

# VAISHALI EDUCATION POINT

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## NUMBER SYSTEM

Class :- IX

Subject :- Math

### General Instructions

QNo.

Questions

1

Find 3 rational nos lying between  $\frac{3}{2}$  and  $\frac{2}{3}$

$$\frac{5}{6}, \frac{6}{6}, \frac{7}{6}$$

2

Express in p/q form. (i) .999..... (ii)  $3.\overline{002}$   
(iii)  $0.\overline{37}$  (iv)  $5.2\overline{32}$

3

If  $a = 2$  and  $b = 3$  then find the value of each of the following.

(i) 31; (ii) 17; (iii)  $\frac{25}{36}$ ; (iv)  $\frac{4}{9}$

(i)  $a^m + b^n$  (ii)  $a^m + b^m$

(ii)  $\left(\frac{1}{a} + \frac{1}{b}\right)^m$  (iii)  $\left(\frac{a}{b}\right)^m$

4

Simplify  $\left(\frac{81}{16}\right)^{-3/4} \times \left[\left(\frac{25}{9}\right)^{-3/2} \div \left(\frac{5}{2}\right)^{-3}\right]$

1

5

Simplify :  $\frac{(25)^{3/2} \times (243)^{3/5}}{(16)^{5/4} \times (8)^{4/3}}$

$$\frac{3375}{512}$$

6

If  $27^x = \frac{9}{3^x}$  Find x.

$$x = \frac{1}{2}$$

7

Find two irrational no's between 0.31 and 0.32

8

Find 2 irrational no's between  $\sqrt{3}$  and  $\sqrt{5}$

9

Give examples of 2 irrational no.s whose (i) difference is a rational no. (ii) sum is an irrational no. (iii) sum is a rational no. (iv) Product is a rational no.

10 Examine whether the following numbers are rational or a irrational (i)  $\sqrt{7}$  (ii)  $\sqrt{225}$   
 (iii)  $(2-\sqrt{2})(2+\sqrt{2})$  (iv)  $(\sqrt{5}+\sqrt{2})$

(i) Irrational (ii) Rational (iii) Rational (iv) Irrational

11 With long division, tell whether the following are terminating or non-terminating repeating. Give reasons also. (i)  $\frac{6}{75}$  (ii)  $\frac{2}{21}$

(i) Terminating because factors denominator are 5 only. (ii) Nonterminating repeating because factors of denominator are other than 2 and 5.

12 Find the decimal expansion of  $\frac{3}{13}$

13 Represent the following on real line. (i)  $\sqrt{5}$  (ii)  $\sqrt{10}$   
 (iii)  $\sqrt{8}$

14 Find the value of  $\sqrt{4.6}$  and  $\sqrt{5.7}$  geometrically.

15 Rationalize the denominator of (i)  $\frac{\sqrt{3}-\sqrt{2}}{2\sqrt{3}+\sqrt{2}}$  (ii)  $\frac{2\sqrt{6}-\sqrt{5}}{3\sqrt{5}-2\sqrt{6}}$

16 Find the value of a & b if  $\frac{3+\sqrt{2}}{3-2\sqrt{2}} = a+b\sqrt{2}$

a = 13, b = 9.

17 Simplify  $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} + \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

10

18 If  $ax = b$ ,  $by = c$  and  $cz = a$ . Prove that  $xyz = 1$ .

19 Show that  $\left(\frac{x^a}{x^b}\right)^{a+b} \left(\frac{x^b}{x^c}\right)^{b+c} \left(\frac{x^c}{x^a}\right)^{c+a} = 1$ .

20 If  $x = 2 + \sqrt{3}$  find the value of  $\left(x^2 + \frac{1}{x^2}\right)$

14

21 If  $x = 2 + \sqrt{3}$  find the value of  $x^3 + \frac{1}{x^3}$

52

22 If a and b are rational nos, find the value of a and b.  $\frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}+1}{\sqrt{3}-1} = a + \sqrt{3}b$ . 5 Marks

Questions.

$$a = 4, b = 0$$

23 Rationalize the denominator of

$$(i) \frac{1}{\sqrt{6} + \sqrt{5} - \sqrt{11}} \quad (ii) \frac{15}{\sqrt{10} + \sqrt{20} + \sqrt{40} - \sqrt{5} - \sqrt{80}}$$

(i)

24 Show that  $\frac{1}{3 - \sqrt{8}} - \frac{1}{\sqrt{8} - \sqrt{7}} + \frac{1}{\sqrt{7} - \sqrt{6}} - \frac{1}{\sqrt{6} - \sqrt{5}} + \frac{1}{\sqrt{5} - 2} = 5$

25 Show that  $\frac{6}{2\sqrt{3} - \sqrt{6}} + \frac{\sqrt{6}}{\sqrt{3} + \sqrt{2}} - \frac{4\sqrt{3}}{\sqrt{6} - \sqrt{2}} = 0$

26 Prove that  $\frac{1}{1 + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \dots + \frac{1}{\sqrt{8} + \sqrt{9}} = 2$

27 Insert three rational numbers between  $\frac{3}{5}$  and  $\frac{5}{7}$ .

28 Find four rational numbers between  $\frac{3}{8}$  and  $\frac{5}{11}$ . How many rational numbers can be determined lying between these numbers.

29 Find three rational numbers between  $\frac{3}{5}$  and  $\frac{5}{7}$ . How many rational numbers can be determined between these two numbers?

30 Let 'a' be a rational number and 'b' be an irrational number. Is 'ab' necessarily an irrational? Justify your answer with an example.

