Cube and Cube Root

1. Which of the following numbers is a perfect cube?

a 1331 b 1441
c 3475 d 2285

2. The cube root of $(-125) \times (-3375)$ is

a 65 b -75
c -85 d 75

3. Out of the following given numbers, which one is Hardy-Ramanujan number?

a 2406 b 1729
c 13833 d None of these

4. Which of the following is a cube of negative number?

a 1331 b -729
c 3375 d -1724

5. The value of the expression $\sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064}$ is

a 9.7 b 3.6
c 6.3 d 4.8

6. $\frac{14}{15}$ is the cube root of which of the following numbers?

a $\frac{-2744}{3375}$ b $\frac{32764}{4485}$
c $\frac{2744}{3375}$ d $\frac{-3375}{2744}$

7. If $32^* K$ (where * means multiplication) gives a perfect cube, then the value of K is

a 3 b 2 c 5 d 8

8. The value of the expression $\sqrt[3]{288} \times \sqrt[3]{432} \times \sqrt[3]{648}$ is

a 432 b 565
c 469 d 328

9. If x and y are negative integers such that $x^2 > y^2$, then relation between x^3 and y^3 is

a $x^3 < y^3$
b $x^3 > y^3$
c $x^3 = y^3$
d None of the above

10. By what smallest number should 243 be divided, so that the quotient be a perfect cube. Then, the cube root of the quotient is

a 81 b 3
c 9 d None of these

11. Which smallest number should be added to the multiple of 4, 9 and 12 to make it a perfect cube?

a 28 b 36 c 9 d 89

12. Match the following:

	List I		List II
A.	$\sqrt[6]{\left(\frac{91125}{216}\right)^2}$	i.	3
B.	Smallest cubic number is	ii.	$\frac{8}{5}$
C.	If $\sqrt[3]{4\frac{12}{125}} = x$, then x is	iii.	1
D.	If $(27)^{1/3} = 3$, then $\sqrt[3]{27}$ is	iv.	$\frac{45}{6}$

Codes

	A	B	C	D
a	(i)	(ii)	(iii)	(iv)
b	(iv)	(iii)	(ii)	(i)
c	(iv)	(ii)	(iii)	(i)
d	(ii)	(iv)	(i)	(iii)

13. If $\sqrt{3\left(\sqrt[3]{x}-\frac{1}{\sqrt[3]{x}}\right)}=2$, then the value of $\left(x-\frac{1}{x}\right)$ is

a $\frac{728}{9}$ b $\frac{72}{27}$

c $\frac{728}{27}$ d $\frac{3}{15}$

14. Three numbers are in the ratio 2 : 3 : 4 to one another. The sum of their cubes is 33957. Then, the difference in the cubes of greatest and smallest numbers is

a 20000 b 21200

c 19208 d 22208

15. **Assertion** (A) 1729 is a Hardy-Ramanujan number.

Reason (R) Cube of 12^3 is 1728.

Which of the following is true?

a Both (A) and (R) are true and (R) is correct explanation of (A)

b Both (A) and (R) are true but (R) is not the correct explanation of (A)

c (A) is true and (R) is false

d (A) is false and (R) is true

16. If cube of a number x is four times of x. Then, value of x, where $x > 0$, is

a 8 b 2

c 4 d 3

17. If surface area of a cube is 150 cm^2. Then, the volume of the cube will be

a 25 cm^3 b 75 cm^3

c 125 cm^3 d 27 cm^3

18. Find the odd one out from the given options.

a

	1^3	
2	343	3
	3	

b

	2^3	
7	10648	2
	3	

c

	2^3	
5	12167	3
	3	

d

	2^3	
3	3375	2
	3	

19. In the given five-digit number 1*A*6*B*3, *B* is the greatest single digit perfect cube and twice of it exceeds *A* by 7. Then, the sum of the above number and its cube root is

a 18700

b 11862

c 19710

d 25320

20. Which of the following is odd?

a $2 \times 1 + 3^3 = 27 + 2 = 29$

b $7 \times 2 + 2^3 = 14 + 8 = 22$

c $5 \times 2 + 3^2 = 5 \times 11 = 55$

d $3 \times 3 + 2^3 = 9 + 8 = 17$

21. State 'T' for true or 'F' for false.

I. For any positive number n, $n^2 < n^3$.

II. 1728 is a Hardy-Ramanujan number.

III. Hardy-Ramanujan numbers can't be expressed as a sum of two cubes in two different ways.

IV. As the square of negative number is positive, similarly the cube of negative number is also positive.

V. For two natural numbers a and b, $a^3 \times b^3 = (a \times b)^3$.

Codes

	I	II	III	IV	V
a	T	F	F	F	T
b	T	F	T	F	T
c	F	T	F	T	F
d	F	F	T	T	T

22. Fill in the blanks with the help of options, given in the box.

(i) 125 cm^3, (ii) 27 cm^3, (iii) 5, (iv) 8, (v) 6, (vi) 9, (vii) 3, (viii) 2, (ix) 4, (x) 7

I. Volume of a cube, whose surface area is 54 cm^2, is ___ .

II. The number of perfect cubes greater than 1 and less than 1000 is ___ .

III. The least number by which 72 be divided to make it a perfect cube is ___ .

IV. Unit digit of a cube of a number having 7 as unit the digit, will be ___ .

V. If a^2 ends in 9, then a^3 ends in ___ or ___ .

Codes

	I	II	III	IV	V
a	(ii)	(iv)	(vi)	(vii)	(x),(vii)
b	(i)	(ii)	(iii)	(iv)	(v),(ix)
c	(vi)	(vii)	(viii)	(ix)	(x),(iii)
d	(x)	(v)	(iii)	(iv)	(i),(ix)

4 Cube and Cube Root

1. $1331 = 11 \times 11 \times 11$

$\Rightarrow \quad \sqrt[3]{1331} = 11$

Hence, 1331 is a perfect cube.

