Mathematics for Class 9

1. Number Systems

Q 1 Is every real number is a rational number ?

Mark (1)

Q 2 Is 1.01001000100001 …… irrational? If so, why?

Mark (1)

Q 3 Is every whole number is a natural number ?

Mark (1)

Q 4 Look at the following examples of rational number in the form p/q ($q \neq 0$),where p and q integers with no common factors other than 1 and having terminating decimal representations. Can you guess the property which satisfy q ?

$$\frac{7}{8} = \frac{7}{2^3} = \frac{7 \times 5^3}{2^3 \times 5^3} = \frac{875}{(2 \times 5)^3} = \frac{875}{10^3} = \frac{875}{1000} = 0.875$$

$$\frac{3}{40} = \frac{3}{2^3 \times 5} = \frac{3 \times 5^2}{2^3 \times 5^3} = \frac{75}{(2 \times 5)^3} = \frac{75}{1000} = 0.075$$

$$\frac{4}{25} = \frac{4 \times 2^2}{5^2 \times 2^2} = \frac{4 \times 4^2}{(5 \times 2^2)} = \frac{16}{100} = 0.16$$

Mark (1)

Q 5 Is zero a rational number? Explain it.

Mark (1)

Q 6 If $\frac{1}{x} = \frac{x^2}{27}$, then find x is rational or irrational number.

Mark (1)

Q 7 Insert three rational numbers between $\frac{-13}{24}, \frac{-9}{24}$.

Mark (1)

Q 8 Find two rational numbers between 1 and 2.

Mark (1)

Q 9 Is $\sqrt{225}$ a rational number?

Mark (1)

Q 10 Is it true that every integer is a rational Number ?

Mark (1)

Q 11 Is every rational number is an Integer.

Mark (1)

Q 12 Is $\sqrt{23}$ a rational number?

Mark (1)

Q 13 **Find the product of $\sqrt[3]{2}$ and $\sqrt[3]{24}$.**

Mark (1)

Q 14 Is 2 a rational number? Can you write it in the form $\frac{p}{q}$, where p and q are integers?

Mark (1)

Q 15 **Find the greatest among $\sqrt[4]{5}, \sqrt[4]{7}, \sqrt[4]{3}$.**

Mark (1)

Q 16 Find, whether $\frac{1}{625}$ is a terminating or non terminating decimal number.

Mark (1)

Q 17 Find the value of x , if $5^{x-2} = 125$.

Mark (1)

Q 18 Simplify:

(i) $\left(3^{\frac{1}{5}}\right)^4$

(ii) $13^{\frac{1}{5}}.17^{\frac{1}{5}}$

Marks (2)

Q 19 Rationalize the denominators of the following:

(i) $\frac{1}{\sqrt{7}}$

(ii) $\frac{1}{\sqrt{2}}$

Marks (2)

Q 20 Simplify $\sqrt{7}\left(\sqrt{35}+\sqrt{7}\right)$.

Marks (2)

Q 21 Find two irrational numbers between 2 ad 2.5.

Marks (2)

Q 22 Insert a rational & an irrational number between 2 and 3.

Marks (2)

Q 23 Identify $\sqrt{45}$ as rational number or irrational number.

Marks (2)

Q 24 Give examples of two irrational numbers the product of which is:

i) a raional number

ii) an irrational number.

Marks (2)

Q 25 identify $\sqrt{}$80 as rational number or irrational number.

Marks (2)

Q 26 How to insert irrational numbers between two given rational numbers.

Marks (2)

Q 27 Find the decimal representation of $\frac{8}{3}$.

Marks (2)

Q 28 Express $\frac{7}{8}$ in the decimal form by long division method.

Marks (2)

Q 29 Find three rational numbers between -2 and 5.

Marks (2)

Q 30 Insert 100 rational numbers between $\frac{-3}{13}$ and $\frac{9}{13}$.

Marks (2)

Q 31 Insert 10 rational numbers between $\frac{-3}{11}$ and $\frac{8}{11}$.

Marks (2)

Q 32 State whether the following statements are true or false. Give reasons for your answers.

(i) Every integer is a whole number

(ii) Every rational number is a whole number.

Marks (2)

Q 33 Find five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$.

Marks (2)

Q 34 Find six rational numbers between 3 and 4.

Marks (2)

Q 35 Find five rational numbers between 1 and 2.

Marks (2)

Q 36 Express 0.8888 ……..in the form of p/q where p and are integers and q $\neq$ 0.

Marks (2)

Q 37 Rationalise the denominator of $\frac{2}{\sqrt{7}+\sqrt{5}}$.

Marks (2)

Q 38 Rationalise the denominator in each of the following:

(i) $\frac{2}{\sqrt{3}}$

(ii) $\frac{1}{\sqrt{7}}$

(iii) $\frac{1}{\sqrt{2}}$

Marks (3)

Q 39 Simplify $\frac{6-4\sqrt{2}}{6+4\sqrt{2}}$.

