

CLASS X MATHEMATICS | REAL NUMBERS

CBSE-STYLE CHAPTER ASSESSMENT | STANDARD LEVEL | 2026-27

Time: 1 hour 30 minutes

Questions: 25

Maximum Marks: 50

Name: _____ Roll No.: _____ Date: _____

Instructions: All questions are compulsory; attempt either alternative in Q24. Write answers on a separate answer sheet. Show all steps. Use exact values unless asked otherwise. Calculators are not allowed. Marks are shown in brackets.

SECTION A | OBJECTIVE QUESTIONS

12 × 1 = 12 marks

- Which is the prime factorisation of 84? [1]
(A) $2 \times 3^2 \times 7$ (B) $2^2 \times 3 \times 7$ (C) $2^2 \times 3^2 \times 7$ (D) $2 \times 3 \times 7^2$
 - The HCF of any two consecutive positive integers is: [1]
(A) 1 (B) 2 (C) Their product (D) The larger integer
 - If a prime p divides a^2 , where a is a positive integer, then p must divide: [1]
(A) $a - 1$ (B) $a + 1$ (C) $2a + 1$ (D) a
 - Given that $\text{HCF}(18, 24) = 6$, the value of $\text{LCM}(18, 24)$ is: [1]
(A) 48 (B) 54 (C) 72 (D) 144
 - Fill in the blank:** For coprime positive integers a and b , $\text{LCM}(a, b) = \underline{\hspace{2cm}}$. [1]
 - Fill in the blank:** Prime factorisation is unique except for the _____ of factors. [1]
 - True or False:** The square of every irrational number is irrational. [1]
 - True or False:** The HCF of two positive integers always divides their LCM. [1]
 - Match the columns.** Write the two correct pairs. ($\frac{1}{2}$ mark each) [1]

Column A	Column B
(i) HCF of 12 and 20	(a) 60
(ii) LCM of 12 and 20	(b) 4
 - Very short answer:** Write one pair of coprime composite numbers. [1]
- For Q11-12, choose the correct assertion-reason option:**
 (A) Both A and R are true; R correctly explains A. (B) Both are true; R does not explain A.
 (C) A is true, but R is false. (D) A is false, but R is true.
- Assertion (A):** $2^2 \times 3 \times 5 + 5$ is a composite number. [1]
Reason (R): It equals $5(2^2 \times 3 + 1)$, a product of two integers greater than 1.
 - Assertion (A):** The sum of two irrational numbers is always irrational. [1]
Reason (R): $\sqrt{2} + (-\sqrt{2}) = 0$, which is rational.

SECTION B | SHORT ANSWERS

5 × 2 = 10 marks

- State the Fundamental Theorem of Arithmetic. Illustrate it by factorising 90. (1 + 1) [2]
 - Find x and y in the factor tree. Then write the prime factorisation of 180, using powers of primes. (1 + 1) [2]
- ```

 180
 / \
 x 15
 / \ / \
 3 y 3 5
 / \
 2 2

```
- Use prime factorisation to find the HCF and LCM of 72 and 120. (1 + 1) [2]
  - Two positive integers have HCF 12 and LCM 180. One is 36. Find the other and verify the HCF. (1 + 1) [2]
  - Can  $14^n$  end in 0 for any positive integer  $n$ ? Justify your answer using prime factors. [2]

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Continue answering on your answer sheet. Give reasons wherever asked.

**Q18-25 | 28 marks**

### SECTION C | APPLICATION AND REASONING

**4 × 3 = 12 marks**

- 18.** Prove that  $\sqrt{2}$  is irrational by contradiction. Begin with  $\sqrt{2} = p/q$  in lowest terms and justify each divisibility step. **[3]**
- 19.** Find the HCF and LCM of 36, 84 and 126 by prime factorisation. Show how you select the powers of the prime factors. **(1 + 2)** **[3]**
- 20.** Find the least positive integer by which 756 must be multiplied to make a perfect square. Write the resulting square number and its positive square root. **(2 + 1)** **[3]**
- 21.** Can 6 and 200 be the HCF and LCM of two positive integers? Give a reason. Then find a pair, both greater than 6, with HCF 6 and LCM 210. **(1 + 2)** **[3]**

### SECTION D | CASE-BASED QUESTIONS

**2 × 4 = 8 marks**

#### 22. Preparing stationery kits **[4]**

Prodigy Educlasses uses all the items below to make the greatest possible number of identical kits. Every kit must have the same number of notebooks and the same number of pens, with no items left over.

| Item               | Notebooks | Pens |
|--------------------|-----------|------|
| Available quantity | 108       | 180  |

- (a) Find the greatest number of kits that can be made. **(1)**
- (b) How many notebooks and pens will each kit contain? **(1)**
- (c) Six complete kits are kept in reserve. How many notebooks and pens are distributed in the remaining kits? Show your calculations. **(2)**

#### 23. Synchronising display lights **[4]**

Three lights flash at regular intervals as shown. All three flash together at 10:00 a.m.; each flash is instantaneous.

| Light                    | A          | B          | C          |
|--------------------------|------------|------------|------------|
| Interval between flashes | 24 seconds | 36 seconds | 60 seconds |

- (a) Should HCF or LCM be used to find when all three next flash together? **(1)**
- (b) Find the interval, in seconds, between successive simultaneous flashes. **(1)**
- (c) Give the next time all three flash together. How many such occasions occur from 10:00 a.m. to 10:30 a.m., including both endpoints? **(2)**

### SECTION E | LONG ANSWERS AND PROOFS

**2 × 4 = 8 marks**

- 24.** Prove that  $\sqrt{5}$  is irrational. Hence show that  $2 + 3\sqrt{5}$  is irrational. **(3 + 1)** **[4]**  
**OR**  
Prove that  $\sqrt{3}$  is irrational. Hence show that  $7 - 2\sqrt{3}$  is irrational. **(3 + 1)**
- 25.** Positive integers  $a$  and  $b$  have HCF 18 and LCM 540. Write  $a = 18m$  and  $b = 18n$ . **[4]**
- (a) Explain why  $m$  and  $n$  must be coprime positive integers. **(1)**
- (b) Find the value of  $mn$  using the HCF-LCM-product relation. **(1)**
- (c) Find all unordered pairs  $(a, b)$ . Explain why your list is complete. **(2)**