1. Real Numbers - Board Exam Questions

The detailed solution for all the questions can be found at pschool.in/math/ncert/g10/chap-1

1 Mark Questions (MCQ)

1) The HCF of 960 and 432 is:
2) The natural number 2 is:
   (a) a prime number (b) a composite number
   (c) prime as well as composite
   (d) neither prime nor composite
3) For any natural number n, 6^n ends with the digit:
4) The LCM of 960 and 240 is:
5) The natural number 1 is:
   (a) a prime number (b) a composite number
   (c) prime as well as composite
   (d) neither prime nor composite
6) For any natural number n, 5^n ends with the digit:
7) (3 × 11 × 13 + 3) is:
   (a) a prime number (b) divisible by 13
   (c) a composite number (d) an odd number
8) The greatest number which divides both 134 and 188, leaving remainders 4 and 6 respectively, is:
9) If HCF(98, 28) = m and LCM(98, 28) = n, then the value of n − 7m is:
10) If $(-1)^n + (-1)^8 = 0$, then n is:
    (a) any positive integer
    (b) any negative integer
    (c) any odd number (d) any even number
11) Which of the following is a rational number between $\sqrt{3}$ and $\sqrt{5}$?
    (a) 1.4142387954012... (b) $2.32\overline{6}$
    (c) π (d) 1.857142
12) The least number which is a perfect square and is divisible by

each of 16, 20 and 50, is:

13) The sum of the exponents of prime factors in the prime factorisation of 4004 is:

14) The HCF of 40, 110 and 360 is:

15) If x is the LCM of 4, 6, 8 and y is the LCM of 3, 5, 7 and p is the LCM of x and y, then which of the following is true?
(a) p = 35x (b) p = 4y
(c) p = 8x (d) p = 16y

16) If $x = ab^3$ and $y = a^3b$, where a and b are prime numbers, then [HCF(x, y) − LCM(x, y)] is equal to:

17) $\left(1+\sqrt{3}\right)^2 - \left(1-\sqrt{3}\right)^2$ is:
(a) a positive rational number
(b) a negative integer
(c) a positive irrational number
(d) a negative irrational number

18) $\left(\sqrt{3}+2\right)^2 + \left(\sqrt{3}-2\right)^2$ is a/an
(a) positive rational number
(b) negative rational number
(c) positive irrational number
(d) negative irrational number

19) Let $x = a^2b^3c^n$ and $y = a^3b^mc^2$, where a, b, c are prime numbers. If LCM of x and y is $a^3b^4c^3$, then the value of m + n is

20) For any prime number p, if p divides a^2, where a is any real number then p also divides
(a) a (b) $a^{\frac{1}{2}}$
(c) $a^{\frac{3}{2}}$ (d) $a^{\frac{1}{8}}$

21) $\sqrt{0.4}$ is a/an
(a) natural number (b) integer
(c) rational number (d) irrational number

22) Which of the following cannot be the unit digit of 8^n, where n is a natural number?
(a) 4 (b) 2
(c) 0 (d) 6

23) If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM (a, b, c) = 3780, then x is equal to

24) The sum of two numbers is 1215 and their HCF is 81, then the possible pairs of such numbers are

25) If two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$, where a and b are prime numbers, then LCM (p, q) is:

26) If the HCF (2520, 6600) = 40 and LCM (2520, 6600) = 252 × k, then the value of k is

27) A pair of irrational numbers whose product is a rational number is:
(a) $(\sqrt{16}, \sqrt{4})$ (b) $(\sqrt{5}, \sqrt{2})$
(c) $(\sqrt{3}, \sqrt{27})$ (d) $(\sqrt{36}, \sqrt{2})$

28) The HCF of two numbers 65 and 104 is 13. If LCM of 65 and 104 is 40x, then the value of x is:

29) The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is:

30) The LCM of three numbers 28, 44, 132 is:

31) If the product of two co-prime numbers is 553, then their HCF is:

32) If 'p' and 'q' are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q'?

33) The ratio of HCF to LCM of the least composite number and the least prime number is:

34) If $p^2 = \dfrac{32}{50}$, then p is a/an
(a) whole number (b) integer
(c) rational number (d) irrational number

35) If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x, y are prime numbers, then the result obtained by dividing the product of the positive integers by the LCM(a, b) is

36) Let a and b be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where p and q are prime numbers. If HCF$(a, b) = p^mq^n$ and LCM$(a, b) = p^rq^s$, then $(m + n)(r + s) =$

Assertion and Reason

1) ASSERTION (A): $(\sqrt{3}+\sqrt{5})$ is an irrational number.
REASON (R): Sum of the any two irrational numbers is always irrational.

2) ASSERTION (A): H.C.F. $(36m^2, 18m)$ = 18m, where m is a prime number.
REASON (R): H.C.F. of two numbers is always less than or equal to the smaller number.

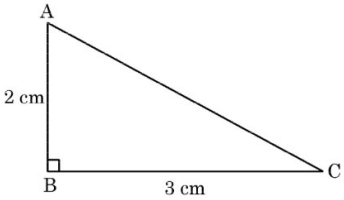
3) ASSERTION (A): 4^n ends with digit 0 for some natural number n.
REASON (R): For a number 'x' having 2 and 5 as its prime factors, x^n always ends with digit 0 for every natural number n.

4) ASSERTION (A): For any two prime numbers p and q, their HCF is 1 and LCM is p + q.
REASON (R): For any two natural numbers, HCF × LCM = product of numbers.

5) ASSERTION (A): The number 5^n cannot end with the digit 0, where n is a natural number.
REASON (R): A number ends with 0, if its prime factorization contains both 2 and 5.

