

# UNIQUE STUDY POINT

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|---------------------------------|-----------------------------|-------------------------|
| <b>Class:</b> VIII              | <b>Subject:</b> Mathematics | <b>Session:</b> 2025-26 |
| <b>Chapter:</b> 05 - Prime Time | <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.

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

1. Which of the following is a prime number?  
(a) 87  
(b) 89  
(c) 91  
(d) 93
2. The number of factors of a prime number is:  
(a) 1  
(b) 2  
(c) 3  
(d) More than 3
3. The HCF of 12 and 18 is:  
(a) 2  
(b) 3  
(c) 6  
(d) 36
4. A number ending in 0 is always divisible by:  
(a) 2, 5, and 10  
(b) 2, 4, and 5  
(c) 3, 5, and 10  
(d) 4, 5, and 10
5. The smallest number which is divisible by both 15 and 20 is:

- (a) 30
- (b) 60
- (c) 100
- (d) 300

6. Which of the following is NOT a factor of 60?

- (a) 12
- (b) 15
- (c) 18
- (d) 20

7. If 3 is a prime number and  $2 \times 3 + 1 = 7$  is also prime, which other prime follows this pattern?

- (a)  $2 \times 5 + 1 = 11$
- (b)  $2 \times 7 + 1 = 15$
- (c)  $2 \times 11 + 1 = 23$
- (d)  $2 \times 13 + 1 = 27$

8. How many prime numbers are there between 1 and 10?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

9. The prime factorization of 64 is:

- (a)  $2 \times 32$
- (b)  $4 \times 16$
- (c)  $2^6$
- (d)  $8 \times 8$

10. Two numbers are co-prime if their:

- (a) Sum is a prime number
- (b) Product is a prime number
- (c) HCF is 1
- (d) LCM is their product

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

11. Find the HCF of 24 and 36 using prime factorization.

12. Check if 1728 is divisible by 8.

13. List all prime numbers between 70 and 90.

14. Are 30 and 45 co-prime? Justify your answer.

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

15. Find the LCM of 24, 36, and 48 using prime factorization method.

16. Find all pairs of twin primes between 50 and 100.

17. A number when divided by 12, 15, and 18 leaves remainder 0. Find the smallest such three-digit number.

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

18. Anshu plays the treasure hunting game. Grumpy has placed treasures on three numbers: 60, 90, and 120.

- (a) Find all jump sizes that will land on all three treasures. (2 marks)
- (b) What is the largest jump size that works? (1 mark)
- (c) Using prime factorization, explain why this is the largest jump size. (2 marks)

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

##### 19. Case Study 1: The Garden Design

A gardener has a rectangular plot of land measuring 72 meters by 90 meters. He wants to divide it into equal square plots without any land left over.

- (a) What is the largest size of square plot possible? (2 marks)
- (b) How many such square plots will there be? (2 marks)

##### 20. Case Study 2: The Number Pattern

Guna discovered that 6 is a perfect number because the sum of its factors (1, 2, 3, 6) equals 12, which is twice the number.

- (a) Show that 28 is also a perfect number by listing all its factors and finding their sum. (2 marks)
- (b) Is there any perfect number between 6 and 28? Justify. (2 marks)

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## DETAILED ANSWER KEY - PAPER 04

### SECTION A - Answers to MCQs

**1. (b) 89**

89 is a prime number.  $87 = 3 \times 29$ ,  $91 = 7 \times 13$ ,  $93 = 3 \times 31$ .

**2. (b) 2**

A prime number has exactly two factors: 1 and itself.

**3. (c) 6**

$12 = 2^2 \times 3$  and  $18 = 2 \times 3^2$ .  $\text{HCF} = 2 \times 3 = 6$

**4. (a) 2, 5, and 10**

Numbers ending in 0 are divisible by 2, 5, and 10.

**5. (b) 60**

$\text{LCM}(15, 20) = 60$ .  $15 = 3 \times 5$ ,  $20 = 2^2 \times 5$ ,  $\text{LCM} = 2^2 \times 3 \times 5 = 60$

**6. (c) 18**

$60 = 2^2 \times 3 \times 5$ .  $18 = 2 \times 3^2$ . Since 18 has two 3s but 60 has only one, 18 is NOT a factor of 60.

