

# UNIQUE STUDY POINT

By Sumeet Sahu

[www.uniquestudyonline.com](http://www.uniquestudyonline.com)

Unique Study Point, Amitesh Nagar, Indore, MP | Contact: 8103405051

<b>Class:</b> X	<b>Subject:</b> Mathematics	<b>Session:</b> 2025-26
<b>Chapter:</b> 01 - Real Numbers	<b>Time:</b> 1½ Hours	<b>Max. Marks:</b> 40

## General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

## General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five Sections A, B, C, D and E.
3. Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks and Section E comprises of 2 Case Study Based Questions of 4 marks each.
4. There is no overall choice.
5. Use of Calculators is not permitted.

## SECTION A - Multiple Choice Questions (1 mark each)

Questions 1 to 10 carry 1 mark each.

1. The exponent of 11 in the prime factorization of 7436 is
  - (a) 1
  - (b) 2
  - (c) 3
  - (d) 4
2. If two positive integers  $w$  and  $z$  are written as  $w = t^2u^3$  and  $z = t^4u$ , where  $t$  and  $u$  are prime numbers, then the LCM ( $w, z$ ) is:
  - (a)  $tu$
  - (b)  $t^2u^2$
  - (c)  $t^4u^3$
  - (d)  $t^6u^4$
3. The HCF and the LCM of 45, 54, 72 respectively are
  - (a) 9, 1080
  - (b) 18, 2160

- (c) 9, 2160
- (d) 1080, 9

4. If the HCF of 133 and 203 is expressible in the form  $133m - 203$ , then the value of  $m$  is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

5. Shreya has 84 cm long silver and 140 cm long golden ribbon. She cuts each ribbon into pieces such that all pieces are of equal length. What is the length of each piece?

- (a) 14 cm as it is the HCF of 84 and 140
- (b) 14 cm as it is the LCM of 84 and 140
- (c) 28 cm as it is the LCM of 84 and 140
- (d) 28 cm as it is the HCF of 84 and 140

6. The largest number which divides 154 and 231 leaving remainders 10 and 15 respectively is

- (a) 36
- (b) 72
- (c) 144
- (d) 216

7. If  $10584 = 2^m \times 3^n \times 7^k \times 13^p$ , then the value of  $m + n + k + p$  is

- (a) 6
- (b) 7
- (c) 8
- (d) 9

8. If  $p = 7^2 \times 13$ ,  $q = 7 \times 11^2 \times 17$ ,  $r = 11^n \times 17^3$  and  $\text{LCM}(p, q, r) = 7^2 \times 11^3 \times 13 \times 17^3$ , then  $n$  is equal to

- (a) 1
- (b) 2
- (c) 3
- (d) 4

9. In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

**Assertion (A):** If product of two numbers is 11220 and their HCF is 22, then their LCM is 510.

**Reason (R):** For any two positive integers  $a$  and  $b$ ,  $\text{HCF}(a,b) \times \text{LCM}(a,b) = a \times b$ .

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

10. In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

**Assertion (A):**  $30^n$  ends with the digit zero, where  $n$  is natural number.

**Reason (R):** A number ends with zero if it is divisible by both 2 and 5.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

## SECTION B - Short Answer Questions (2 marks each)

Questions 11 to 14 carry 2 marks each.

11. Explain why  $13 \times 17 \times 19 + 19$  and  $19 \times 23 \times 29 + 23 \times 19$  are composite numbers.
12. Two numbers are in the ratio 7 : 9 and their LCM is 630. What is the HCF of these numbers?
13. Show that any number of the form  $33^n$ , where  $n \in \mathbb{N}$  can never end with digit 0. (2017)
14. The LCM of two numbers is 4 times their HCF. The sum of LCM and HCF is 800. Find the HCF of the two numbers.

## SECTION C - Short Answer Questions (3 marks each)

Questions 15 to 17 carry 3 marks each.

15. Prove that  $\sqrt{17}$  is an irrational number. (2023)
16. 4 Bells toll together at 4.00 am. They toll after 12, 15, 20 and 24 seconds respectively. How many times will they toll together again in the next 4 hours?
17. Given that  $\sqrt{17}$  is irrational, prove that  $8 + 7\sqrt{17}$  is irrational. (CBSE Sample Paper 2022)

## SECTION D - Long Answer Question (5 marks)

Questions 18 carry 5 marks.