6) ASSERTION (A): HCF of any two consecutive even natural numbers is always 2.
REASON (R): Even natural numbers are divisible by 2.

7) ASSERTION (A): The perimeter of △ABC is a rational number.
REASON (R): The sum of the squares of two rational numbers is always rational.



8) ASSERTION (A): The number 5^n cannot end with the digit 0, where n is a natural number.
REASON (R): Prime factorisation of 5 has only two factors, 1 and 5.

9) ASSERTION (A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
REASON (R): HCF is always a factor of LCM.

2 Mark Questions

1) Using prime factorisation, find HCF and LCM of 96 and 120.
2) Find the HCF and LCM of 72 and 120.
3) Find the H.C.F and L.C.M of 480 and 720 using the Prime factorisation method.
4) Find the smallest number which is divisible by both 644 and 462.
5) Two numbers are in the ratio 2 : 3 and their LCM is 180. What is the HCF of these numbers?
6) Two numbers are in the ratio 4 : 5 and their HCF is 11. Find the LCM of these numbers.
7) The H.C.F of 85 and 238 is expressible in the form $85m - 238$. Find the value of m.
8) If the HCF of 210 and 55 is expressed as 210 × 5 + 55m, then find the value of m.
9) Find the length of the plank that can be used to measure the lengths 4 m 20 cm and 5 m 4 cm exactly, in the least time.
10) A hall has a length of 9.75 m, breadth of 6.75 m and height of 5.25 m. What is the length of the longest unmarked ruler that can exactly measure the dimensions of the hall?
11) Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.
12) Three bells toll at intervals of 9, 12 and 15 minutes respectively. If they start tolling together, after what time will they next toll together?
13) There are three bells placed at different swings in a park, which toll at intervals of 5, 6 and 8 minutes, respectively. They all toll together when the park opens for the visitors at 10:00 a.m. How many more times do they all toll together till the park is closed at 7:00 p.m.?
14) Show that the number 5×11×17+3×11 is a composite number.
15) Can the number $(15)^n$, n being a natural number, end with the digit 0? Give reasons.
16) Show that 6^n can not end with digit 0 for any natural number 'n'.

17) Prove that $\sqrt{2}$ is an irrational number.

18) Prove that $2+\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

19) Prove that $2+3\sqrt{5}$ is an irrational number given that $\sqrt{5}$ is irrational number.

20) Prove that $2-5\sqrt{3}$ is an irrational number given that $\sqrt{3}$ is irrational.

21) Prove that $5-2\sqrt{3}$ is an irrational number. It is given that $\sqrt{3}$ is an irrational number.

3 Mark Questions

1) Prove that $\sqrt{2}$ is an irrational number.

2) Prove that $\sqrt{3}$ is an irrational number.

3) Prove that $\sqrt{5}$ is an irrational number.

4) Prove that $\dfrac{1}{\sqrt{5}}$ is an irrational number.

5) Given that $\sqrt{3}$ is irrational, prove that $5+2\sqrt{3}$ is irrational.

6) Given that $\sqrt{3}$ is irrational number, prove that $(2+3\sqrt{3})$ is an irrational number.

7) Prove that $\left(5\sqrt{3}+\dfrac{2}{3}\right)$ is an irrational number given that $\sqrt{3}$ is an irrational number.

8) Prove that $\dfrac{2-\sqrt{3}}{5}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

9) Prove that $\left(\sqrt{2}+\sqrt{3}\right)^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number.

10) Find by prime factorisation the LCM of the numbers 18180 and 7575. Also, find the HCF of the two numbers.

11) Find the HCF and LCM of 26, 65 and 117, using prime factorisation.

12) Let x and y be two distinct prime numbers and $p=x^2y^3$, $q=xy^4$, $r=x^5y^2$. Find the HCF and LCM of p, q and r. Further check if

$\text{HCF}(p, q, r) \times \text{LCM}(p, q, r) = p \times q \times r$ or not.

13) Find the greatest number less than 10,000 which is exactly divisible by 48, 60 and 65.

14) The dimensions of a window are 156 cm × 216 cm. Arjun wants to put grill on the window creating complete squares of maximum size. Determine the side length of the square and hence find the number of squares formed.

15) In a workshop, the number of teachers of English, Hindi and Science are 36, 60 and 84 respectively. Find the minimum number of rooms required, if in each room the same number of teachers are to be seated and all of them being of the same subject.

16) In a teachers' workshop, the number of teachers teaching French, Hindi and English are 48, 80 and 144 respectively. Find the minimum number of rooms required if in each room the same number of teachers are seated and all of them are of the same subject.

17) National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?

18) Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again?

19) The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change together next?

20) State true or false for each of the following statements and justify in each case: (i) 2 × 3 × 5 × 7 + 7 is a composite number.

(ii) 2 × 3 × 5 × 7 + 1 is a composite number.

21) Let p, q and r be three distinct prime numbers. Check whether $p \cdot q \cdot r + q$ is a composite number or not. Further, give an example for 3 distinct primes p, q, r such that (i) $p \cdot q \cdot r + 1$ is a composite number. (ii) $p \cdot q \cdot r + 1$ is a prime number.

4 Mark Questions

1) Teaching Mathematics through activities is a powerful approach that enhances students' understanding and engagement. Keeping this in mind, Ms. Mukta planned a prime number game for class 5 students. She announces the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way by multiplying to a prime number, the last student got 173250.
(i) What is the least prime number used by students? (1)
(ii) (a) How many students are in the class? (2)
OR (b) What is the highest prime number used by students?
(iii) Which prime number has been used maximum times? (1)