IX NUMBER SYSTEMS (MCQs) R.D. SHARMA SOLUTIONS

1) Which one of the following is a correct statement?
(a) Decimal expansion of a rational number is terminating
(b) Decimal expansion of a rational number is non-terminating
(c) Decimal expansion of an irrational number is terminating
(d) Decimal expansion of an irrational number is non-terminating and non-repeating.

Solution:-
Decimal expansion of an irrational number is non-terminating and non-repeating (d) eg:- $2.10100100010000 1\ldots$

2) Which one of the following statements is true?
(a) The sum of two irrational numbers is always an irrational no.
(b) The sum of two irrational numbers is always a rational no.
(c) The sum of two irrational numbers may be a rational no. or an irrational number.
(d) The sum of two irrational numbers is always an integer.

Solution:-
The sum of two irrational numbers may be a rational no. or an irrational number. (c)
eg:- $(2+\sqrt{3})+(4-\sqrt{3}) = 2+\sqrt{3}+4-\sqrt{3} = 6$, a rational number
$2\sqrt{5}+7\sqrt{5} = 9\sqrt{5}$, an irrational number.

3) Which of the following is a correct statement?
(a) Sum of two irrational numbers is always irrational.
(b) Sum of a rational and an irrational number is always an irrational number
(c) Square of an irrational number is always a rational no.
(d) Sum of two rational numbers can never be an integer

Solution:-
Sum of a rational and an irrational number is always an irrational number (b)
eg:- $6+(7+\sqrt{11}) = 13+\sqrt{11}$, an irrational number.

4) Which of the following statements is true?
(a) Product of two irrational numbers is always irrational.
(b) Product of a non-zero rational and an irrational is always irrational.
(c) Sum of two irrational numbers can never be irrational

(d) Sum of an integer and a rational number can never be an integer

Solution:-

$5 \times \sqrt{2} = 5\sqrt{2}$, an irrational number

Thus, product of a non-zero rational number and an irrational number is always irrational (b)

5) Which of the following is irrational?

(a) $\sqrt{\frac{4}{9}}$ (b) $\frac{4}{5}$ (c) $\sqrt{7}$ (d) $\sqrt{81}$

Solution:-

$\sqrt{\frac{4}{9}} = \frac{2}{3}$, rational

$\frac{4}{5}$ is also a rational number in $\frac{p}{q}$ form.

$\sqrt{81} = 9$, a rational number.

Thus $\sqrt{7}$ (c) is an irrational number.

6) Which of the following is irrational?

(a) 0.14 (b) $0.1\overline{416}$ (c) $0.\overline{1416}$ (d) 0.10140014000014...

Solution:-

0.14 - rational, terminating decimal expansion.

$0.1\overline{416}$, $0.\overline{1416}$ - rational, non-terminating and repeating decimal expansion

Thus, 0.10140014000014... (d) is irrational with non-terminating non-repeating decimal expansion.

7) Which of the following is rational?

(a) $\sqrt{3}$ (b) π (c) $\frac{4}{0}$ (d) $\frac{0}{4}$

Solution:-

$\sqrt{3}$, π irrational numbers since the decimal expansion is non-terminating non-repeating.

$\frac{4}{0}$ - not defined

Thus $\frac{0}{4} = 0$, a rational number (d)

8) The number 0.3185643185643185643... is

(a) a natural number (b) an integer

(c) a rational number (d) an irrational number

Solution:-

The given number is $0.\overline{318564}$, a rational number with non-terminating repeating decimal expansion (c)

9) If n is a natural number, then $\sqrt{n}$ is
(a) always a natural number
(b) always a rational number
(c) always an irrational number
(d) sometimes a natural numbers and sometimes an irrational number.

Solution:-

Let 5 be a natural number, then $\sqrt{5}$ is irrational and 9 be another natural number, then $\sqrt{9} = 3$ is rational. Thus, sometimes a natural number and sometimes an irrational number (d)

10) Which of the following numbers can be represented as non-terminating, repeating decimals ?
(a) 39/24 (b) 3/16 (c) 3/11 (d) 137/25

Solution:-

$\frac{39}{24}\ ^{13}_{8} = \frac{13}{8} = \frac{13}{2^3.5^0}$, terminating decimal

$\frac{3}{16} = \frac{3}{2^4.5^0}$, terminating decimal

$\frac{3}{11}$, non-terminating repeating decimal (c)

$\frac{137}{25} = \frac{137}{5^2.2^0}$, terminating decimal.