18. (a) Find the largest possible positive integer that divides 195, 273 and 364 leaving remainder 13, 15 and 19 respectively. (3)
- (b) An army contingent of 1134 soldiers is to march behind an army band of 72 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? (2)

## SECTION E - Case Study Based Questions (4 marks each)

Questions 19 to 20 carry 4 marks each.

19. A morning walk may help improve your mental clarity and ability to focus throughout the day. A recent study found that amongst older adults, those who started their days with a morning walk improved their cognitive function, compared to those who remained sedentary. Walking may also help you think more creatively. In a morning walk three students step off together, their steps measure 95 cm, 114 cm and 133 cm respectively.
  - (i) What is the HCF of 95 and 133? (1)
  - (ii) Find the sum of exponents of the prime factors of total distance. (1)
  - (iii) What is the minimum distance each should walk so that he can cover the distance in complete steps? (2)
20. A family room is an informal, all purpose room in a house. The family room is designed to be a place where family and guests gather for group recreation like talking, reading, watching TV and other family activities. The length, breadth and height of a room are 15 m 60 cm, 12 m 40 cm and 9 m 30 cm.
  - (i) Determine the longest rod which can measure the three dimensions of the room exactly. (2)
  - (ii) What is LCM of the given three measurements? (1)

**(iii)** If the HCF (1560 and 1240) = 40, then find LCM (1560 and 1240). (1)

SECTION A - Answers to MCQs

1. Answer: (b) 2

**Solution:**  $7436 = 4 \times 1859 = 4 \times 11 \times 169 = 2^2 \times 11 \times 13^2$   
Therefore, the exponent of 11 is 1. Answer should be (a) 1.

2. Answer: (c)  $t^4u^3$

**Solution:**  $w = t^2u^3, z = t^4u^1$   
LCM = Product of highest powers of all prime factors =  $t^4u^3$

3. Answer: (a) 9, 1080

**Solution:**  $45 = 3^2 \times 5, 54 = 2 \times 3^3, 72 = 2^3 \times 3^2$   
HCF =  $3^2 = 9$ , LCM =  $2^3 \times 3^3 \times 5 = 1080$

4. Answer: (b) 2

**Solution:** Using Euclidean algorithm:

$$203 = 133 \times 1 + 70$$

$$133 = 70 \times 1 + 63$$

$$70 = 63 \times 1 + 7$$

$$63 = 7 \times 9 + 0$$

$$\text{HCF} = 7 = 133 \times 2 - 203 \times 1, \text{ so } m = 2$$

5. Answer: (d) 28 cm as it is the HCF of 84 and 140

**Solution:** To cut ribbons into equal pieces, we need HCF(84, 140)

$$84 = 2^2 \times 3 \times 7, 140 = 2^2 \times 5 \times 7$$

$$\text{HCF} = 2^2 \times 7 = 28 \text{ cm}$$

6. Answer: (b) 72

**Solution:** Required number = HCF(154-10, 231-15) = HCF(144, 216) = 72

7. Answer: (b) 7

**Solution:**  $10584 = 2^3 \times 3^2 \times 7 \times 21 = 2^3 \times 3^2 \times 7^2$

Actually, let me recalculate:  $10584 = 8 \times 1323 = 8 \times 3^2 \times 147 = 8 \times 9 \times 3 \times 49 = 2^3 \times 3^3 \times 7^2$

So  $m = 3, n = 3, k = 2, p = 0$  (no factor of 13)

There seems to be an error in the question as 10584 doesn't contain 13 as a factor.

8. Answer: (c) 3

**Solution:**  $p = 7^2 \times 13^1, q = 7^1 \times 11^2 \times 17^1, r = 11^n \times 17^3$

$$\text{LCM} = 7^2 \times 11^3 \times 13^1 \times 17^3$$

For this to be true, n must be 3.

9. Answer: (a) Both A and R are true and R is the correct explanation of A

**Solution:** Product = HCF  $\times$  LCM, so LCM =  $11220/22 = 510$ . Both statements are true.

R correctly explains the formula used in A.

10. Answer: (a) Both A and R are true and R is the correct explanation of A

**Solution:**  $30^n = (2 \times 3 \times 5)^n = 2^n \times 3^n \times 5^n$ . This contains both factors 2 and 5, so ends in 0.

Both statements are true and R explains A.

SECTION B - Answers to Short Answer Questions

11. Solution:

**First number:**  $13 \times 17 \times 19 + 19 = 4199 + 19 = 4218 = 2 \times 3 \times 19 \times 37$  (composite)

**Second number:**  $19 \times 23 \times 29 + 23 \times 19 = 12673 + 437 = 13110 = 2 \times 3 \times 5 \times 19 \times 23$  (composite)

Both numbers have factors other than 1 and themselves.

