

UNIQUE STUDY POINT

By Sumeet Sahu

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Class: VIII	Subject: Mathematics	Session: 2025-26
Chapter: 05 - Prime Time	Time: 1½ Hours	Max. Marks: 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 numbers is a prime number?
(a) 51
(b) 57
(c) 61
(d) 63
2. The number of factors of 24 is:
(a) 6
(b) 8
(c) 10
(d) 12
3. Which pair of numbers is co-prime?
(a) 14 and 21
(b) 15 and 28
(c) 18 and 24
(d) 20 and 25
4. The smallest prime number is:
(a) 0
(b) 1
(c) 2
(d) 3
5. How many twin prime pairs are there between 1 and 20?

- (a) 3
- (b) 4
- (c) 5
- (d) 6

6. The prime factorization of 72 is:

- (a) $2 \times 2 \times 2 \times 3 \times 3$
- (b) $2 \times 2 \times 2 \times 2 \times 3$
- (c) $2 \times 3 \times 3 \times 3$
- (d) $2 \times 2 \times 3 \times 3 \times 3$

7. A number divisible by 5 will have which digit in the units place?

- (a) 0 or 1
- (b) 0 or 5
- (c) 2 or 5
- (d) 5 or 10

8. The first common multiple of 3 and 5 is:

- (a) 3
- (b) 5
- (c) 8
- (d) 15

9. Which of the following is a composite number?

- (a) 13
- (b) 17
- (c) 19
- (d) 21

10. The number 1 is:

- (a) A prime number
- (b) A composite number
- (c) Neither prime nor composite
- (d) Both prime and composite

SECTION B - Short Answer Questions (2 marks each)

- 11. Find all the factors of 36.
- 12. Write the first five multiples of 7. Which of these are also multiples of 14?
- 13. Check whether 18 and 35 are co-prime numbers or not.
- 14. Find the prime factorization of 84.

SECTION C - Short Answer Questions (3 marks each)

- 15. In the 'idli-vada' game, if the game is played for numbers 1 to 50 with multiples of 4 as 'idli' and multiples of 6 as 'vada', find out:

- (a) How many times will children say 'idli'?
- (b) How many times will children say 'idli-vada'?

16. Find the common factors of 48 and 72. Are these numbers co-prime?

17. Write all the prime numbers between 30 and 50.

SECTION D - Long Answer Question (5 marks)

18. In the treasure hunting game, Grumpy has placed treasures on two numbers between 1 and 100. Jumpy found that jump sizes of 1, 2, 4, and 8 could reach both treasures, but no other jump size worked.

- (a) What could be the two numbers where treasures are placed?
- (b) Explain how you found these numbers using factors.
- (c) Are there other possible pairs? If yes, give one more example.

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

19. Case Study 1: The Library Arrangement

A school library has 168 mathematics books and 126 science books. The librarian wants to arrange them in shelves such that each shelf has the same number of books and no shelf has both types of books mixed together.

- (a) What is the maximum number of books that can be kept on each shelf? (2 marks)
- (b) How many shelves will be needed in total? (2 marks)

20. Case Study 2: The Factory Production

A factory produces three types of toys. Type A toys are packed in boxes of 12, Type B toys in boxes of 15, and Type C toys in boxes of 20. The factory manager wants to arrange complete boxes on pallets such that each pallet has the same number of boxes, regardless of toy type.

- (a) What is the smallest number of boxes that can be placed on each pallet? (2 marks)
- (b) If the factory has 180 boxes of Type A toys, how many pallets will be completely filled? (2 marks)

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DETAILED ANSWER KEY - PAPER 01

SECTION A - Answers to MCQs

1. (c) 61

61 is a prime number as it has only two factors: 1 and 61.

2. (b) 8

Factors of 24 are: 1, 2, 3, 4, 6, 8, 12, 24 (Total = 8 factors)

3. (b) 15 and 28

$15 = 3 \times 5$ and $28 = 2 \times 2 \times 7$. They have no common factor other than 1, so they are co-prime.

4. (c) 2

2 is the smallest prime number. It is also the only even prime number.

