

Real Numbers

Previous Years' CBSE Board Questions

1.1 Introduction

MCQ

1. The total number of factors of a prime number is
(a) 1 (b) 0 (c) 2 (d) 3
(2020) (U)

1.2 The Fundamental Theorem of Arithmetic

MCQ

2. The ratio of HCF to LCM of the least composite number and the least prime number is
(a) 1:2 (b) 2:1
(c) 1:1 (d) 1:3 (2023)
3. If $\text{HCF}(39, 91) = 13$, then $\text{LCM}(39, 91)$ is
(a) 91 (b) 273 (c) 39 (d) 3549
(Term I, 2021-22) (Ap)
4. Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers, is
(a) 2 (b) 3 (c) 4 (d) 1
(Term I, 2021-22) (Ev)
5. If 'n' is any natural number, then $(12)^n$ cannot end with the digit
(a) 2 (b) 4 (c) 8 (d) 0
(Term I, 2021-22)
6. The number 385 can be expressed as the product of prime factors as
(a) $5 \times 11 \times 13$ (b) $5 \times 7 \times 11$
(c) $5 \times 7 \times 13$ (d) $5 \times 11 \times 17$
(Term I, 2021-22)
7. The HCF and the LCM of 12, 21 and 15 respectively, are
(a) 3, 140 (b) 12, 420
(c) 3, 420 (d) 420, 3 (2020) (Ap)

VSA (1 mark)

8. The LCM of two numbers is 182 and their HCF is 13. If one of the numbers is 26, find the other. (2020)
9. The LCM of two numbers is 9 times their HCF. The sum of LCM and HCF is 500. Find the HCF of the two numbers. (2019C) (Ap)

10. If $\text{HCF}(336, 54) = 6$, find $\text{LCM}(336, 54)$. (2019) (Ap)
11. The HCF of two numbers a and b is 5 and their LCM is 200. Find the product ab . (AI 2019)
12. What is the HCF of smallest prime number and the smallest composite number? (2018)
13. Show that any number of the form 6^n , where $n \in \mathbb{N}$ can never end with digit 0. (Board Term I, 2017) (An)
14. The HCF of two numbers is 27 and their LCM is 162, if one of the number is 54, find the other number. (Board Term I, 2017) (Ap)
15. The LCM of two numbers is 2079 and their HCF is 27. If one of the number is 297. Find the other number. (Board Term I, 2015)

SA I (2 marks)

16. Find the least number which when divided by 12, 16 and 24 leaves remainder 7 in each case. (2023)
17. Two numbers are in the ratio 2 : 3 and their LCM is 180. What is the HCF of these numbers? (2023)
18. Explain why $2 \times 3 \times 5 + 5$ and $5 \times 7 \times 11 + 7 \times 5$ are composite numbers. (2021C) (U)
19. If HCF of 65 and 117 is expressible in the form $65n - 117$, then find the value of n . (2019)
20. Find the HCF of 612 and 1314 using prime factorisation. (AI 2019) (Ap)
21. Express 5050 as product of its prime factors. Is it unique? (Board Term I, 2017)
22. Show that the numbers 231 and 396 are not co-prime. (Board Term I, 2017)

SA II (3 marks)

23. Find HCF and LCM of 404 and 96 and verify that $\text{HCF} \times \text{LCM} = \text{Product of the two given numbers}$. (2018) (An)
24. An army contingent of 678 soldiers is to march behind an army band of 36 members in a Republic Day parade. The two groups are to march in the same number of columns. What is the maximum number of columns they can march? (Board Term I, 2017)
25. On a morning walk, three persons steps off together and their steps measure 40 cm, 42 cm, and 45 cm respectively. What is the minimum distance each

should walk so that each can cover same distance in complete steps? (Board Term I, 2015) (Ap)

LA (4/5/6 marks)

26. A sweet shopkeeper prepares 396 gulab jamuns and 342 ras-gullas. He packs them into containers. Each container consists of either gulab jamun or ras-gullas but have equal number of pieces. Find the number of pieces he should put in each box so that number of boxes are least. (Board Term I, 2017)
27. Find the largest possible positive integer that divides 125, 162 and 259 leaving remainder 5, 6 and 7 respectively. (Board Term I, 2017) (Ap)

1.3 Revisiting Irrational Numbers

SA I (2 marks)

28. Show that $5+2\sqrt{7}$ is an irrational number, where $\sqrt{7}$ is given to be an irrational number. (2020) (Ap)
29. Show that $\frac{3+\sqrt{7}}{5}$ is an irrational number, given that $\sqrt{7}$ is irrational. (2019C) (Ap)

30. Given that $\sqrt{2}$ is irrational, prove that $(5+3\sqrt{2})$ is an irrational number. (2018)

31. How many irrational numbers lie between $\sqrt{2}$ and $\sqrt{3}$? Write any two of them. (Board Term I, 2017)

SA II (3 marks)

32. Prove that $\sqrt{3}$ is an irrational number. (2023)
33. Prove that $\sqrt{5}$ is an irrational number. (2023, NCERT, AI 2019) (Ap)
34. Prove that $\sqrt{2}$ is an irrational number. (2020 C, NCERT, Delhi 2019)
35. Prove that $2+5\sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number. (2019) (Ap)

LA (4/5/6 marks)

36. Define irrational number and prove that $3+2\sqrt{5}$ is an irrational number. (NCERT, Board Term I, 2017) (Ap)
37. Prove that $2+\sqrt{5}$ is an irrational number. (Board Term I, 2015)

