REAL NUMBERS

QUESTION BANK

I Multiple Choice Question (10X1)

1. Every rational number is
(A) A natural number
(B) An integer
(C) A real number
(D) A whole number

2. Between two rational numbers
(A) There is no rational number
(B) There is exactly one rational number
(C) There are infinitely many rational numbers
(D) There are only rational numbers and no irrational numbers .

3. Decimal representation of a rational number cannot be
(A) terminating

(B) non-terminating

(C) non-terminating repeating

(D) non-terminating non-repeating

4. The product of any two irrational numbers is

(A) Always an irrational number

(B) Always a rational number

(C) Always an integer

(D) Some time rational, some time irrational

5. The decimal expansion of the number √2 is

(A) A finite decimal

(B) 1.41421

(C) non-terminating recurring

(D) non-terminating non-recurring

6. Which of the following is irrational?

(a) $\sqrt{\frac{4}{9}}$

(b) $\frac{\sqrt{12}}{\sqrt{3}}$

(c) $\sqrt{7}$

(d) $\sqrt{81}$

7. Which of the following is irrational?

(A) 0

(B) $0.14\overline{16}$

(C) $0.\overline{1416}$

(D) 0.4014001400014...

8. A rational number between √2 and √3 is

$\frac{\sqrt{2}+\sqrt{3}}{2}$

$\frac{\sqrt{2}-\sqrt{3}}{2}$

(A)

(B)

(C) 1.5

(D) 1.8

9. The value of 1.999….in the form $\frac{p}{q}$, of where p and q are integers and $q \neq 0$, is

(A) $\frac{19}{10}$

(B) $\frac{1999}{1000}$

(C) 2

(E) $\frac{1}{9}$

10. $2\sqrt{3} + \sqrt{3}$ is equal to

(A) $\sqrt{6}$

(B) 6

(C) $3\sqrt{3}$

(D) $3\sqrt{6}$

ANSWERS:

1. **Sol**.(C) A real number

   We know that rational and irrational numbers taken together are known as real numbers. Therefore, every real number is either a rational number or an irrational number. Hence, every rational number is a real number. Therefore, (c) is the correct answer.

2. **Sol.** (C) there are infinitely many rational numbers.

Between two rational numbers there are infinitely many rational number for example

between 4 and 5 there are 4.1,4.2 .4.22,4.223..... Hence, (C) is the correct answer.

3. **Sol.** (D) non-terminating non repeating

The decimal representation of a rational number cannot be non-terminating and non- Repeating.

4 Sol.(D)some time rational,some time irrational

The product of any two irrational numbers is either rational or irrational.

$(2+\sqrt{3})(2-\sqrt{3})$	$(2+\sqrt{3})(1-\sqrt{3})$
$(2)^2-(\sqrt{3})^2$	$2(1-\sqrt{3})+\sqrt{3}(1-\sqrt{3})$
$4-3=1$	$2-2\sqrt{3}+\sqrt{3}-3$
RATIONAL	$-1-\sqrt{3}$
	IRRATIONAL

Hence, (D) is the correct answer. For example:

5. Sol. (D) non-terminating non-recurring

The decimal expansion of the number √2 is 1.41421……

6 Sol. (C) is the correct answer.

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

$$\frac{\sqrt{12}}{\sqrt{3}}=\frac{\sqrt{4\times 3}}{\sqrt{3}}=\frac{2\sqrt{3}}{\sqrt{3}}=2,$$

$$\sqrt{7}$$

$$\sqrt{81}=9,$$

7. Sol. (D) 0.4014001400014...

A number is irrational if and only of its decimal representation is non-terminating and

non- recurring.

(a) 0.14 is a terminating decimal and therefore cannot be an irrational number.

(b) $0.14\overline{16}$ is a non-terminating and recurring decimal therefore cannot be irrational.

(c) $0.14\overline{16}$ is a non-terminating and recurring decimal and therefore cannot be irrational.

(d) 0.4014001400014... is a non-terminating and non-recurring decimal and therefore is an

irrational number.

8. Sol. (C) is the correct answer.

We know that $\sqrt{2}$ = 1.4142135……. and $\sqrt{3}$ = 1.732050807……..

We see that 1.5 is a rational number which lies between

1.4142135…..and1.732050807…. Hence, (C) is the correct answer.

9. Sol. (C) is the correct answer.

Let $x = 1.999\ldots = 1.\overline{9}$ ….(1)

Then, $10x = 19.999\ldots = 19.\overline{9}$ ….(2)

Subtracting (1) and (2), we get

$$9x = 18 \Rightarrow x = 18 \div 9 = 2$$

∴ The value of 1.999…. in the form of p/q is 2/1 or Hence, (C) is the correct answer.