Marks (3)

Q 40 Rationalize the denominators of the following:

(i) $\frac{1}{\sqrt{7}-\sqrt{6}}$

(ii) $\frac{1}{\sqrt{5}+\sqrt{2}}$

(iii) $\frac{1}{\sqrt{7}-2}$

Marks (3)

Q 41 Represent $\sqrt{9.3}$ on the number line.

Marks (3)

Q 42 Visualize 3.765 on the number line using successive magnification.

Marks (3)

Q 43 State whether the following statements are true or false. Justify.

i) Every irrational number is a real number.

ii) Every point on the number line is of the form $\sqrt{m}$, where m is a natural number.

iii) Every real number is an irrational number.

Marks (3)

Q 44 Classify the following numbers as rational or irrational.

(i) $\sqrt{23}$

(ii) $\sqrt{225}$

(iii) $7.\overline{478}$

Marks (3)

Q 45 Find three different irrational numbers between the rational numbers $\frac{5}{7}$ and $\frac{9}{11}$.

Marks (3)

Q 46 Prove that $(3+\sqrt{2})^2$ is an irrational number.

Marks (3)

Q 47 Are square roots of all the +ve integers irrational? If not, give an example of the square root of a number that is a rational number.

Marks (3)

Q 48 Simplify

(i) $2^{\frac{2}{3}}.2^{\frac{1}{5}}$

(ii) $\left(\frac{1}{3^3}\right)^7$

(iii) $\frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$

(iv) $7^{\frac{1}{2}} \times 8^{\frac{1}{2}}$

Marks (4)

Q 49 Simplify

(i) $(625)^{\frac{-1}{4}}$

(ii) $\sqrt[5]{(32)^{-3}}$

Marks (4)

Q 50 Simplify

(i) $\left(\sqrt{4}\right)^{-3}$

(ii) $\left(\sqrt[3]{8}\right)^{\frac{-1}{2}}$

Marks (4)

Q 51 Rationalize the denominator of

(i) $\frac{1}{3+\sqrt{2}}$

(ii) $\frac{1}{2+\sqrt{3}}$

Marks (4)

Q 52 Simplify

(i) $\left(\sqrt{5}+\sqrt{2}\right)^2$

(ii) $\left(\sqrt{11}-\sqrt{5}\right)^2$

Marks (4)

Q 53 Simplify:

(i) $\left(5+\sqrt{5}\right)\left(5-\sqrt{5}\right)$

(ii) $\left(3+2\sqrt{2}\right)\left(3-2\sqrt{2}\right)$

Marks (4)

Q 54 Simplify

(i) $\left(3+\sqrt{3}\right)\left(2+\sqrt{2}\right)$

(ii) $\left(5+\sqrt{7}\right)\left(2+\sqrt{5}\right)$

Marks (4)

Q 55 Represent $\sqrt{3}$ on a number line.

Marks (4)

Q 56 Represent $\sqrt{2}$ on a number line.

Marks (4)

Q 57 You know that $\frac{1}{7}=0.\overline{142857}$. Can you predict the decimal expansions of $\frac{2}{7},\frac{3}{7},\frac{4}{7},\frac{5}{7},\frac{6}{7}$ without actually doing the long division? If so how?

Marks (5)

Q 58 Represent $\sqrt{5}$ on the number line.

Marks (5)

Q 59 Construct the square root spiral.

Marks (5)

Q 60 Find:

(i) $9^{\frac{3}{2}}$

(ii) $32^{\frac{2}{5}}$

(iii) $16^{\frac{3}{4}}$

Marks (6)

Q 61 Simplify

(i) $(64)^{1/3}$

(ii) $(125)^{-1/3}$

(iii) $(27)^{\frac{-2}{3}}$

(iv) $\left(\frac{64}{25}\right)^{\frac{-3}{2}}$

Marks (6)

Q 62 Simplify

(i) $\frac{3}{\sqrt{3}+1}+\frac{5}{\sqrt{3}-1}$

(ii) $\frac{\sqrt{7}-1}{\sqrt{7}+1}-\frac{\sqrt{7}+1}{\sqrt{7}-1}$

Marks (6)

Q 63 Simplify

(i) $\sqrt{5}\times\sqrt{45}$

(ii) $\sqrt{2x}\times\sqrt{8x}$

(iii) $\frac{\sqrt{2}}{\sqrt{50}}$

Marks (6)

Q 64 Examine, whether the following numbers are rational or irrational.

(i) $\left(\sqrt{2}+2\right)^2$

(ii) $\left(5+\sqrt{5}\right)\left(5-\sqrt{5}\right)$

(iii) $\frac{6}{2\sqrt{3}}$

Marks (6)

Q 65 Write the following in decimal form and find the type of decimal expansion.

