2. SQUARE, SQUARE ROOTS AND CUBE, CUBE ROOTS

Class: VII . MATHEMATICS FOUNDATION+, SOLUTIONS

2025-26

TEACHING TASK

JEE MAINS LEVEL

01. $30^2 < x < 31^2$

$\Rightarrow 900 < x < 961$

$\Rightarrow 900 < 965 < 961$

Since $\sqrt{965} = 31.05 \approx 31.$

Ans: C

02

$$\begin{array}{r|l} 9 & \overline{99}\,\overline{80}\,\overline{01} \\ 81 & \\ \hline 189 & 1801 \\ & 1701 \\ \hline 1989 & 10001 \\ & 10001 \\ \hline & 0 \end{array}$$

$\therefore \sqrt{998001} = 999$ (Three digits)

Ans: A

03. $1000 = 10^3$

Ans: B

04.

$$\begin{array}{r|l} 2 & 392 \\ 2 & 196 \\ 2 & 98 \\ 7 & 49 \\ & 7 \end{array}$$

$\therefore 392 = 2^3 \times 7^2$

To make 392, a perfect cube, it must be multiplied with 7

Ans: B

05. $49^2 = 2401$

Ans: C

06. Let $\sqrt[3]{x} = a$

$\therefore a + \frac{48}{a} = 16$

$\Rightarrow a^2 + 48 = 16a$

$\Rightarrow a^2 - 16a + 48 = 0$

$\Rightarrow a^2 - 12a - 4a + 48 = 0$

$\Rightarrow a(a-12) - 4(a-12) = 0$

$\Rightarrow (a-12)(a-4) = 0$

$\Rightarrow a = 12$ or 4

$\Rightarrow \sqrt[3]{x} = 12$ or $\sqrt[3]{x} = 4$

$\Rightarrow x = 1728$ or 64

Ans: D

07. $\sqrt[3]{1+3+5+7+\ldots 53} =$

$1, 3, 5, 7 \ldots 53$ are in A.P.

$a + (n-1)d = 53$

$\Rightarrow 1 + (n-1)2 = 53$

$\Rightarrow n = 27$

$\therefore \sqrt[3]{(27)^2} = \sqrt[3]{3^6} = 3^2 = 9$

NOTE: Sum of the first n odd natural numbers $= n^2$

Ans: D

08 $512 = 8^3 = a^b$

here $a = 8$, $b = 3$

Now, $\sqrt[b]{a} = \sqrt[3]{8} = 2$

Ans: A

09. $\sqrt[3]{5832} = \sqrt[3]{18^3} = 18$

Ans: A

10 $5832 = 18^3$, $2197 = 13^3$

Ans: A, C

JEE ADVANCED LEVEL

01. A) $\sqrt{105} = 10.25$ (approx)

B) $\sqrt{196} = 14$

C) $\sqrt{289} = 17$

D) $\sqrt{361} = 19$

Ans: A, B, C, D

02 $\sqrt[3]{0.125} + \sqrt[3]{0.729}$

$= \sqrt[3]{(0.5)^3} + \sqrt[3]{(0.9)^3}$

$= 0.5 + 0.9$

$= 1.4$

Also $\sqrt{\frac{49}{25}} = \frac{7}{5} = 1.4$

Ans: A, B

03 Statement I: $\sqrt{441} = 21$ (True)

Statement II: obviously (False)

Ans: C

04. Statement I: $64 = 4^3$ (True) (4)

Statement II: $\sqrt[3]{64} = 4$ (False) Ans: C

05. Assertion: Conceptual (True)

Reason: $4^2 < 20 < 5^2$

$\therefore \sqrt{20}$ is an irrational number Ans: A

06. Assertion: Conceptual (True)

Reason: Conceptual (True) Ans: A

07. 180 is not a perfect square. Ans: D

08. $169 = 13^2$ Ans: A

09. $\sqrt{144} = 12$ Ans: A

10. A) $3^3 = 27$,

B) $4^3 = 64$

D) $5^3 = 125$

c) 81 is not a perfect cube Ans: A, B, D

11. $64 = 4^3$

$\therefore \sqrt[3]{64} = 4.$ Ans: B

12. $1^2 = 1, \quad 1^3 = 1$ Ans: A

13. $24^2 = 576$ Ans: 24

14. Two digit perfect cubes are 27 and 64

$\therefore 27 + 64 = 91$ Ans: 91

15 a) $15^2 = 225$ (P)

b) $\sqrt[3]{1728} = 12$ (Q)

c) $13^2 = 169$ (R)

d) $6^3 = 216$

Ans: P, Q, R, –

16 a) $49 = 7^2$ (P)

b) We can find the square root of 2025 by repeated subtraction method (Q)

c) We can find the square root of 2 by long division method (R)

d) $2.25 \sim 2$ (Estimation) (S)

Ans: P, Q, R, S

LEARNERS TASK CUQ's

01. Conceptual Ans: D

02. Conceptual Ans: BC

03. Conceptual Ans: C

04. Conceptual

Ans: B

05. Conceptual

Ans: A

06. 2 | 32
2 | 16
2 | 8
2 | 4
2

$\therefore 32 = 2^5$

$\therefore$ 2 should be multiplied

Ans: C

07 $\sqrt[3]{1331} = \sqrt[3]{(11)^3} = 11$

Ans. B.