2. $\sqrt[3]{(-125) \times (-3375)} = (-5) \times (-15)$

$= 75$

3. $1729 = 1728 + 1 = 12^3 + 1^3$

4. $(-9)^3 = -729 \quad [\because \sqrt[3]{(-ve)} = -ve]$

5. $\sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064}$

$= 3 + 0.2 + 0.4 = 3.6$

6. $\frac{14^3}{15^3} = \frac{2744}{3375}$

7. $32 = 2 \times 2 \times 2 \times 2 \times 2$

For making the perfect cube, we multiply 32 by 2.

So, $K = 2$, i.e. $32 \times 2 = 64 = 4^3$

8. $\sqrt[3]{288} \times \sqrt[3]{432} \times \sqrt[3]{648}$

$= \sqrt[3]{(2 \times 3 \times 4 \times 3 \times 4)\,(2 \times 6 \times 6 \times 6)\,(3 \times 6 \times 6 \times 6)}$

$= 6 \times 6 \times 3 \times 4 = 432$

9. $\because x^2 > y^2$

$\Rightarrow \quad x > y \;\alpha - x > -y$

$\Rightarrow \quad x \times x^2 > y \times y^2$

$\Rightarrow \quad x^3 > y^3$

10. We have, $243 = 3 \times 3 \times 3 \times 3 \times 3$

So, to have a perfect cube root 243 should be divided by 9.

11. LCM of 4, 9 and 12 = 36

Perfect cube greater than 36 is 64.

$\therefore$ Required number = 64 – 36 = 28

13. $\sqrt[3]{3\left(\sqrt[3]{x} - \frac{1}{\sqrt[3]{x}}\right)} = 2$

Cubing on both sides,

$$3\left(\sqrt[3]{x} - \frac{1}{\sqrt[3]{x}}\right) = 8$$

$$\Rightarrow \quad \sqrt[3]{x} - \frac{1}{\sqrt[3]{x}} = \frac{8}{3} \qquad \ldots (i)$$

Cubing both sides, we get

$$x - \frac{1}{x} - 3\left(\sqrt[3]{x} - \frac{1}{\sqrt[3]{x}}\right) = \frac{512}{27}$$

$$\Rightarrow x - \frac{1}{x} - 3 \times \frac{8}{3} = \frac{512}{27} \text{ [from Eq. (i)]}$$

$$\Rightarrow x - \frac{1}{x} = \frac{512}{27} + 8 = \frac{728}{27}$$

14. Given, numbers are in the ratio 2 : 3 : 4.

Let the numbers be $2x$, $3x$ and $4x$.

Then, $(2x)^3 + (3x)^3 + (4x)^3 = 33957$

$\Rightarrow \quad 8x^3 + 27x^3 + 64x^3 = 33957$

$\Rightarrow \quad x^3 = \frac{33957}{99} \Rightarrow x^3 = 343$

$\Rightarrow \quad x = \sqrt[3]{343} = 7$

$\therefore$ Difference in cubes of greatest and smallest numbers $= (4x)^3 - (2x)^3$

$= (64 - 8)x^3 = 56x^3$

$= 56 \times 7 \times 7 \times 7$

$= 343 \times 56 = 19208$

16. $\because \quad x^3 = 4x$

$\Rightarrow \quad x^3 - 4x = 0$

$\Rightarrow \quad x(x^2 - 4) = 0$

Either $x = 0$ or $x^2 - 4 = 0$

$\Rightarrow \quad x^2 = 4$

$\Rightarrow \quad x = \pm 2$

$\because \quad x \neq 0, x \neq -2$

$\therefore \quad x = 2$

17. Surface area of cube $= 6l^2$ [where, l is a side]

$\Rightarrow \quad 6l^2 = 150$

$\Rightarrow \quad l^2 = 25 \Rightarrow l = 5$

$\therefore$ Volume $= l^3 = (5)^3 = 125 \text{ cm}^3$

18. In the given figure, except option (d) the rule followed is

(a) $\{2 \times 3 + 1^3\}^3 = (6 + 1)^3$

$= 7^3 = 343$

(b) $\{7 \times 2 + 2^3\}^3 = (14 + 8)^3$

$= (22)^3 = 10648$

(c) $\{5 \times 3 + 2^3\}^3 = (15 + 8)^3$

$= (23)^3 = 12167$

(d) $\{3 \times 2 + 2^3\}^3 = (6 + 8)^3$

$= \{14\}^3 \neq 3375$

19. 1A6B3

B = Greatest single digit perfect cube = 8

$A = 2 \times 8 - 7 = 9$

$\therefore$ Number = 19683

Now, $\sqrt[3]{19683} = 27$

$\therefore$ Sum = 19683 + 27 = 19710

21. I. True II. False III. False IV. False V. True

22. I. 27 cm^3 II. 8 III. 9 IV. 3 V. 7, 3