**7. (c)  $2 \times 11 + 1 = 23$**

23 is prime.  $15 = 3 \times 5$  (not prime) and  $27 = 3^3$  (not prime).

**8. (c) 4**

Prime numbers between 1 and 10: 2, 3, 5, 7 (Total = 4)

**9. (c)  $2^6$**

$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^6$

**10. (c) HCF is 1**

Two numbers are co-prime if they have no common factor other than 1, i.e., their HCF is 1.

### SECTION B - Answers to Short Answer Questions

**11.**

Prime factorization:

$$24 = 2 \times 2 \times 2 \times 3 = 2^3 \times 3$$

$$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$$

$$\text{HCF} = 2^2 \times 3 = 4 \times 3 = 12$$

**12.**

Check last three digits: 728

$$728 \div 8 = 91 \text{ (exact division)}$$

Yes, 1728 is divisible by 8.

**13.**

Prime numbers between 70 and 90:

71, 73, 79, 83, 89

**14.**

$$30 = 2 \times 3 \times 5$$

$$45 = 3 \times 3 \times 5$$

Common factors: 3 and 5

No, 30 and 45 are NOT co-prime as they have common factors other than 1.

### SECTION C - Answers to Short Answer Questions

**15.**

Prime factorization:

$$24 = 2^3 \times 3$$

$$36 = 2^2 \times 3^2$$

$$48 = 2^4 \times 3$$

$$\text{LCM} = 2^4 \times 3^2 = 16 \times 9 = 144$$

**16.**

Twin prime pairs between 50 and 100:

(59, 61)

(71, 73)

**17.**

Find LCM of 12, 15, and 18:

$$12 = 2^2 \times 3$$

$$15 = 3 \times 5$$

$$18 = 2 \times 3^2$$

$$\text{LCM} = 2^2 \times 3^2 \times 5 = 4 \times 9 \times 5 = 180$$

Smallest three-digit multiple of 180 = 180 itself.

### SECTION D - Answer to Long Answer Question

**18.**

(a) To find all jump sizes, we need common factors of 60, 90, and 120.

$$60 = 2^2 \times 3 \times 5$$

$$90 = 2 \times 3^2 \times 5$$

$$120 = 2^3 \times 3 \times 5$$

$$\text{HCF} = 2 \times 3 \times 5 = 30$$

Common factors of 30: 1, 2, 3, 5, 6, 10, 15, 30

(b) Largest jump size = 30

(c) The HCF represents the largest number that divides all three numbers. Using prime factorization, we take the minimum power of each common prime factor. Since 60 has  $2^2$ , 90 has  $2^1$ , and 120 has  $2^3$ , we take  $2^1$ . Similarly for 3 and 5. Thus  $\text{HCF} = 2 \times 3 \times 5 = 30$ .

## SECTION E - Answers to Case Study Based Questions

### 19. Case Study 1: The Garden Design

(a) Find HCF of 72 and 90:

$$72 = 2^3 \times 3^2$$

$$90 = 2 \times 3^2 \times 5$$

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

Largest square plot size = 18 m  $\times$  18 m

(b) Number of square plots:

$$\text{Length: } 72 \div 18 = 4 \text{ plots}$$

$$\text{Width: } 90 \div 18 = 5 \text{ plots}$$

$$\text{Total} = 4 \times 5 = 20 \text{ square plots}$$

### 20. Case Study 2: The Number Pattern

(a) Factors of 28:

$$28 = 1 \times 28 = 2 \times 14 = 4 \times 7$$

Factors: 1, 2, 4, 7, 14, 28

$$\text{Sum} = 1 + 2 + 4 + 7 + 14 + 28 = 56$$

$$56 = 2 \times 28 \checkmark$$

Yes, 28 is a perfect number.

(b) Check numbers between 6 and 28:

For a number to be perfect, sum of factors must equal twice the number.

Checking systematically (or using mathematical knowledge):

No perfect number exists between 6 and 28.

The third perfect number is 496.