

OPERATIONS ON SURDS ①

Class: VII. Mathematics

SOLUTIONS

TEACHING TASK

01. $3\sqrt{32} + 6\sqrt{45} - \sqrt{162} - 2\sqrt{245}$
 $= 3\sqrt{16 \times 2} + 6\sqrt{9 \times 5} - \sqrt{81 \times 2} - 2\sqrt{49 \times 5}$
 $= 12\sqrt{2} + 18\sqrt{5} - 9\sqrt{2} - 14\sqrt{5}$
 $= 3\sqrt{2} + 4\sqrt{5}$

Ans: A

02. $x^{\frac{1}{4}} = 4 \Rightarrow x^{\frac{3}{4}} = 4^3 = 64$
 $y^{\frac{1}{2}} = 3 \Rightarrow y^{\frac{5}{2}} = 3^5 = 243$
 $\therefore x^{\frac{1}{4}} + y^{\frac{1}{2}} = 64 + 243 = 307$

Ans: C

03. $7\sqrt{4} \times 5\sqrt{3} = 35\sqrt{12}$

Ans: C

04. $5\sqrt{8} - \sqrt{2} + 5\sqrt{25 \times 2} - \sqrt{32}$
 $= 5 \cdot 2\sqrt{2} - \sqrt{2} + 25\sqrt{2} - 4\sqrt{2}$
 $= 10\sqrt{2} - \sqrt{2} + 25\sqrt{2} - 4\sqrt{2}$
 $= 30\sqrt{2}$

Ans: D

05. $\frac{\sqrt{96}}{\sqrt{6}} = \sqrt{\frac{96}{6}} = \sqrt{16} = 4$

Ans: D

07 $\sqrt[4]{1250 \times 8} + 3\sqrt{25 \times 3} * 3\sqrt{16 \times 3}$ (2)

$$= \sqrt[4]{10^4} + 15\sqrt{3} * 12\sqrt{3}$$

$$= 10 + 540 = 550$$

Ans: A

08 $\sqrt[4]{3^4} - 8\sqrt[3]{6^3} + 15 + 15\sqrt[5]{2^5}$

$$= 3 - 48 + 15 + 30$$

$$= 0 \text{ or } 24\sqrt{0}$$

Ans: B, C

09 Statement I: $\sqrt{x} \cdot x \sqrt[4]{x} \times \sqrt{y}$

$$= \sqrt[4]{x^2} \times \sqrt[4]{x} \times \sqrt[4]{y^2}$$

$$= \sqrt[4]{x^3 y^2} \quad (\text{True})$$

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Statement II: (Conceptual) (True) Ans: A

10 $\sqrt[mn]{x^{n^2}} \cdot \sqrt[mn]{x^{m^2}} = \sqrt[mn]{x^{m^2+n^2}}$ Ans: B

11 $\frac{\sqrt[35]{x^{14}}}{\sqrt[35]{y^{15}}} = \sqrt[35]{\frac{x^{14}}{y^{15}}}$ Ans: A

12 $(A+B)^2 + (A-B)^2 = (2\sqrt{7})^2 + (2\sqrt{3})^2$

$$= 28 + 12 = 40$$

Ans: 40

$$13 \quad a) \quad 5\sqrt{2} + 6\sqrt{2} = 11\sqrt{2} \quad (3)$$

$$b) \quad 45\sqrt{6} - 18\sqrt{6} = 27\sqrt{6}$$

$$c) \quad 24\sqrt{5} - 16\sqrt{5} + 7\sqrt{5} - 35\sqrt{5} = 0$$

$$d) \quad 4\sqrt{3} + 18\sqrt{3} = 22\sqrt{3}$$

Ans: x, p, s, v

LEARNERS TASK

CUB'S

$$01 \quad \sqrt{12} + \sqrt{27} = 2\sqrt{3} + 3\sqrt{3} = 5\sqrt{3}$$

Ans: B

$$02 \quad 4\sqrt{20} - 2\sqrt{45} \\ = 8\sqrt{5} - 6\sqrt{5} = 2\sqrt{5}$$

Ans: C

$$03 \quad \frac{\sqrt{12}}{\sqrt{3}} = \sqrt{\frac{12}{3}} = \sqrt{4} = 2$$

Ans: A

$$06 \quad \frac{\sqrt{32}}{\sqrt{8}} = \sqrt{\frac{32}{8}} = \sqrt{4} = 2$$

$$04 \quad \frac{\sqrt{x}}{\sqrt{y}} = \sqrt{\frac{x}{y}}$$

Ans: B

$$05 \quad \frac{2\sqrt{5}}{\sqrt{3}} = \sqrt{\frac{5}{3}} = \sqrt{\frac{5 \times 3}{3 \times 3}} = \frac{\sqrt{15}}{3}$$

Ans: A

$$07 \quad 5\sqrt{5 \times 45} = 5 \times \sqrt{225} = 5 \times 15 = 75$$

Ans: B

$$08 \quad 6\sqrt{2} + 11\sqrt{2} = 17\sqrt{2}$$

Ans: A

$$09 \quad \sqrt{32} \times \sqrt{2}$$

$$\sqrt{64} \times \sqrt{4} = \sqrt{32}$$

Ans: —

$$10 \quad \sqrt[n]{x^m} \cdot \sqrt[n]{y^m} = \sqrt[n]{(xy)^m} = (xy)^{\frac{m}{n}} \quad \text{Ans: A} \quad \textcircled{4}$$

