

Real Numbers



Competency Based Questions



◆ Multiple Choice Questions

1. The decimal form of $\frac{129}{2 \times 5 \times 7}$ is

- (a) terminating
(b) non-terminating repeating
(c) non-terminating non-repeating
(d) none of the above

Ans. (b) non-terminating repeating

2. HCF of 8, 9, 25 is

- (a) 8 (b) 9 (c) 25 (d) 1

Ans. (d) 1

3. Which of the following is not irrational?

- (a) $(2 - \sqrt{3})^2$ (b) $(\sqrt{2} + \sqrt{3})^2$
(c) $(\sqrt{2} - \sqrt{3})(\sqrt{2} + \sqrt{3})$
(d) $\frac{2\sqrt{7}}{7}$

Ans. (c) $(\sqrt{2} - \sqrt{3})(\sqrt{2} + \sqrt{3})$

4. The product of a rational and irrational number is

- (a) rational (b) irrational
(c) both of above (d) none of above

Ans. (b) irrational

5. The sum of a rational and irrational number is

- (a) rational (b) irrational
(c) both of above (d) none of above

Ans. (b) irrational

6. The product of two different irrational numbers is always

- (a) rational (b) irrational
(c) rational or irrational (d) none of above

Ans. (c) rational or irrational

7. The sum of two irrational numbers is always

- (a) irrational (b) rational
(c) rational or irrational (d) one

Ans. (a) irrational

8. If $b = 3$, then any integer can be expressed as $a =$

- (a) $3q, 3q + 1, 3q + 2$ (b) $3q$
(c) none of the above (d) $3q + 1$

Ans. (a) $3q, 3q + 1, 3q + 2$

9. The product of three consecutive positive integers is divisible by

- (a) 4 (b) 6
(c) no common factor (d) only 1

Ans. (b) 6

10. The set $A = \{0, 1, 2, 3, 4, \dots\}$ represents the set of

- (a) whole numbers (b) integers
(c) natural numbers (d) even numbers

Ans. (a) whole numbers

11. Which number is divisible by 11?

- (a) 1516 (b) 1452 (c) 1011 (d) 1121

Ans. (b) 1452

12. LCM of the given number 'x' and 'y' where y is a multiple of 'x' is given by

- (a) x (b) y (c) xy (d) $\frac{x}{y}$

Ans. (b) y

13. The largest number that will divide 398, 436 and 542 leaving remainders 7, 11 and 15 respectively is

- (a) 17 (b) 11
(c) 34 (d) 45

Ans. (a) 17

Explanation:

Algorithm $398 - 7 = 391$; $436 - 11 = 425$; $542 - 15 = 527$

$\therefore$ HCF of 391, 425, 527 = 17

14. There are 312, 260 and 156 students in class X, XI and XII respectively. Buses are to be hired to take these students to a picnic. Find the

maximum number of students who can sit in a bus if each bus takes equal number of students

- (a) 52 (b) 56 (c) 48 (d) 63

Ans. (a) 52

Explanation: HCF of 312, 260, 156 = 52

15. There is a circular path around a sports field. Priya takes 18 minutes to drive one round of the field. Harish takes 12 minutes. Suppose they both start at the same point and at the same time and go in the same direction. After how many minutes will they meet ?

- (a) 36 minutes (b) 18 minutes
(c) 6 minutes (d) They will not meet

Ans. (a) 36 minutes

Explanation: LCM of 18 and 12 = 36

16. Express 98 as a product of its primes

- (a) $2^2 \times 7$ (b) $2^2 \times 7^2$
(c) 2×7^2 (d) $2^3 \times 7$

Ans. (c) 2×7^2

17. Three farmers have 490 kg, 588 kg and 882 kg of wheat respectively. Find the maximum capacity of a bag so that the wheat can be packed in exact number of bags.

