744
2	1372
2	686
7	343
7	49
7	7
	1

Ans. By prime factorization, we have

$2744 = 2 \times 2 \times 2 \times 7 \times 7 \times 7$

$= (2 \times 2 \times 2) \times (7 \times 7 \times 7)$.

Therefore,

$\sqrt[3]{2744} = (2 \times 7) = 14$

Therefore,

$\sqrt[3]{-2744} = -(\sqrt[3]{2744}) = -14$

11. Evaluate: $\left[\sqrt[3]{216 \times (-343)}\right]$

Ans. $\left[\sqrt[3]{216 \times (-343)}\right]$

$= \left[\sqrt[3]{216 \times (-343)}\right]$

$= \sqrt[3]{216} \times \sqrt[3]{343}$

$= \sqrt[3]{6 \times 6 \times 6} \times \sqrt[3]{(-7) \times (-7) \times (-7)}$

$= [6 \times (-7)]$

$= -42$

12. Find the value of $(29)^3$ by the short-cut method.

Ans. Here, a = 2 and b = 9.

$a^2 \times a = a^3$;

$a^2 \times 3b = 3a^2 \times b$;

$b^2 \times 3a = 3a \times b^2$;

$b^2 \times b = b^3$

Therefore, $(29)^3 = 24389$

4 x 2 8 + 16 24	4 x 27 108 + 55 163	81 x 6 486 + 72 558	81 x 9 729

13. Find the cube root of 5.832.

Ans. Converting 5.832 into fraction, we get $\frac{5832}{1000}$

$= \sqrt[3]{\frac{5832}{1000}}$

$= \frac{\sqrt[3]{(2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3)}}{\sqrt[3]{2 \times 2 \times 2 \times 5 \times 5 \times 5}}$

$= \frac{18}{10}$

$= 1.8$

14. Evaluate: $\sqrt[3]{(125 \times 64)}$.

Ans. $\sqrt[3]{(125 \times 64)}$

$= \sqrt[3]{125} \times \sqrt[3]{64}$

$= \sqrt[3]{5 \times 5 \times 5} \times \sqrt[3]{4 \times 4 \times 4}$

$= [4 \times 5]$

$= 20$

15. Find the value of $(71)^3$ by the short-cut method.

Ans. Here, $a = 7$ and $b = 1$

$a^2 \times a = a^3$;

$a^2 \times 3b = 3a^2 \times b$;

$b^2 \times 3a = 3a \times b^2$;

$b^2 \times b = b^3$

Therefore, $(71)^3 = 357911$

49 x 7 343 + 14 357	49 x 3 147 + 2 149	1 x 21 21	1 x 1 1