31 Are the square root of all positive intergers irrational? If not, give an example of the square root of a number that is a rational number.

32 Find two irrational numbers between 0.6 and 0.65.

33 Write three rational numbers between  $\sqrt{3}$  and  $\sqrt{5}$ .

34 Find the value of  $\left(\frac{-27}{64}\right)^{-\frac{2}{3}}$

35 Simplify  $\sqrt[4]{12} \div \sqrt{3} \cdot \sqrt[3]{2}$

36 
$$64^{\frac{-1}{3}} \left[ 64^{\frac{1}{3}} - 64^{\frac{2}{3}} \right]$$

Simplify

37 
$$\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left(\frac{25}{9}\right)^{\frac{-3}{2}}$$

Simplify :

38 
$$\frac{2^{x+1} + 2^x}{2^{x+1} - 2^x}$$

Simplify :

39 
$$\left(\frac{81}{16}\right)^{\frac{-3}{4}} \times \left[\left(\frac{25}{9}\right)^{\frac{-3}{2}} + \left(\frac{5}{2}\right)^{-3}\right] = 1$$

Prove that

40 Show that :  $(x^p + q)^{p-q} \times (x^q + r)^{q-r} \times (x^r + p)^{r-p} = 1$ .

41 
$$\frac{1}{1 + x^{c-a} + x^{b-a}} + \frac{1}{1 + x^{a-b} + x^{c-b}} + \frac{1}{1 + x^{a-c} + x^{b-c}} = 1$$

Prove that :

42 Find the value of x, if  $\left(\frac{3}{5}\right)^5 \left(\frac{5}{3}\right)^{-9} = \left(\frac{3}{5}\right)^{2x}$

Find the value of x, if

43 Find the value of x if  $7^{x-3} \times 5^{2x-8} = 1225$ .

44 Write the following in the ascending order of their magnitude :  $\sqrt[3]{5}, \sqrt[4]{5}, \sqrt[3]{4}$ .

45 Represent  $\sqrt{3}$  on the number line.

46 Represent  $\sqrt{10}$  on the number line.

47 Find a point corresponding to  $3 + \sqrt{2}$  on the number line.

48 Represent  $\sqrt{9.5}$  on the number line.

49 Represent  $\sqrt{3.6}$  on the number line.

50 Find the square root of 5.6 geometrically.

51

Express  $5.\bar{3}$  in the form of  $\frac{p}{q}$ , where p, q are integers,  $q \neq 0$ .

52

Express  $16.5\bar{23}$  in the form of  $\frac{p}{q}$ , where p, q are integers,  $q \neq 0$ .

53

Express  $0.4\bar{35}$  in the form of  $\frac{p}{q}$ , where p, q are integers,  $q \neq 0$ .

54

Rationalise the denominator of  $\frac{6}{3\sqrt{2}-2\sqrt{3}}$ .

55

Rationalise the denominator of  $\frac{3\sqrt{2}}{\sqrt{6}-\sqrt{3}}$ .

56

Rationalise the denominator of  $\frac{2}{\sqrt{27}}$ .

57

Find the rationalisation factor of  $\sqrt{7}-\sqrt{5}$ .

58

Rationalise the denominator of  $\frac{1}{3-2\sqrt{2}}$  and find its value if  $\sqrt{2}=1.414$ .

59

Evaluate  $\frac{\sqrt{10}-\sqrt{5}}{\sqrt{2}}$ , given that  $\sqrt{5}=2.236$  and  $\sqrt{10}=3.162$ .

60

Simplify the following by rationalising the denominator of  $\frac{1}{\sqrt{7}+\sqrt{6}-\sqrt{3}}$ .

61

Rationalise the denominator  $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}-2\sqrt{3}}$ .

62

Rationalise the denominator  $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$ .

63

Simplify :  $\frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}}$ .

64

Simplify :  $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \frac{1}{\sqrt{5}+\sqrt{4}}$ .

65 Simplify :  $\frac{1}{1+\sqrt{2}+\sqrt{3}} + \frac{1}{1-\sqrt{2}+\sqrt{3}}$ .

66 Simplify :  $\frac{6}{2\sqrt{3}-\sqrt{6}} + \frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}} - \frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}}$ .

67 Simplify :  $\frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{5}-\sqrt{3}} - \frac{2}{\sqrt{3}-\sqrt{2}}$ .

68 If  $\frac{5+\sqrt{6}}{5-\sqrt{6}} = a+b\sqrt{6}$ , find a and b.

69 If  $\frac{2\sqrt{6}-\sqrt{5}}{\sqrt{45}-\sqrt{24}} = a+b\sqrt{30}$ , find the values of a and b.

70 Find the values of a and b, if  $\frac{6-4\sqrt{2}}{6+4\sqrt{2}} = a+b\sqrt{2}$ .

71 Find the values of a and b, if  $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} + \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} = a+b\sqrt{15}$ .

72 If  $p = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$  and  $q = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ , find  $p^2+q^2$ .

73 If  $a = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$  and  $b = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ , find the value of  $a^2 + b^2 - 5ab$ .

74  $x = 5 - 2\sqrt{6}$ , then find the value of  $x^2 + \frac{1}{x^2}$ .

75 If  $x = 3 + 2\sqrt{2}$ , then find whether  $x + \frac{1}{x}$  is rational or irrational.

76 If  $\sqrt{2} = 1.414$ ,  $\sqrt{3} = 1.732$ , then find the value of  $\frac{4}{3\sqrt{3}-2\sqrt{2}} + \frac{3}{3\sqrt{3}+2\sqrt{2}}$ .