- (a) 98 kg (b) 290 kg (c) 200 kg (d) 350 kg

Ans. (a) 98 kg

Explanation: HCF of 490, 588, 882 = 98 kg

18. For some integer p , every even integer is of the form

- (a) $2p + 1$ (b) $2p$ (c) $p + 1$ (d) p

Ans. (b) $2p$

19. For some integer p , every odd integer is of the form

- (a) $2p + 1$ (b) $2p$ (c) $p + 1$ (d) p

Ans. (a) $2p + 1$

20. $m^2 - 1$ is divisible by 8, if m is

- (a) an even integer (b) an odd integer
(c) a natural number (d) a whole number

Ans. (b) an odd integer

21. If two positive integers A and B can be expressed as $A = xy^3$ and $B = x^4y^2z$; x, y being prime numbers, the LCM (A, B) is

- (a) xy^2 (b) x^4y^2z (c) x^4y^3 (d) x^4y^3z

Ans. (d) x^4y^3z

22. The product of a non-zero rational and an irrational number is

- (a) always rational (b) rational or irrational
(c) always irrational (d) zero

Ans. (c) always irrational

23. If two positive integers A and B can be expressed as $A = xy^3$ and $B = x^4y^2z$; x, y being prime numbers then HCF (A, B) is

- (a) xy^2 (b) x^4y^2z (c) x^4y^3 (d) x^4y^3z

Ans. (a) xy^2

24. The largest number which divides 60 and 75, leaving remainders 8 and 10 respectively, is

- (a) 260 (b) 75 (c) 65 (d) 13

Ans. (d) 13

25. The least number that is divisible by all the numbers from 1 to 5 (both inclusive) is

- (a) 5 (b) 60 (c) 20 (d) 100

Ans. (b) 60

Explanation: LCM of 2, 3, 4, 5 = 60

26. The least number that is divisible by all the numbers from 1 to 8 (both inclusive) is

- (a) 840 (b) 2520 (c) 8 (d) 420

Ans. (a) 840

27. The decimal expansion of the rational number $\frac{14587}{250}$ will terminate after:

- (a) one decimal place (b) two decimal places
(c) three decimal places
(d) four decimal places

Ans. (c) three decimal places

28. The decimal expansion of the rational number $\frac{97}{2 \times 5^4}$ will terminate after:

- (a) one decimal place
(b) two decimal places
(c) three decimal places
(d) four decimal places

Ans. (d) four decimal places

29. The product of two consecutive natural numbers is always:

- (a) prime number (b) even number
(c) odd number (d) even or odd

Ans. (b) even number

30. If the HCF of 408 and 1032 is expressible in the form $1032 \times 2 + 408 \times p$, then the value of p is

- (a) 5 (b) -5 (c) 4 (d) -4

Ans. (b) -5

Explanation: HCF of 408 and 1032 is 24,
 $\therefore 1032 \times 2 + 408 \times (-5)$

31. The number in the form of $4p + 3$, where p is a whole number, will always be

- (a) even (b) odd
(c) even or odd (d) multiple of 3

Ans. (b) odd

32. When a number is divided by 7, its remainder is always:

- (a) greater than 7 (b) at least 7
(c) less than 7 (d) at most 7

Ans. (c) less than 7

33. $(6 + 5\sqrt{3}) - (4 - 3\sqrt{3})$ is

- (a) a rational number (b) an irrational number
(c) a natural number
(d) an integer

Ans. (b) an irrational number

34. If HCF (16, y) = 8 and LCM (16, y) = 48, then the value of y is

- (a) 24 (b) 16 (c) 8 (d) 48

Ans. (a) 24

35. According to the fundamental theorem of arithmetic, if T (a prime number) divides b^2 , $b > 0$, then

- (a) T divides b (b) b divides T
(c) T^2 divides b^2 (d) b^2 divides T^2

Ans. (a) T divides b

36. The number ' π ' is

- (a) natural number
(b) rational number
(c) irrational number
(d) rational or irrational

Ans. (c) irrational number

37. If $\text{LCM}(77, 99) = 693$, then $\text{HCF}(77, 99)$ is

- (a) 11 (b) 7 (c) 9 (d) 22

Ans. (a) 11

38. Euclid's division lemma states that for two positive integers a and b , there exist unique integer q and r such that $a = bq + r$, where r must satisfy

- (a) $a < r < b$ (b) $0 < r \leq b$
(c) $1 < r < b$ (d) $0 \leq r < b$

Ans. (d) $0 \leq r < b$

◆ Assertion-Reason 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: $\frac{13}{3125}$ is a terminating decimal fraction.

Reason: If $q = 2^n \cdot 5^m$ where n and m are non-negative integers, then $\frac{p}{q}$ is a terminating decimal fraction.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Explanation: Since the factors of the denominator 3125 is of the form $2^0 \times 5^5$, $\frac{13}{3125}$ is a terminating decimal fraction.

