NCERT

PW

UP CLASS 10 BOARD PHOD

Chapterwise Question Bank with Mind Maps & PYQs

2026 EXAMINATION

14 MIND MAPS

Mathematics

OMR Sheet Included

20 PYQs PAPERS	100 MOST PROBABLE Qs.	MODEL PAPERS	COMPETENCY & NCERT
Chapterwise + Full Length Papers	Handpicked & High Yield	As per Latest Pattern by UPMSP	New Pattern Questions with Solutions

Based on Latest Syllabus prescribed by Madhyamik Shiksha Parishad U.P., Prayagraj

Chapter-wise Weightage of
UP Board Past 6 Years' Papers

MATHEMATICS						
CHAPTERS	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Real Numbers	5	8	5	5	5	5
Polynomials	7	-	-	1	4	5
Pair of Linear Equations in Two Variables	14	20	18	13	16	13
Quadratic Equations	-	27	6	10	2	1
Arithmetic Progressions	3	-	-	-	1	5
Triangles	2	11	5	6	6	5
Coordinate Geometry	5	9	5	6	6	5
Introduction to Trigonometry	8	7	6	5	7	12
Some Applications of Trigonometry	4	12	4	16	13	6
Circles	10	1	-	-	4	5
Areas Related to Circles	2	8	5	2	7	3
Surface Areas and Volumes	6	12	5	15	9	13
Statistics	8	19	10	13	8	10
Probability	2	-	-	-	4	4

**The marks allotment mentioned above is chapter-wise and includes internal choice questions as well. Therefore, the total might not match the Maximum Marks of the respective Previous Year Paper.*

Contents

UP BOARD PREVIOUS YEAR PAPERS

THROUGH QR CODE

- UP Board Previous Year 2025 (BZ)
- UP Board Previous Year 2024 (HX)
- UP Board Previous Year 2024 (HY)
- UP Board Previous Year 2025 (BV)
- UP Board Previous Year 2025 (BW)
- UP Board Previous Year 2024 (HZ)
- UP Board Previous Year 2024 (IA)
- UP Board Previous Year 2024 (IB)

100 MOST PROBABLE QUESTIONS (ANALYZED & SELECTED FROM PYQs)

To Access Detailed Explanations
Scan This QR Code

Note: *Questions in this section are selected based on repetitive concepts from past examinations, though patterns and typologies may vary.*

1. Real Numbers

1. If LCM of 26, 156 is 156, then the value of HCF will be: ***(1 Mark)*** **(2024 HX) (2023 DY)**

   (*a*) 156 (*b*) 26 (*c*) 13 (*d*) 6

2. Given that LCM of (132, 288) = 3168, then HCF (132, 288) will be ***(1 Mark)*** **(2023 DX) (2022 RE)**

   (*a*) 288 (*b*) 132 (*c*) 48 (*d*) 12

3. Find the HCF of the 96 and 404 by the prime factorization method. ***(2 Marks)*** **(2025 BV) (2020 NA)**

4. Prove that $3\sqrt{2}$ is an irrational number.

   (2 Marks) **(NCERT Intext) (2025 BZ) (2020 NA)**

5. Prove that $\sqrt{2}$ is an irrational number.

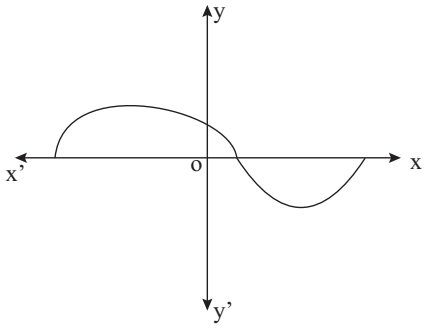
   (2 Marks) **(NCERT Intext) (2024 HI) (2023 EA) (2022 HI)**

6. Prove that $\sqrt{3}$ is an irrational number.

   (2 Marks) **(NCERT Intext) (2024 IA) (2023 DX) (2020 NA)**

2. Polynomials

7. For a polynomial $f(x)$ the graph of $y = f(x)$ is given. The number of zeroes of $f(x)$ in the graph will be ***(1 Mark)*** **(2025 BY)**