(i) $\frac{36}{100}$

(ii) $\frac{1}{11}$

(iii) $4\frac{1}{8}$

Marks (6)

Q 66 Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

(i) $0.\overline{6}$

(ii) $x = 0.\overline{47}$

(iii) $0.\overline{001}$

Marks (6)

Q 67 Identify the following as rational or irrational number.

(i) $\sqrt{4}$

(ii) $\sqrt{100}$

(iii) $\sqrt{3}$

(iv) 0.101101110111110...

(v) 0.375

(vi) 22.3333333...

Marks (6)

Most Important Questions

Q 1 Are all-rational numbers real numbers?

Q 2 Is it possible to find a natural number between 1 and 2?

Q 3 Is each point on the number line of the form $\sqrt{m}$,where m is a natural numbers?

Q 4 Find one rational number between 5 and 6.

Q 5 Without actual division, find whether the following rational numbers are terminating or non-terminating repeating:
11/50 and 27/56.

Q 6 Name the following:

(a) The outer layer of the cell

(b) The fluid like substance present outside the nucleus

Q 7 Can photosynthesis take place outside the leaves? If yes, then where this process takes place?

Q 8 Express the decimal expression $0.4\overline{73}$ as a rational numbers.

Q 9 Insert four rational numbers between (1/3) and (1/4).

Q 10 Give one example of each:

(a) a parasitic plant

(b) a parasitic animal

(c) a saprophyte

Q 11 Find two irrational numbers between 1.5 and 1.7.

Q 12 (a) What is a parasite?

(b) State a difference between total parasite and partial parasite?

Q 13 Find an irrational number between (1/7) and (1/5).

Q 14 (a) What is an insectivorous plant?

(b) Give one example of insectivorous plant.

(c) Give the structure and mode of nutrition of one insectivorous plant.

Q 15 Rationalize the expression [1/{(2$\sqrt{}$3) + $\sqrt{}$7}].

Q 16 Find the value of the expression $\frac{5-\sqrt{3}}{\sqrt{3}-3\sqrt{2}}$

Q 17 What is the role of fungi in daily life?

Q 18 If $\frac{\sqrt{7}-1}{\sqrt{7}+1}-\frac{\sqrt{7}+1}{\sqrt{7}-1}=a+b\sqrt{7},$ find the value of a and b.

Q 19 Give an example of two irrational numbers whose

a) Sum is a rational number

b) Difference is a rational number.

c) Product is a rational number.

Q 20 Classify the following expressions as rational or irrational.

$$a)\ (6-\sqrt{2})^2 \quad b)\ (2-\sqrt{2})(2+\sqrt{2}) \quad c)(2+\sqrt{3})(2+3\sqrt{3})$$

Q 21 Prove that the following expression

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

Q 22

$$\text{If } x=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} \text{ and } y=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}, \text{find the value of } x^2+y^2+xy.$$

Q 23 Simplify $\frac{7\sqrt{3}}{\sqrt{10}+\sqrt{3}}-\frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}}-\frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

Q 24 Simplify $(\sqrt{x^{-3}})^5$.

Q 25 Is $x^a + x^b = x^{a+b}$.

Q 26 Simplify $(16^{-1/5})^{5/2}$.

Q 27 Identify as rational or irrational number.

a) $\sqrt{}_{12}\, x\, \sqrt{}_{12}$ b) $\sqrt{}_{4}\, x\, \sqrt{}_{18}$

Q 28 Simplify $(0.008)^{1/3}$.

Q 29 Find the value of x if $2^{5x} \div 2^x = \sqrt[5]{2^{20}}$

Q 30 Find the value of $(\sqrt{4})^{-7} \times (\sqrt{2})^{-5}$.

Q 31 Find the value of $\left(\frac{x^{-4}}{x^{-10}}\right)^{5/4}$.

Q 32 Find the value of x when $\left(\frac{3}{5}\right)^x \left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$.

Q 33 Simplify the following: $\frac{(25)^{3/2} \times (243)^{3/5}}{(16)^{5/4} \times (8)^{4/3}}$

Q 34 Show that $\frac{x^{a(b-c)}}{x^{b(a-c)}} \div \left(\frac{x^b}{x^a}\right)^c = 1$

Q 35 Express the following expression in the form of a rational number

$$\frac{(0.6)^0 - (0.1)^{-1}}{\left(\frac{3}{8}\right)^{-1}\left(\frac{3}{2}\right)^3 + \left(-\frac{1}{3}\right)^{-1}}$$

Q 36 Simplify $\left(\frac{5^{-1}\times 7^{2}}{5^{2}\times 7^{-4}}\right)^{7/2}\times\left(\frac{5^{-2}\times 7^{3}}{5^{3}\times 7^{-5}}\right)^{-5/2}$.