2. Assertion: A number N when divided by 15 gives the remainder 2. Then the remainder is same when N is divided by 5.

Reason: $\sqrt{3}$ is an irrational number.

Ans. (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Explanation: Let we take three numbers which are divisible by 5 and 15 both, are 30, 45, 60.

Now, we add the remainder 2, we get 32, 47, 62

Therefore, we can see that as one numbers are divisible by 5 & 15 but remainder is same as 2.

3. Assertion: Denominator of 34.12345 . When expressed in the form $\frac{p}{q}$, $q \neq 0$, is of the form

$2^m \times 5^n$, where m and n are non-negative integers.

Reason: 34.12345 is a terminating decimal fraction.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Explanation: Reason is clearly true.

$$\text{Here, } 34.12345 = \frac{3412345}{100000} = \frac{682469}{20000} = \frac{682469}{2^5 \times 5^4}$$

Its denominator is of the form $2^m \times 5^n$.

...[Here $m = 5$ and $n = 4$ are non-negative integers.]

4. Assertion: When a positive integer a is divided by 3, the values of remainder can be 0, 1 or 2.

Reason: According to Euclid's Division Lemma $a = bq + r$, where $0 \leq r < b$ and r is an integer.

Ans. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Explanation: Given positive integers A and B , there exists unique integers Q and R satisfying $a = bq + r$, where $0 \leq r < b$.

This is known as Euclid's Division Lemma.

5. Assertion: The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.

Reason: If a and b are two positive integers, then $\text{H.C.F.} \times \text{L.C.M.} = a \times b$.

Ans. (d) Assertion (A) is false but Reason (R) is true.

Explanation: Since $\text{HCF} \times \text{LCM} = a \times b$

$$\Rightarrow 3072 = 16 \times 162$$

$$\therefore 3072 \neq 2592$$

◆ Case Based Questions

I. To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections—section A and Section B of grade X. There are 32 students in Section A and 36 students in Section B.



(i) What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B?

- (a) 144 (b) 128 (c) 288 (d) 272
 Ans. (c) 288

Explanation: L.C.M of 32 and 36;
 $32 = 2^5$; $36 = 2^2 \times 3^2$
 $\therefore \text{L.C.M} = 2^5 \times 3^2 = 288$

- (ii) If the product of two positive integers is equal to the product of their HCF and LCM is true then, the HCF (32, 36) is

- (a) 2 (b) 4 (c) 6 (d) 8
 Ans. (b) 4

Explanation: $\text{H.C.F} \times \text{L.C.M} = 32 \times 36$

$$\text{H.C.F} = \frac{32 \times 36}{\text{L.C.M}} = \frac{1152}{288} = 4$$

$\therefore \text{H.C.F} = 4$

- (iii) 36 can be expressed as a product of its primes as
 (a) $2^2 \times 3^2$ (b) $2^1 \times 3^3$ (c) $2^3 \times 3^1$ (d) $2^0 \times 3^0$

- Ans. (a) $2^2 \times 3^2$

- (iv) $7 \times 11 \times 13 \times 15 + 15$ is a

- (a) Prime number
 (b) Composite number
 (c) Neither prime nor composite
 (d) None of the above

- Ans. (b) Composite number

- (v) If p and q are positive integers such that $p = ab^2$ and $q = a^2b$, where a and b are prime numbers, then the LCM (p, q) is

- (a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3

- Ans. (b) a^2b^2

- II. A seminar is being conducted by an Educational Organisation, where the participants will be educators of different subjects. The number of participants in Hindi, English and Mathematics are 60, 84 and 108 respectively.



- (i) In each room the same number of participants are to be seated and all of them being in the same subject, hence maximum number of participants that can accommodated in each room are

- (a) 14 (b) 12 (c) 16 (d) 18

- Ans. (b) 12

Explanation: $H \rightarrow 60$; $E \rightarrow 84$; $M \rightarrow 108$

H.C.F of 60, 84 and 108

$$60 = 2^2 \times 3 \times 5; \quad 84 = 2^2 \times 3 \times 7; \quad 108 = 2^2 \times 3^3$$

$$\text{H.C.F} = 2^2 \times 3 = 12$$

- (ii) What is the minimum number of rooms required during the event?