11) Every point on a number line represents
(a) a unique real number (b) a natural number
(c) a rational number (d) an irrational number.

Solution:- a unique real number (a)

12) Which of the following is irrational ?
(a) 0.15 (b) 0.01516 (c) $0.\overline{1516}$ (d) 0.5015001500015...

Solution:-

0.15 – rational, terminating decimal expansion

0.01516 – rational, terminating decimal expansion

$0.\overline{1516}$ - rational, non-terminating repeating decimal expansion

0.501500150015... - irrational, non-terminating non-repeating decimal expansion

13) The number $1.\overline{27}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$ is

(a) 14/9 (b) 14/11 (c) 14/13 (d) 14/15

Solution:-

Let $x = 1.272727\ldots$ $\longrightarrow (1)$

$100x = 127.272727\ldots$ $\longrightarrow (2)$

eq:(2) − eq:(1), $99x = 126$

$$x = \frac{126}{99} = \frac{14}{11} \text{ (b)}$$

14) The number $0.\overline{3}$ in the form $\frac{p}{q}$; where p and q are integers and $q \neq 0$ is

(a) 33/100 (b) 3/10 (c) 1/3 (d) 3/100

Solution:-

Let $x = 0.3333\ldots$ $\longrightarrow (1)$

$10x = 3.3333\ldots$ $\longrightarrow (2)$

(2) − (1), $9x = 3$

$$x = \frac{3}{9} = \frac{1}{3} \text{ (c)}$$

15) $0.3\overline{2}$ when expressed in the form $\frac{p}{q}$ (p, q are integers; $q \neq 0$) is

(a) 8/25 (b) 29/90 (c) 32/99 (d) 32/199

Solution:-

Let $x = 0.3222\ldots$

$10x = 3.222\ldots$ $\longrightarrow (1)$

$100x = 32.222\ldots$ $\longrightarrow (2)$

(2) − (1), $90x = 29$

$$x = \frac{29}{90} \text{ (b)}$$

16) $23.\overline{43}$ when expressed in the form $\frac{p}{q}$ (p, q are integers $q \neq 0$) is

(a) $\frac{2320}{99}$ (b) $\frac{2343}{100}$ (c) $\frac{2343}{999}$ (d) $\frac{2320}{199}$

Solution:-

Let $x = 23.434343\ldots$ → (1)

$100x = 2343.434343\ldots$ → (2)

(2)-(1), $99x = 2320$

$x = \frac{2320}{99}$ (a)

17) $0.\overline{001}$ when expressed in the form $\frac{p}{q}$ (p, q are integers, $q \neq 0$) is

(a) $\frac{1}{1000}$ (b) $\frac{1}{100}$ (c) $\frac{1}{1999}$ (d) $\frac{1}{999}$

Solution:-

Let $x = 0.001001001\ldots$

$1000x = 1.001001001\ldots$

$999x = 1$

$x = \frac{1}{999}$ (d)

18) The value of $0.\overline{23} + 0.\overline{22}$ is

(a) $0.4\overline{5}$ (b) $0.\overline{43}$ (c) $0.\overline{45}$ (d) 0.45

Solution:-

$$0.\overline{23} + 0.\overline{22} = 0.232323\ldots$$
$$+\ 0.222222\ldots$$
$$0.454545\ldots$$
$$= 0.\overline{45}$$ (c)

19) An irrational number between 2 and 2.5 is

(a) $\sqrt{11}$ (b) $\sqrt{5}$ (c) $\sqrt{22.5}$ (d) $\sqrt{12.5}$

Solution:- $\sqrt{5} = 2.236\ldots$ (b)

20) The number of consecutive zeroes in $2^3 \times 3^4 \times 5^4 \times 7$ is

(a) 3 (b) 2 (c) 4 (d) 5

Solution:-

$$2^3 \times 3^4 \times 5^4 \times 7 = (2^3 \times 5^3) \times 5 \times 3^4 \times 7$$
$$= 10^3 \times 5 \times 3^4 \times 7$$

Thus, no. of consecutive zeroes = 3 (a)

21) The smallest rational number by which $\frac{1}{3}$ should be multiplied so that its decimal expansion terminates after one place of decimal is

(a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) 3 (d) 30

Solution:-

$$\frac{1}{3} \times \frac{3}{10} = \frac{1}{10} = 0.1$$

Hence, the required smallest rational number is $\frac{3}{10}$ (b)