

NUMBER SYSTEM

Ques 1: Represent the following on number line:

Q (i) $\sqrt{10}$ (ii) $\sqrt{17}$ (iii) $\sqrt{5.6}$

Ques 2: Write the following numbers in $\frac{p}{q}$ form:

(i) $2.0\overline{15}$ (Ans: $-\frac{399}{198}$)

Q (ii) $0.\overline{235}$ ($\frac{235}{999}$)

x (iii) $1.\overline{32} + 0.\overline{35}$ ($\frac{553}{330}$)

Ques 3: Find 2 rational and irrational numbers between $\sqrt{2}$ and $\sqrt{3}$.

Ques 4: Simplify:

(i) $2\sqrt{50} + 3\sqrt{32} + 4\sqrt{18}$ ($34\sqrt{2}$)

(ii) $\sqrt[4]{16} - 6\sqrt[3]{343} + 18 \times \sqrt[5]{243} - \sqrt{196}$ (0)

(iii) $\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$ (0)

(iv) $\sqrt{225} - 4\sqrt{6} + \sqrt{294} - 2\sqrt{\frac{1}{6}}$ ($15 + \frac{8\sqrt{6}}{3}$)

Ques 5: (i) If $x = 3 + 2\sqrt{2}$, check whether $x + \frac{1}{x}$ is rational or irrational (6, Rational)

(ii) If $x = 7 + 4\sqrt{3}$, then find whether $x^2 + \frac{1}{x^2}$ is rational or irrational ($112\sqrt{3}$, irrational)

Ques 6: Rationalise the denominator:

(i) $\frac{4\sqrt{3} + 5\sqrt{2}}{4\sqrt{3} + 3\sqrt{2}}$ ($\frac{9 + 4\sqrt{6}}{15}$)

(ii) $\frac{\sqrt{2}}{\sqrt{2} + \sqrt{3} - \sqrt{5}}$ ($\frac{\sqrt{6} + 3 + \sqrt{15}}{6}$)

Ques 8: (i) If $x = 2 + \sqrt{3}$, find $(x + \frac{1}{x})^3$ (64)

(ii) If $x = 5 - 2\sqrt{6}$, find $x^2 + \frac{1}{x^2}$ (98)

Ques 9: Simplify:

(i) $\frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}} + \frac{3\sqrt{2}}{\sqrt{6} + \sqrt{3}} - \frac{4\sqrt{3}}{\sqrt{6} + \sqrt{2}}$ (0)

$$(ii) \frac{\sqrt{72}}{5\sqrt{72} + 3\sqrt{288} - 2\sqrt{648}} \quad \left(\frac{1}{5}\right)$$

Ques 10. (i) If $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$ then find

$$\frac{4}{3\sqrt{3} + 2\sqrt{2}} + \frac{3}{3\sqrt{3} - 2\sqrt{2}} \quad (1.765)$$

(ii) If $\sqrt{5} = 2.236$ and $\sqrt{10} = 3.162$; Find

$$\frac{15}{\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80}} \quad (5.398)$$

Ques 11. Find a and b : if

$$\frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}} = a + b\sqrt{5} \quad \begin{pmatrix} a=0 \\ b=1 \end{pmatrix}$$

Ques 12. Prove that:

$$\left(x^{a-b}\right)^{a+b} \cdot \left(x^{b-c}\right)^{b+c} \cdot \left(x^{c-a}\right)^{c+a} = 1$$

Ques 13. Simplify:

$$\left(\frac{x^b}{x^c}\right)^{b+c-a} \times \left(\frac{x^c}{x^a}\right)^{c+a-b} \times \left(\frac{x^a}{x^b}\right)^{a+b-c} \quad (1)$$

Ques 14. Prove that:

$$\frac{a^{-1}}{a^{-1} + b^{-1}} + \frac{a^{-1}}{a^{-1} - b^{-1}} = \frac{2b^2}{b^2 - a^2}$$

Ques 15. Prove $m - n = 2$

$$\frac{9^{m+1} \times \left(3^{\frac{-n}{2}}\right)^{-2} - 27^n}{\left(3^m \times 2\right)^3} = \frac{1}{729}$$

Ques 16. If $(5)^{2x-1} - (25)^{x-1} = 2500$. Find x . (3)

Ques 17. If $2^x = 5^y = 10^z$, then prove that

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$

Ques 18. Write $\sqrt[3]{4}$, $\sqrt{3}$, $\sqrt[4]{6}$ in ascending order.
($\sqrt[4]{6} < \sqrt[3]{4} < \sqrt{3}$)

Ques 19. Simplify:
 $\sqrt[4]{\sqrt[3]{x^2}}$ in exponential form ($x^{\frac{1}{6}}$)

Ques 20. If x , y and z are positive real no.'s and p , q , r are natural numbers such that $x^p = y^q = z^r$ and $\frac{y}{x} = \frac{z}{y}$, then prove that $\frac{2}{q} = \frac{1}{p} + \frac{1}{r}$