- (a) 11 (b) 31 (c) 41 (d) 21

- Ans. (d) 21

Explanation: $\frac{60}{12} + \frac{84}{12} + \frac{108}{12} = 5 + 7 + 9 = 21$

- (iii) The LCM of 60, 84 and 108 is

- (a) 3780 (b) 3680 (c) 4780 (d) 4680

- Ans. (a) 3780

Explanation: $\text{L.C.M} = 2^2 \times 3^3 \times 5 \times 7 = 3780$

- (iv) The product of HCF and LCM of 60, 84 and 108 is

- (a) 55360 (b) 35360 (c) 45500 (d) 45360

- Ans. (d) 45360

Explanation: $12 \times 3780 = 45360$

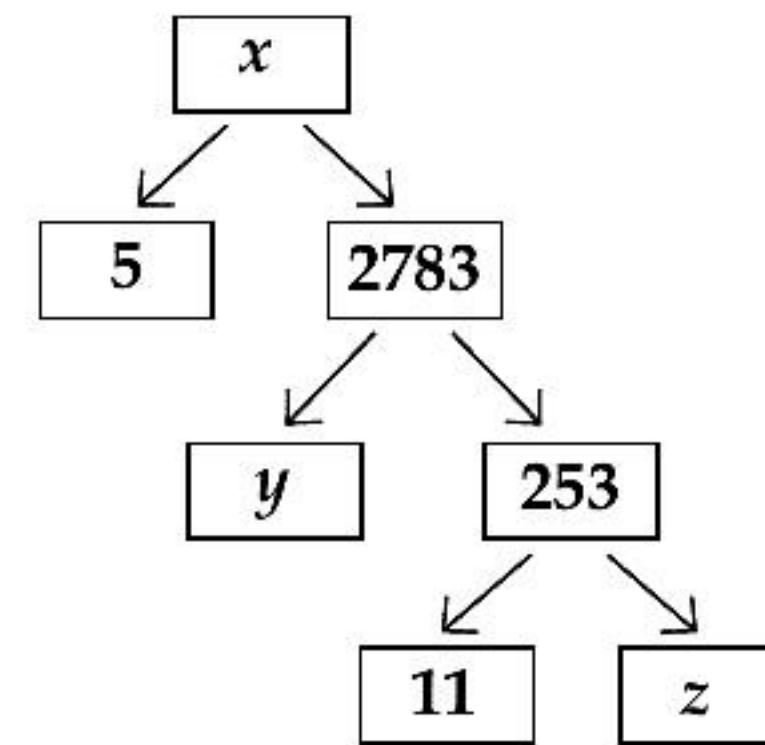
- (v) 108 can be expressed as a product of its primes as

- (a) $2^3 \times 3^2$ (b) $2^3 \times 3^3$ (c) $2^2 \times 3^2$ (d) $2^2 \times 3^3$

- Ans. (d) $2^2 \times 3^3$

- III. A Mathematics Exhibition is being conducted in your School and one of your friends is making a model of a factor tree. He has some difficulty and asks for your help in completing a quiz for the audience.

Observe the following factor tree and answer the following:



- (i) What will be the value of x ?

- (a) 15005 (b) 13915 (c) 56920 (d) 17429

- Ans. (b) 13915

Explanation: Value of $x = 2783 \times 5 = 13915$

- (ii) What will be the value of y ?

- (a) 23 (b) 22 (c) 11 (d) 19

- Ans. (c) 11

Explanation: $253y = 2783 \quad \therefore y = \frac{2783}{253} = 11$

- (iii) What will be the value of z ?

- (a) 22 (b) 23 (c) 17 (d) 19

- Ans. (b) 23

Explanation: $11z = 253 \Rightarrow z = \frac{253}{11} = 23$
 $\therefore z = 23$

- (iv) According to Fundamental Theorem of Arithmetic 13915 is a

- (a) Composite number
 (b) Prime number
 (c) Neither prime nor composite
 (d) Even number

- Ans. (a) Composite number

- (v) The prime factorisation of 13915 is

- (a) $5 \times 11^2 \times 13^2$
 (b) $5 \times 11^3 \times 23^2$
 (c) $5 \times 11^2 \times 23$
 (d) $5 \times 11^3 \times 13^2$

- Ans. (c) $5 \times 11^2 \times 23$

IV. For 71th republic day Parade on 26/01/2021 in Delhi, Captain RS Meel is planning for parade of following two groups: (1) First group of Army contingent of 624 members behind an army band of 32 members. (2) Second group of CRPF troops with 468 soldiers behind the 228 members of bikers. These two groups are to march in the same number of columns. This sequence of soldiers is followed by jhankis of difference states which are showing the culture of the respective states.