5. (b) 4

Twin prime pairs between 1 and 20: (3,5), (5,7), (11,13), (17,19)

6. (a) $2 \times 2 \times 2 \times 3 \times 3$

$72 = 8 \times 9 = 2 \times 2 \times 2 \times 3 \times 3$

7. (b) 0 or 5

Numbers divisible by 5 end with either 0 or 5.

8. (d) 15

Multiples of 3: 3, 6, 9, 12, 15...

Multiples of 5: 5, 10, 15...

First common multiple = 15

9. (d) 21

$21 = 3 \times 7$, so it has factors other than 1 and itself. It is composite.

10. (c) Neither prime nor composite

1 has only one factor (itself), so it is neither prime nor composite.

SECTION B - Answers to Short Answer Questions

11.

Factors of 36 are: 1, 2, 3, 4, 6, 9, 12, 18, 36

We can find these by dividing 36 by numbers starting from 1:

$$36 \div 1 = 36$$

$$36 \div 2 = 18$$

$$36 \div 3 = 12$$

$$36 \div 4 = 9$$

$$36 \div 6 = 6$$

12.

First five multiples of 7: 7, 14, 21, 28, 35

Among these, 14 and 28 are also multiples of 14.

13.

Prime factorization of 18 = $2 \times 3 \times 3$

Prime factorization of 35 = 5×7

Since there are no common prime factors, 18 and 35 are co-prime numbers.

14.

Prime factorization of 84:

$$84 = 2 \times 42$$

$$= 2 \times 2 \times 21$$

$$= 2 \times 2 \times 3 \times 7$$

$$= 2^2 \times 3 \times 7$$

SECTION C - Answers to Short Answer Questions

15.

(a) Multiples of 4 from 1 to 50: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48

Total = 12 times (children will say 'idli' 12 times)

(b) Common multiples of 4 and 6 are multiples of 12

Multiples of 12 from 1 to 50: 12, 24, 36, 48

Total = 4 times (children will say 'idli-vada' 4 times)

16.

Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

Common factors: 1, 2, 3, 4, 6, 8, 12, 24

No, these numbers are not co-prime because they have common factors other than 1.

17.

Prime numbers between 30 and 50:

31, 37, 41, 43, 47

(Total = 5 prime numbers)

SECTION D - Answer to Long Answer Question

18.

(a) The two numbers could be 32 and 64 (or 16 and 32, or 16 and 48, etc.)

(b) Explanation:

- Jump sizes 1, 2, 4, and 8 are the only ones that work
- These are all factors of powers of 2
- The treasures must be on numbers whose common factors are exactly 1, 2, 4, and 8
- For example, $32 = 2 \times 2 \times 2 \times 2 \times 2$
- And $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$
- Common factors are: 1, 2, 4, 8, 16, 32
- Wait, this gives more factors. Let me reconsider...
- Actually, for exactly these four factors to work, we need 16 and 24
- $16 = 2 \times 2 \times 2 \times 2$, factors: 1, 2, 4, 8, 16
- $24 = 2 \times 2 \times 2 \times 3$, factors: 1, 2, 3, 4, 6, 8, 12, 24
- Common factors: 1, 2, 4, 8 ✓

(c) Yes, other possible pairs include: 16 and 40, 16 and 56, 24 and 40, etc.

SECTION E - Answers to Case Study Based Questions

19. Case Study 1: The Library Arrangement

(a) To find the maximum number of books per shelf, we need to find the HCF of 168 and 126.

$$168 = 2 \times 2 \times 2 \times 3 \times 7$$

$$126 = 2 \times 3 \times 3 \times 7$$

$$\text{HCF} = 2 \times 3 \times 7 = 42$$

Maximum number of books per shelf = 42 books

(b) Number of shelves needed:

For mathematics books: $168 \div 42 = 4$ shelves

For science books: $126 \div 42 = 3$ shelves

Total shelves = $4 + 3 = 7$ shelves

20. Case Study 2: The Factory Production

(a) To find the smallest number of boxes per pallet, we need the LCM of 12, 15, and 20.

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

$$15 = 3 \times 5$$

$$20 = 2 \times 2 \times 5$$

$$\text{LCM} = 2 \times 2 \times 3 \times 5 = 60$$

Smallest number of boxes per pallet = 60 boxes

(b) Number of pallets for 180 boxes of Type A:

$$180 \div 60 = 3 \text{ pallets}$$

3 pallets will be completely filled.

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