10 Sol. (C) is the correct answer.

Given

$$2\sqrt{3} + \sqrt{3} = (2+1)\sqrt{3} = 3\sqrt{3}$$

Hence, (C) is the correct answer

II: SHORT ANSWERS TYPE QUESTIONS (2 MARKS)

1. Simplify: $\sqrt{10} \times \sqrt{15}$
2. Rationalizing the Denominator $\frac{1}{\sqrt{7}-2}$

$$\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$$

3. Simplify:

4. If $x^{1/12} = 49^{1/24}$,then find the value of x.

5. Identify a rational number among the following numbers: $2 + \sqrt{2}$, $2\sqrt{2}$, 0 and π.

6. Simplify $\sqrt[4]{\sqrt[3]{2^2}}$

7. Find the value of $(256)^{0.16} \times (256)^{0.09}$

8. Find a rational number and an irrational number between the following:

   (i) 2 and 3

   (ii) 0 and 0.1

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

10. Simplify: $(\sqrt{2} + \sqrt{3})(\sqrt{2} - \sqrt{3})$

ANSWERS:

1. $5\sqrt{6}$ **2.** $(\sqrt{7}+2)/3$ **3.** 2 **4.** x= 7 **5.** 0 **6.** $2^{1/6}$ **7.** 4

8. Real numbers lies between given numbers **10.** -1

III: SHORT ANSWER TYPE QUESTIONS (3 MARKS)

Example: Show that 0.00323232……can be expressed in the form of p/q, where p and q are integers

and $q \neq 0$.

Let $x = 0.00323232\ldots$

$\Rightarrow x = 0.00\overline{32}$ ..... (1)

Multiplying both sides by 100 to equation (1), we ge

$100\,x = 0.\overline{32}$ ..... (2)

Multiplying both sides by 10000 to equation (1), we get

$10000\,x = 32.\overline{32}$ ..... (3)

Subtracting equation (2) from equation (3), we get

$10000\,x - 100x = 32.\overline{32} - 0.\overline{32}$

$\Rightarrow 9900x = 32$

$\Rightarrow x = \frac{32}{9900} = \frac{8}{2475}$

$\frac{7}{3\sqrt{3} - 2\sqrt{2}}$,

1. Rationalize:
2. If √2 = 1.4142, then find the **value of** $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}}$
3. Evaluate : $(\sqrt{5}+\sqrt{2})^2 + (\sqrt{8}-\sqrt{5})^2$
4. If $x = \frac{\sqrt{2}+1}{\sqrt{2}-1}$ and $y = \frac{\sqrt{2}-1}{\sqrt{2}+1}$, find the value of (x + y).
5. Show that 0.02353535……can be expressed in the form of p/q, where p and q are integers and q ≠ 0.

ANSWERS:

1. $\frac{7}{19}(3\sqrt{3}+2\sqrt{2})$ **2.** 0.4142 **3.** 20-3√10 **4.** 6 **5.** 47/1980

IV: LONG ANSWER TYPE QUESTIONS (5 MARKS)

Example : *If* $\frac{3+\sqrt{2}}{3-\sqrt{2}} = a + b\sqrt{2}$, find the value of a and b.

Sol: We have ,

$$\frac{3+\sqrt{2}}{3-\sqrt{2}} = \frac{3+\sqrt{2}}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{9+2+6\sqrt{2}}{9-2} = \frac{11+6\sqrt{2}}{7} = \frac{11}{7} + \frac{6\sqrt{2}}{7} \quad \text{.....(i)}$$

$$\frac{3+\sqrt{2}}{3-\sqrt{2}} = a + b\sqrt{2}$$

$$\frac{11}{7} + \frac{6\sqrt{2}}{7} = a + b\sqrt{2} \qquad \text{[using (i)]}$$

Equating rational and irrational parts, we get

a= 7/11 and b = 6/7

Q1. Prove that:

$$\frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}} = 1$$

Q2. If x = 3 + √7 , find the value of $\left(x + \frac{1}{x}\right)$.

Q3. Find the value of a and b in the following

$$\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + \frac{7}{11}\sqrt{5}\,b.$$

Q4. Show that:

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

ANSWERS:

2. 3/2 (3 + √7) 3. a= 0 and b = 1.