(i) What is the maximum number of columns in which the army troops can march?

- (a) 8 (b) 16 (c) 4 (d) 32

Ans. (b) 16

(ii) What is the maximum number of columns in which the CRPF troops can march?

- (a) 4 (b) 8 (c) 12 (d) 16

Ans. (c) 12

Explanation: HCF of 624, 468 and 228

(iii) What is the maximum number of columns in which total army troops and CRPF troops together can march past?

- (a) 2 (b) 4 (c) 6 (d) 8

Ans. (b) 4

Explanation: HCF of 228 and 32

(iv) What should be subtracted from the numbers of CRPF soldiers and the number of bikers so that their maximum number of columns is equal to the maximum number of columns of army troops?

- (a) 4 Soldiers and 4 Bikers
(b) 4 Soldiers and 2 Bikers
(c) 2 Soldiers and 4 Bikers
(d) 2 Soldiers and 2 Bikers

Ans. (a) 4 Soldiers and 4 Bikers

Explanation: Maximum no. of columns of army troops = 16 (from point (i)). But 228 and 468 are not divisible by 16. If we subtract 4 from 228 and 468, both 224 and 464 are divisible by 16.

(v) What should be added with the number of CRPF soldiers and the number of bikers so that their maximum number of columns is equal to the maximum number of columns of army troops?

- (a) 4 Soldiers and 4 Bikers
(b) 12 Soldiers and 12 Bikers
(c) 6 Soldiers and 6 Bikers
(d) 12 Soldiers and 6 Bikers

Ans. (b) 12 Soldiers and 12 Bikers

V. In a classroom activity on real numbers, the students have to pick a number card from a pile and frame question on it if it is not a rational

number for the rest of the class. The number cards picked up by first 5 students and their questions on the numbers for the rest of the class are as shown below. Answer them:

(i) Suraj picked up $\sqrt{8}$ and his question was: Which of the following is not irrational?

- (a) It is a natural number.
(b) It is an irrational number.
(c) It is a rational number.
(d) None of these.

Ans. (b) It is an irrational number.

Explanation: Here, $\sqrt{8} = 2\sqrt{2}$ i.e., product of rational and irrational numbers = irrational number

(ii) Shreya picked up 'BONUS' and her question was. Which of the following is not irrational?

- (a) $3 - 4\sqrt{5}$
(b) $\sqrt{7} - 6$
(c) $2 + 2\sqrt{9}$
(d) $4\sqrt{11} - 6$

Ans. (c) $2 + 2\sqrt{9}$

Explanation: Here, $\sqrt{9} = 3$

So, $2 + 2\sqrt{9} = 2 + 6 = 8$, which is not irrational.

(iii) Ananya picked up $\sqrt{5} - \sqrt{10}$ and her question was $\sqrt{5} - \sqrt{10}$ is _____ number.

- (a) a natural
(b) an irrational
(c) a whole
(d) a rational

Ans. (b) an irrational

Explanation: Here $\sqrt{5}$ and $\sqrt{10}$ are both irrational and difference of two irrational numbers is also irrational.

(iv) Suman picked up $\frac{1}{\sqrt{5}}$ and her question was: $\frac{1}{\sqrt{5}}$ is _____ number.

- (a) a whole
(b) a rational
(c) an irrational
(d) a natural

Ans. (c) an irrational

Explanation: As $\sqrt{5}$ is irrational, so its reciprocal is also irrational.

(v) Preethi picked up $\sqrt{6}$ and her question was. Which of the following is not irrational?

- (a) $15 + 3\sqrt{6}$
(b) $\sqrt{24} - 9$
(c) $5\sqrt{150}$
(d) None of these

Ans. (d) None of these

Explanation: We know that $\sqrt{6}$ is irrational.

So, $15 + 3\sqrt{6}$ is irrational.

Similarly, $\sqrt{24} - 9 = 2\sqrt{6}$ is irrational.

and $5\sqrt{150} = 5 \times 5\sqrt{6} = 25\sqrt{6}$ is irrational.