08 $1+2+3+\ldots+10 = 55$

$\therefore 55^2 = 3025$

Ans: A

09 $\sqrt[3]{2}, \sqrt[3]{3}, \sqrt[3]{36}$

product $= \sqrt[3]{2} \times \sqrt[3]{3} \times \sqrt[3]{36}$

$= \sqrt[3]{2 \times 3 \times 36}$

$= \sqrt[3]{6^3}$

$= 6$

Ans: B

10 A) $49 = 7^2$, 7 is a prime number

B) $121 = 11^2$, 11 is a prime number

Ans: A, C

JEE MAINS LEVEL

01. 7

Ans: B

02 $(-3)^2 = (-9)$

$(-3)^5 = -243$

Ans: A

03. Conceptual

Ans: B

04 Conceptual

Ans: A

05 Conceptual

Ans: C

06 $\sqrt{x} + \sqrt{y} = \sqrt{1980}$

$\sqrt{x} + \sqrt{y} = 6\sqrt{55}$

Let $\sqrt{x} = a\sqrt{55}$, $\sqrt{y} = b\sqrt{55}$

$\therefore a\sqrt{55} + b\sqrt{55} = 6\sqrt{55}$

$\Rightarrow a + b = 6$

$\therefore (a,b) \in (1,5), (2,4), (3,3)$ ~~(4,2), (5,1)~~

Ans: 3

07

07. $\left(\frac{x}{y}+\frac{y}{x}\right)^2 = \frac{x^2}{y^2}+2+\frac{y^2}{x^2}$

$\left(\frac{y}{z}+\frac{z}{y}\right)^2 = \frac{y^2}{z^2}+2+\frac{z^2}{y^2}$

$\left(\frac{x}{z}+\frac{z}{x}\right)^2 = \frac{x^2}{z^2}+2+\frac{z^2}{x^2}$

$G.E = \frac{x^2}{y^2}+\frac{y^2}{x^2}+\frac{y^2}{z^2}+\frac{z^2}{y^2}+\frac{x^2}{z^2}+\frac{z^2}{x^2}+6 = 165$

$\Rightarrow \frac{x^2}{y^2}+\frac{y^2}{x^2}+\frac{y^2}{z^2}+\frac{z^2}{y^2}+\frac{x^2}{z^2}+\frac{z^2}{x^2} = 159$

$\Rightarrow \frac{x^4z^2+y^4z^2+x^4y^2+y^4x^2+z^4y^2+z^4x^2}{x^2y^2z^2} = 159$

$\Rightarrow \frac{x^2y^2(x^2+y^2)+y^2z^2(y^2+z^2)+z^2x^2(z^2+x^2)}{x^2y^2z^2} = 159$

$\Rightarrow \frac{x^2y^2(6-z^2)+y^2z^2(6-x^2)+z^2x^2(6-y^2)}{x^2y^2z^2} = 159$

$\Rightarrow \frac{6(x^2y^2+y^2z^2+z^2x^2)-3x^2y^2z^2}{x^2y^2z^2} = 159$

$\Rightarrow 6\left(\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}\right) = 162$

$\Rightarrow \frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2} = 27.$ Ans: 27

08 $\sqrt[3]{9261} = \sqrt[3]{(21)^3} = 21$ Ans: A

69. $\sqrt{0.000625} = \sqrt{(0.025)^2} = 0.025$ Ans: A

10. A) $3^3 = 27$ Ans: A

JEE ADVANCED LEVEL

01. A) $64 = 4^3$

B) $343 = 7^3$

D) $729 = 9^3$ Ans: A, C, D

02 Rational Numbers

B) $\frac{3}{1000}$ C) $\frac{13}{2^8 \times 5}$ Ans: B, C

03 Statement I:

2 | 512
2 | 256
2 | 128
2 | 64
2 | 32
2 | 16
2 | 8
2 | 4
2

$\therefore 512 = 2^9$,

$= (2^3)^3$

$= 8^3$

(True)

Statement II: Conceptual (False) Ans: C

04. Statement I: Conceptual (True)

Statement II: Conceptual (False) Ans: C

05 Assertion: Conceptual (True)

Reason: Conceptual (True) Ans: A

06. Assertion:

$5 \overline{)1225}$

$5 \overline{)245}$

$7 \overline{)49}$

7

$\therefore 1225 = 5^2 \times 7^2$

$= 35^2$

(True)

Reason: Conceptual (True) Ans: A

07. $1 + 3 + 5 + \cdots + 99$ are in A.P.

$a + (n-1)d = 99$

$\Rightarrow 1 + (n-1).2 = 99$

$\Rightarrow n = 50$

$\Rightarrow$

$\therefore Sum = (50)^2 = 2500$

Ans: C

08 $3 + 9 + 15 + \cdots + 63$ are in A.P

$a + (n-1)d = 63$

$\therefore \Rightarrow 3 + (n-1)6 = 63$

$\Rightarrow n = 11$

$Sum = \frac{n}{2}[a+l]$

$= \frac{11}{2}[3+63]$

$= 363$ Ans: A

09. $2+4+6+\cdots+400$

$= 2(1+2+3+\cdots+200)$

$= \frac{2 \times 200 \times 201}{2} = 40200$

Ans: D

10. B) 250 is not a perfect cube — Ans: B

11. $\sqrt[3]{216} = 6$ — Ans: A

12. Conceptual — Ans: B

13. $10^3 = 1000 \rightarrow$ 4 digit number — Ans: 10

14. $4^3 = 64$. — Ans: 4

15. a) $(76)^2 = 5776$ Ans: 76

b) $\sqrt[3]{512} = 8$ (q)

c) $\sqrt{2025} = 45$ (r)

d) $4^3 = 64$ (s)

Ans: —, q, r, s

16. a) $\sqrt[3]{27} = 3$ (s)

b) $\sqrt[3]{64} = 4$ (p)

c) $\sqrt[3]{8} = 2$ (r)

d) $\sqrt[3]{125} = 5$ (q)

Ans: s, p, r, q

⇒ THE END