V: CASE STUDY BASED QUESTIONS. (4 marks)

Example: Two classmates Salma and Anil simplified two different expressions during

the revision hours and explained to each other their simplifications.

Salma explains simplification of $\frac{\sqrt{2}}{\sqrt{5}+\sqrt{3}}$ by rationalizing the denominator and

Anil explains simplifications of $(\sqrt{2}+\sqrt{3})(\sqrt{2}+\sqrt{3})$ by using the identity.

Answer the following question.

a. What is the conjugate of $\sqrt{5}+\sqrt{3}$

a. $\sqrt{5}+\sqrt{3}$ **b.** $\sqrt{5}-\sqrt{3}$ **c.** $\sqrt{5}$ **x** $\sqrt{3}$ **d.** $\sqrt{5}/\sqrt{3}$
Ans. b

b. By rationalizing the denominator of $\frac{\sqrt{2}}{\sqrt{5}+\sqrt{3}}$ Salma got the answer:

a. $\frac{\sqrt{2}}{\sqrt{5}-\sqrt{3}}$ ***b.*** $\frac{\sqrt{2}(\sqrt{5}-\sqrt{3})}{2}$ ***c.*** $\sqrt{5}-\sqrt{3}$ **d.** $\frac{\sqrt{2}(\sqrt{5}+\sqrt{3})}{2}$
Ans. **b**

c. Anil applied …… identity to solve $(\sqrt{2}+\sqrt{3})(\sqrt{2}+\sqrt{3})$

a. (a+b) (a+b) b. (a+b) (a-b) c. (a-b) (a-b) d. (x+a) (x+b)
Ans. **c**

d. $(\sqrt{2}+\sqrt{3})(\sqrt{2}+\sqrt{3})$ = **……**

a. -1 b. 1 c. 5 d. -5
Ans. **a**

Q1). One day Seema went two children's park for waling. She saw many children playing

with sea-saw, swings and other things. All of a sudden, she saw a line drawn on the

ground. There were many tick marks on the line at equal distance. She wrote '0' at the

centre point of the line, negative numbers on one side and positive numbers on the other

side of '0' point.

Sea-saw

Seema called a boy 'Sonu' and asked following questions:

i. In which side, you will write negative numbers to make it a number line?

ii. In which side, you will indicate Natural numbers?

iii. In which side, you will move to get a larger number?

iv. Which of the following irrational?
a.3.4567
b.1.010010001…
c.7.128128128….
d.√841

Q2) Two friends were given a project to tag the numbers given to them as R, IR which are short form for
rational number, irrational number respectively.

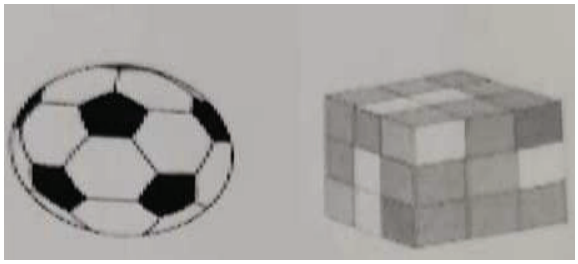
The numbers are: 1.707007000….., 1/5, √49, √2 and √3

$5.020020002\ldots,\ 3/4,\ \sqrt{7},\ \frac{\sqrt{54}}{\sqrt{6}},\ \frac{1}{2\sqrt{3}-\sqrt{11}}$ –

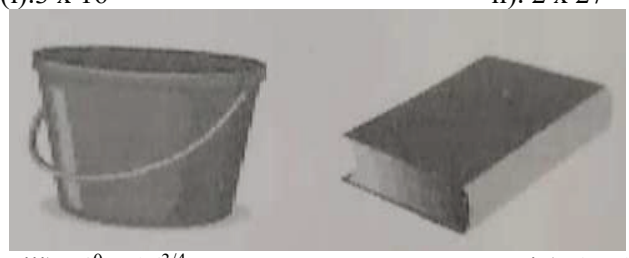
i) Identify rational and irrational numbers from the given numbers.
ii) Find two rational and two irrational number between √2 and √3.

iii) Rationalise: $\frac{1}{2\sqrt{3}-\sqrt{11}}$

Q3) A teacher show 4 articles of different lengths in classroom of standard IX. The difficulty is that the lengths are in exponentials form. The length of the articles are following:



(i).3 x $16^{3/4}$ ii). 2 x $27^{2/3}$



iii). 4^0 x $16^{3/4}$ iv). 2 x $9^{3/2}$ x 3^{-1}

i. The length of the first article is

a) 6 b) 12 c) 24 d) none of these

ii. The product of the lengths of second and third articles is

a) 148 b) 158 c) 144 d) none of these

iii. The product of the lengths of first and third articles is

a) 192 b) 144 c) 324 d) 432

iv. The ratio of the lengths of first and fourth articles is

a). 3:4 b) 4:3 c) 1:1 d) 4:9

v. Select those two articles, whose lengths are equal

a) 1st and 2nd b) 2nd and 3rd c) 2nd and 4th d) 1st and 3rd

ANSWERS:

1.(i) Left side (ii) Right side (iii) Left to right (iv) b

2. Irrational - 1.707007000… , 5.020020002…. ,$\sqrt{7}$, $\frac{1}{2\sqrt{3}-\sqrt{11}}$, $\sqrt{2}$ and $\sqrt{3}$

Rational - 1/5, $\sqrt{49}$, 3/4, $\frac{\sqrt{54}}{\sqrt{6}}$

(ii) real number lies between $\sqrt{2}$ and $\sqrt{3}$.

(iii) $2\sqrt{3} + \sqrt{11}$

3. (i) c (ii) c (iii) a (iv) b (v) c

VI : ASSERTION AND REASONING QUESTIONS

DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
A). Both assertion(A) and reason(R) are true and reason (R) is the correct explanation of assertion (A).
B). Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
C) .Assertion (A) is true but reason (R) is false.
D). Assertion (A) is false but reason (R) is true.

1. **Assertion:** Rational number lying between two rational numbers *x* and *y* is (x+y)/2.

Reason: There is one rational number lying between any two rational numbers.

2. **Assertion:** 5 is a rational number.
Reason: The square roots of all positive integers are irrationals.

3. Assertion: Sum of two irrational numbers 2+$\sqrt{3}$ and 4+$\sqrt{3}$ is irrational number.

Reason: Sum of two irrational numbers is always an irrational number.

4. Assertion: 2+$\sqrt{3}$ is an irrational number.
Reason : Sum of a rational number and an irrational numbers is always an irrational number.

5 Assertion: $11^3 \times 11^4 = 11^{12}$
Reason: If $a > 0$ be a real number and p and q be rational numbers. Then $a^p \times a^q = a^{p+q}$.

6. Assertion: $7^8 \div 7^4 = 7^4$

Reason: If $a > 0$ be a real number and p and q be rational numbers. Then $a^p \times a^q = a^{p+q}$.

7. **Assertion:** $\sqrt{5}$ is an irrational number.

Reason: A number is called irrational, if it cannot be written in the form of p/q, where p and q are integers and $q \neq 0$.

8. **Assertion:** 0.329 is a terminating decimal.

Reason: A decimal in which a digit or a set of digits is repeated periodically, is called a

repeating, or a recurring, decimal.

9 **Assertion:** The rationalizing factor of $3+2\sqrt{5}$ is $3-2\sqrt{5}$.
Reason: If the product of two irrational numbers is rational then each one is called the rationalising factor of the other.

10. **Assertion:** 0.7 and 0.00323232….. are rational numbers**.**
Reason: If the decimal expansion of a real number is either terminating or non - terminating recurring , it is a rational number.

ANSWERS:

1. We know that there are infinitely many rational numbers between any two given rational numbers.
So, Reason is not correct.
One of the rational number lying between two rational numbers x and y is (x+y)/2.

So, Assertion is correct. **Correct option: (C)** Assertion (A) is true but reason (R) is false

2. Here reason is not true. Example $\sqrt{4} = \pm 2$, which is not an irrational number.

Correct option: (C) Assertion (A) is true but reason (R) is false.

3. Here, $(2 + \sqrt{3}) + (4+\sqrt{3}) = 6 + 2\sqrt{3}$ which is an irrational number.

So, Assertion is correct.

Now, $2 + \sqrt{3}$ and $4 - \sqrt{3}$ are two irrational numbers Sum = $(2+\sqrt{3}) + (4-\sqrt{3}) = 6$ which is a rational number. So, Reason is not correct.

Correct option: (C) Assertion (A) is true but reason (R) is false.

4. **Correct option**: **(A)** Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

5. **Correct option: (D)** Assertion (A) is false but reason (R) is true.

6. **Correct option: (B)** Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)

7.Correct option: (A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

8.Correct option: (B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

9.Correct option: **(A)** Both assertion (A)and reason(R) are true and reason (R) is the correct explanation of assertion (A).

10.Correct option: (A) Both assertion (A) and reason (R) are true and reason (R) is the

correct explanation of assertion (A).

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