JEE MAINS LEVEL

$$\begin{aligned} 01. \quad & 24\sqrt{3} + 5 \cdot \sqrt[3]{2^3 \times 3} - 2\sqrt[3]{2^2 \times 7} - 4\sqrt{3^2 \times 7} \\ & = 24\sqrt{3} + 10\sqrt{3} - 4\sqrt{7} - 12\sqrt{7} \\ & = 34\sqrt{3} - 16\sqrt{7} \end{aligned} \quad \text{Ans: A}$$

$$02 \quad \frac{x+1}{x+20} = \frac{8}{27}$$

$$\Rightarrow 27x + 27 = 8x + 160$$

$$\Rightarrow 19x = 143 \Rightarrow x = 7 \quad \text{Ans: B}$$

$$\begin{aligned} 03 \quad & 2\sqrt{3} - \sqrt[3]{3^3 \times 2} + 3\sqrt[3]{2^3 \times 2} - \sqrt[3]{5^3 \times 5} \\ & = 2\sqrt{3} - 3\sqrt{2} + 6\sqrt{2} - 5\sqrt{5} \\ & = 3\sqrt{2} - 3\sqrt{5} \end{aligned} \quad \text{Ans: D}$$

$$\begin{aligned} 04. \quad & 3\sqrt{12} \times \sqrt{98} \times 5\sqrt{27} \\ & 3\sqrt{4 \times 3} \times \sqrt{49 \times 2} \times 5\sqrt{9 \times 3} \\ & = 6\sqrt{3} \times 7\sqrt{2} \times 15\sqrt{3} \\ & = 630 \times 3 \times \sqrt{2} \\ & = 1890\sqrt{2} \end{aligned}$$

$$\begin{aligned} 05 \quad & 5\sqrt[3]{(-3)^3 \times 2} + 2\sqrt[3]{(-2)^3 \times 2} + 4\sqrt[3]{7^3 \times 2} \\ & = -15\sqrt{2} - 4\sqrt{2} + 28\sqrt{2} \\ & = 9\sqrt{2} \end{aligned} \quad \text{Ans: B}$$

$$06 \quad \frac{x+y}{A+B} = \frac{\sqrt{24} + \sqrt{150}}{\sqrt{96} + \sqrt{54}} = \frac{2\sqrt{6} + 5\sqrt{6}}{4\sqrt{6} + 3\sqrt{6}} = 1 \quad (5) \quad \text{Ans: A}$$

$$07 \quad \frac{\sqrt[5]{3}}{\sqrt[3]{2}} (\sqrt[5]{3} \times \sqrt[3]{2}) = (\sqrt[5]{3})^2 = 3^{2/5} = \sqrt[5]{9} \\ = \sqrt[5]{9^3} = \sqrt[5]{729} \quad \text{Ans: C}$$

$$08 \quad \begin{array}{l|l} \sqrt[3]{x} = 5 & \sqrt[4]{y} = 7 \\ \Rightarrow x^{1/3} = 5 & \sqrt[5]{z} = 5 \\ \Rightarrow x = 125 & z^{1/5} = 5 \\ \Rightarrow \sqrt[4]{x} = \sqrt[4]{125} & z = 5^5 \\ & \sqrt[4]{5} = \sqrt[4]{5^5} \end{array}$$

$$\text{Now } \sqrt[4]{xyz} = \sqrt[4]{125} \times 7 \times \sqrt[4]{5^5} \\ = \sqrt[4]{5^8} \times 7 = 25 \times 7 = 175 \quad \text{Ans: A}$$

Statement I

$$09. \quad \sqrt[3]{2} \times 5 \sqrt[3]{4} \times 2 \sqrt[4]{8} \\ 3 \sqrt[3]{2^6} \times 5 \sqrt[3]{4^3} \times 2 \sqrt[4]{8^3} \\ = 30 \sqrt[12]{2^6 \times 4^3 \times 8^3} \\ = 30 \sqrt[12]{2^{21}} \\ = 30 \sqrt[12]{2^{12} \times 2^9} \\ = 60 \sqrt[12]{532}$$

Statement II Conceptual (True)

Ans: —

(6)

10.

$$\frac{\sqrt[15]{x^{12}}}{\sqrt[90]{x^7}} = \frac{\sqrt[90]{x^{12}}}{\sqrt[90]{x^7}} = \sqrt[90]{x^5}$$

Ans: A

11)

$$\sqrt[3]{2x+1} = 9$$

$$\Rightarrow 2x+1 = 729$$

$$\Rightarrow 2x = 728 \Rightarrow x = 364$$

Ans: 364

12

$$a) \sqrt{8} \times \sqrt{2} = \sqrt{16} = 4$$

$$b) \sqrt[3]{2} \times \sqrt[3]{2} \times \sqrt[3]{2} = \sqrt[3]{8} = 2$$

$$c) \frac{\sqrt[4]{2}}{\sqrt[8]{4}} = \frac{\sqrt[8]{4}}{\sqrt[8]{4}} = 1$$

$$d) \frac{\sqrt{9} - \sqrt[3]{27}}{\sqrt{7} \times \sqrt{2}} = \frac{3-3}{\sqrt{7} \times \sqrt{2}} = 0$$

Ans: s, t, v, p

 $\Rightarrow$ THE END $\Leftarrow$