12. Solution:

Let the numbers be  $7x$  and  $9x$  where  $x$  is their HCF.

$$\text{LCM} = (7x \times 9x)/x = 63x \text{ (since } \text{HCF}(7,9) = 1)$$

$$\text{Given: } 63x = 630, \text{ so } x = 10$$

Therefore,  $\text{HCF} = 10$

### 13. Solution:

$$33^n = (3 \times 11)^n = 3^n \times 11^n$$

For a number to end with 0, it must be divisible by  $10 = 2 \times 5$

Since  $33^n$  contains only factors 3 and 11 (no factors of 2 or 5), it can never end with 0.

### 14. Solution:

Let  $\text{HCF} = h$ , then  $\text{LCM} = 4h$

$$\text{Given: } h + 4h = 800$$

$$5h = 800$$

$$h = 160$$

Therefore,  $\text{HCF} = 160$

## SECTION C - Answers to Short Answer Questions

### 15. Solution:

#### Proof by contradiction:

Assume  $\sqrt{17}$  is rational, so  $\sqrt{17} = p/q$  where  $p, q$  are integers with no common factors.

$$\text{Squaring: } 17 = p^2/q^2, \text{ so } 17q^2 = p^2$$

This means  $p^2$  is divisible by 17, so  $p$  is divisible by 17.

$$\text{Let } p = 17k, \text{ then } 17q^2 = 289k^2, \text{ so } q^2 = 17k^2$$

This means  $q$  is also divisible by 17.

But this contradicts our assumption that  $p$  and  $q$  have no common factors.

Therefore,  $\sqrt{17}$  is irrational.

### 16. Solution:

The bells will toll together at intervals equal to  $\text{LCM}(12, 15, 20, 24)$

$$\text{LCM} = 2^3 \times 3 \times 5 = 120 \text{ seconds} = 2 \text{ minutes}$$

In 4 hours = 240 minutes

$$\text{Number of times} = 240/2 = 120$$

So they will toll together 120 times after 4:00 AM.

### 17. Solution:

#### Proof by contradiction:

Assume  $8 + 7\sqrt{17}$  is rational =  $r$

$$\text{Then } 7\sqrt{17} = r - 8 \text{ (rational)}$$

$$\text{So } \sqrt{17} = (r - 8)/7 \text{ (rational)}$$

But this contradicts the given fact that  $\sqrt{17}$  is irrational.

Therefore,  $8 + 7\sqrt{17}$  is irrational.

## SECTION D - Answer to Long Answer Question

### 18. Solution:

$$\text{(a) Required number} = \text{HCF}(195-13, 273-15, 364-19) = \text{HCF}(182, 258, 345)$$

$$182 = 2 \times 7 \times 13, 258 = 2 \times 3 \times 43, 345 = 3 \times 5 \times 23$$

$$\text{HCF} = 1$$

$$\text{(b) Maximum columns} = \text{HCF}(1134, 72)$$

$$1134 = 2 \times 3^4 \times 7, 72 = 2^3 \times 3^2$$

$$\text{HCF} = 2 \times 3^2 = 18 \text{ columns}$$

## SECTION E - Answers to Case Study Based Questions

### 19. Solution:

**(i)**  $\text{HCF}(95, 133): 95 = 5 \times 19, 133 = 7 \times 19$

$$\text{HCF} = 19$$

**(ii)** Total distance =  $\text{LCM}(95, 114, 133)$

$$\text{LCM} = 2 \times 3 \times 5 \times 7 \times 19 = 3990$$

$$\text{Sum of exponents} = 1 + 1 + 1 + 1 + 1 = 5$$

**(iii)** Minimum distance =  $\text{LCM}(95, 114, 133) = 3990 \text{ cm} = 39.9 \text{ m}$

### 20. Solution:

**(i)** Convert to cm: 1560 cm, 1240 cm, 930 cm

$$\text{HCF}(1560, 1240, 930) = 310 \text{ cm}$$

**(ii)**  $\text{LCM}(1560, 1240, 930) = 18600 \text{ cm}$

**(iii)** Using  $\text{HCF} \times \text{LCM} = \text{Product of numbers}$

$$\text{LCM} = (1560 \times 1240)/40 = 48360$$

---

Made with ♥ by Sumeet Sahu

Unique Study Point, Amitesh Nagar, Indore, MP

Website: [uniquestudyonline.com](http://uniquestudyonline.com)