CBSE Sample Questions

1.2 The Fundamental Theorem of Arithmetic

MCQ

1. 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 $\text{HCF}(a, b) = p^m q^n$ and $\text{LCM}(a, b) = p^r q^s$, then $(m+n)(r+s) =$
 (a) 15 (b) 30
 (c) 35 (d) 72 (2022-23) (Ap)
2. **Statement A (Assertion):** If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
Statement R (Reason): HCF is always a factor of LCM.
 (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 and 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. (2022-23) (Ap)

3. The ratio of LCM and HCF of the least composite and the least prime number is
 (a) 1 : 2 (b) 2 : 1
 (c) 1 : 1 (d) 1 : 3 (Term I, 2021-22) (U)
4. If $\text{LCM}(x, 18) = 36$ and $\text{HCF}(x, 18) = 2$, then x is
 (a) 2 (b) 3
 (c) 4 (d) 5 (Term I, 2021-22) (Ap)
5. If sum of two numbers is 1215 and their HCF is 81, then the possible number of pairs of such numbers are
 (a) 2 (b) 3
 (c) 4 (d) 5 (Term I, 2021-22)
6. The LCM of two prime numbers p and q ($p > q$) is 221. Find the value of $3p - q$.
 (a) 4 (b) 28
 (c) 38 (d) 48 (Term I, 2021-22) (Ap)

VSA (1 mark)

7. If $xy = 180$ and HCF $(x, y) = 3$, then find the LCM (x, y) .
(2020-21) (Ap)

SA I (2 marks)

8. 3 bells ring at an interval of 4, 7 and 14 minutes. All three bells rang at 6 am, when the three bells will ring together next?
(2020-21)

SA II (3 marks)

9. Given that $\sqrt{3}$ is irrational, prove that $5 + 2\sqrt{3}$ is irrational.
(2022-23)

1.3 Revisiting Irrational Numbers

MCQ

10. If $a^2 = \frac{23}{25}$, then a is

- (a) rational (b) irrational
(c) whole number (d) integer

(Term I, 2021-22) (U)

SA II (3 marks)

11. Prove that $2 - \sqrt{3}$ is irrational, given that $\sqrt{3}$ is irrational.
(2020-21) (Ap)

Detailed SOLUTIONS

Previous Years' CBSE Board Questions

1. (c): Total number of factors of a prime number is 2 i.e., 1 and number itself.

2. (a): Least composite number = 4

Least prime number = 2

\therefore HCF = 2, LCM = 4

\therefore Required ratio = $\frac{2}{4}$ i.e., 1:2

3. (b): We know that,

HCF \times LCM = Product of two numbers

$$\Rightarrow 13 \times \text{LCM} = 39 \times 91 \Rightarrow \text{LCM} = \frac{39 \times 91}{13} = 273$$

4. (a): Given, HCF = 12

Let two numbers be $12a$ and $12b$

So, $12a \times 12b = 6336 \Rightarrow ab = 44$

We can write 44 as product of two numbers in these ways:

$$ab = 1 \times 44 = 2 \times 22 = 4 \times 11$$

Here, we will take $a = 1$ and $b = 44$; $a = 4$ and $b = 11$.

We do not take $ab = 2 \times 22$ because 2 and 22 are not co-prime to each other.

For $a = 1$ and $b = 44$, 1st no. = $12a = 12$, 2nd no. = $12b = 528$

For $a = 4$ and $b = 11$, 1st no. = $12a = 48$, 2nd no. = $12b = 132$

Hence, we get two pairs of numbers, (12, 528) and (48, 132).

Commonly Made Mistake

- Remember the difference between prime numbers and co-prime numbers.

5. (d): For $n = 1, 2, 3, 4, \dots$

$(12)^n$ cannot end with 0.

6. (b): We have,

$$\begin{array}{r|l} 5 & 385 \\ \hline 7 & 77 \\ 11 & 11 \\ \hline & 1 \end{array}$$

\therefore Prime factorisation of $385 = 5 \times 7 \times 11$

7. (c): We have, $12 = 2 \times 2 \times 3 = 2^2 \times 3$

$$21 = 3 \times 7$$

$$15 = 3 \times 5$$

\therefore HCF $(12, 21, 15) = 3$ and

$$\text{LCM}(12, 21, 15) = 2^2 \times 3 \times 5 \times 7 = 420$$

8. Let the other number be x .

As, HCF $(a, b) \times$ LCM $(a, b) = a \times b$

$$\Rightarrow 13 \times 182 = 26 \times x \Rightarrow x = \frac{13 \times 182}{26} = 91$$

Hence, other number is 91.

9. Let a and b be two number such that

$$\text{LCM}(a, b) = 9 \times \text{HCF}(a, b) \quad \dots(i)$$

$$\text{and } \text{LCM}(a, b) + \text{HCF}(a, b) = 500 \quad \dots(ii)$$

Using (i) in (ii), we get

$$9\text{HCF}(a, b) + \text{HCF}(a, b) = 500$$

$$\Rightarrow 10\text{HCF}(a, b) = 500 \Rightarrow \text{HCF}(a, b) = 50$$

10. Since, HCF $(a, b) \times$ LCM $(a, b) = a \times b$

$$\therefore \text{HCF}(336, 54) \times \text{LCM}(336, 54) = 336 \times 54$$

$$\Rightarrow 6 \times \text{LCM}(336, 54) = 18144$$

$$\Rightarrow \text{LCM}(336, 54) = \frac{18144}{6} = 3024$$

Concept Applied

- Product of two numbers is equal to the product of their HCF and LCM.

11. We know that, HCF $(a, b) \times$ LCM $(a, b) = a \times b$

$$\Rightarrow 5 \times 200 = ab \Rightarrow ab = 1000$$

12. Smallest prime number = 2

Smallest composite number = 4

$$\text{HCF}(2, 4) = 2$$

Key Points

- A composite number is a natural number or a positive integer which has more than two factors.