Class 9 Number System study Material

Q. Define rational number and irrational Number?

Q. Prove that (i) $\sqrt{3} - \sqrt{2}$ (ii) $2/\sqrt{3}$ are irrational numbers

Q. Represent on each number on number line:

(i) 3/7 (ii) 13/7 (iii) 4/9 (iv) 2.5 (v) $\sqrt{2}$ (v) $\sqrt{5}$ (vi) $\sqrt{4.9}$ (vii) $(2 + \sqrt{3})$

Q. Visualize the representation of $5.3\overline{7}$ on the number line upto 5 decimal place. i.e. 5.37777.

Q. Find the three rational numbers between

(i) $\sqrt{2}$ and $\sqrt{3}$ (ii) 1/3 and ½ (iii) 0.2323323332..... and 0.252552555255552.....

Q. Find two irrational numbers between (i) 2 and 2.5. (ii) 0.12 and 0.13. (iii) 0.3030030003...and 0.3010010001.....

Q. Prove that: (i) Sum and difference of a rational and an irrational number is always an irrational number.

(ii) Sum and difference of two irrational numbers is either rational or irrational number.

(ii) Product of a non-zero rational number with an irrational number is either rational or irrationals

(iv) Product of an irrational with a irrational is not always irrational.

Q. Examine whether the following numbers are rational or irrational:

(i) $(2 - \sqrt{3})^2$ (ii) $(\sqrt{2} + \sqrt{3})^2$ (iii) $(3 + \sqrt{2})(3 - \sqrt{2})$ (iv) $\sqrt[3]{3}$

Q. What is surd? [SURDS: Any irrational number of the form $\sqrt[n]{a}$ is given a special name surd. Where 'a' is called Radicand, it should always be a rational number. Also the symbol $\sqrt[n]{\ }$ is called the radical sign and the index n is called order of the surd.

Q. Express the following in the form of p/q. (i) $0.\overline{3}$ (ii) $0.\overline{37}$ (iii) $2.2\,\overline{35}$ (iv) $0.\overline{621}$

Q. Which is greater is each of the following: (i) $\sqrt[3]{16}$ and $\sqrt[5]{8}$ (ii) $\sqrt{\frac{1}{2}}$ and $\sqrt[3]{\frac{1}{3}}$

Q. Q. Arrange $\sqrt{2}$, $\sqrt[3]{3}$ and $\sqrt[4]{5}$ in ascending order

Q. If $x = 1/(2+\sqrt{3})$ then find the value of $x^3 - x^2 - 11x + 3$

Q. if $x = 3 + \sqrt{8}$ and $y = 3 - \sqrt{8}$ then find value of $\frac{1}{x^2} + \frac{1}{y^2}$

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Q. Simplify:

(i) $\sqrt{6}-\sqrt{216}+\sqrt{96}=15\sqrt{6}-\sqrt{6^2\times 6}+\sqrt{16\times 6}$ Ans. $13\sqrt{6}$

(ii) $5\sqrt[3]{250}+7\sqrt[3]{16}-14\sqrt[3]{54}$ Ans. $-3\sqrt[3]{2}$

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(iii) $4\sqrt{3}+3\sqrt{48}-\frac{5}{2}\sqrt{\frac{1}{3}}$ Ans. $\frac{91}{6}\sqrt{3}$

Q. Find value of a and b if $(3 + 2\sqrt{2})/(3 -\sqrt{2}) = a + b\sqrt{2}$

Q. (i) if $x = 3 - \sqrt{8}$ then show that $x^3 + \frac{1}{x^3} = 198$ (ii) If x = 0.125, find the value of $\left(\frac{1}{x}\right)^{\frac{1}{3}}$

Q. If $x = 1 + 2^{1/3} + 2^{2/3}$ then show that $x^3 – 3x^2 – 3x – 1 = 0$ (ii) 25. If $x= 9-4\sqrt{5}$, find $\sqrt{x} - 1/ \sqrt{x}$

Q. If $x = 1 + \sqrt{2} + \sqrt{3}$ then show that $x^4 – 4x^3 – 4x^2 + 16x – 8 = 0$

Q. Simplify: (i) $\frac{16 \times 2^{n+1} - 4 \times 2^n}{16 \times 2^{n+2} - 2 \times 2^{n+2}}$ (ii) $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}$

Q. Rationalise the denominator of each of the following (i) $\frac{1}{1+\sqrt{2}-\sqrt{3}}$ (ii) $\frac{1}{\sqrt{3}+\sqrt{2}-\sqrt{5}}$ (iii) $\frac{3}{\sqrt[3]{9}}$ (iv) $\frac{5}{\sqrt[4]{125}}$

Q. If $a = 9 - 4\sqrt{5}$, Show that $(a - \frac{1}{a})^2 = 320$ (ii) If $x = 1 - \sqrt{2}$, Show that $(x - \frac{1}{x})^3 = 8$

Q. Find the value x, (i) if $5^{x-3} \times 3^{2x-8} = 225$ { ans= 5) (ii) if $3^x = \left(\frac{1}{27^x}\right)$

Q. If $x = (\sqrt{2} + 1) \div (\sqrt{2} - 1)$ and $y = (\sqrt{2} - 1) \div (\sqrt{2} + 1)$ find the value of $x^2 + y^2 + x y$ {Ans: 35 }

Q. if $x = 7 + 4\sqrt{3}$ and $x y = 1$. Find $\frac{1}{x^2}+\frac{1}{y^2}$ {Ans: 194}

Q. If $9^{x+2} = 240 + 9^x$, then find value of x {ans: 1/2}

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Q. if $x = \frac{\sqrt{p+2q}+\sqrt{p-2q}}{\sqrt{p+2q}-\sqrt{p-2q}}$ then show that $qx^2 – p x+ q = 0$

Q. (i) Show that $\frac{1}{1+a^{x-y}}+\frac{1}{1+a^{y-x}}=1$ (ii) Show that $\frac{1}{3-\sqrt{8}}-\frac{1}{\sqrt{8}-\sqrt{7}}+\frac{1}{\sqrt{7}-\sqrt{6}}-\frac{1}{\sqrt{6}-\sqrt{5}}+\frac{1}{\sqrt{5}-2}=5$

Q. (i) $if\ x^2+\frac{1}{x^2}=14$ then find the value of x (ii) Find the product $\sqrt[3]{2} \times \sqrt[4]{2} \times \sqrt[12]{32}$

Q. Find the value of x if $\sqrt{15-x\sqrt{14}} = \sqrt{8} - \sqrt{7}$ {ans = 4}

Q. if $\frac{1+\sqrt{2}}{1-\sqrt{2}}+\frac{1-\sqrt{2}}{1+\sqrt{2}}=a+b\sqrt{2}$, then find a and b

Q. Prove that : $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\ldots\ldots\ldots+\frac{1}{\sqrt{8}+3}=2$