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

8. Zeroes of polynomial $x^2 + 7x + 10$ will be ***(1 Mark)*** **(2020 NA)**

   (*a*) $-2, -5$ (*b*) $2, -5$ (*c*) $2, 5$ (*d*) $-2, 5$

9. Find the zeroes of the quadratic polynomial $x^2 + 10x + 21$ and verify the relationship between the zeroes and the coefficients. ***(4 Marks)*** **(2025 BW)**

3. Pair of Linear Equations in Two Variables

10. In the system of equations $\frac{x}{a} = \frac{y}{b}, ax + by = a^2 + b^2$, value of y will be ***(1 Mark)*** **(2024 HZ)**

    (*a*) a (*b*) ab (*c*) b (*d*) $\frac{b}{a}$

11. If the lines represented by $3x + 2py = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of p will be ***(1 Mark)*** **(2024 IB)**

    (*a*) $\frac{15}{4}$ (*b*) $-\frac{4}{5}$ (*c*) $\frac{3}{5}$ (*d*) $\frac{5}{3}$

12. If the sum and difference of two numbers are 8 and 2 respectively, the numbers will be: ***(1 Mark)*** **(2023 DY)**

    (*a*) 6, 2 (*b*) 5, 3 (*c*) 7, 1 (*d*) 1, 2

13. For what value of 'm' pair of equations $x - 2y = 3$ and $3x + my = 1$ will have unique solution? ***(1 Mark)*** **(2023 EB)**

    (*a*) $m = -6$ (*b*) $m = 0$ only
    (*c*) $m \neq -6$ (*d*) $m \neq 0$

14. The sum of the digits of a two digit number is 9. If the digits of the number be interchanged then the new number is 27 more than the original number. Find the number. ***(4 Marks)*** **(2024 HZ) (2023 EB)**

15. Solve the following pair of equations: ***(6 Marks)*** **(2023 DX) (2022 RE)**

$$\frac{3}{x} + \frac{2}{y} = 11, \quad \frac{4}{x} - \frac{5}{y} = 7$$

16. A fraction becomes $\frac{1}{3}$ when 1 is added to the numerator and it becomes $\frac{1}{4}$ when 1 is subtracted from its denominator. Find the fraction. ***(6 Marks)*** **(2023 DX) (2022 RE)**

17. In a journey of 300 km, if a person travels 60 km by train and rest of the distance by bus, then it takes 4 hours in all. If he travels 100 km by train and rest of the distance by bus, then it takes 10 minutes more. Find the speed of the train and the bus respectively. ***(6 Marks)*** **(2023 EA)**

18. Solve by drawing the graph of linear simultaneous equations $4x - 5y + 16 = 0$ and $2x + y = 6$. Find also the coordinates of the vertices of a triangle formed by these lines and the x-axis. ***(6 marks)*** **(2022 HI)**

4. Quadratic Equations

19. The discriminant of the equation $3x^2 - 2x + \frac{1}{3} = 0$ ***(1 Mark)*** **(NCERT Intext) (2025 BV)(2023 DY)**

    (*a*) 0 (*b*) 1 (*c*) 2 (*d*) 3

20. If the roots of the quadratic equation $3x^2 - 12x + m = 0$ are equal, then the value of m will be: ***(1 Mark)*** **(2025 BV)(2023 DX)(2023 EB)**

    (*a*) 4 (*b*) 6 (*c*) 12 (*d*) 14

21. Find two consecutive positive integers whose sum of squares is 365. ***(6 Marks)*** **(NCERT Intext) (2025 BY) (2024 IB)**

22. Solve the quadratic equation $2x^2 - 5x + 3 = 0$.
(4 Marks) (NCERT Intext) (2024 IA)

23. Find the discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$ and then find the nature of the roots.
(2 Marks) (2023 DY) (2020 NA)

24. Solve the following equation: **(6 Marks) (2023 DY) (2020 NA)**

$$2\left(\frac{2x-1}{x+3}\right)-3\left(\frac{x+3}{2x-1}\right)=5, x \neq -3, \frac{1}{2}$$

25. The denominator of a fraction is one more than twice its numerator. If the sum of the fraction and its reciprocal is $2\left(\frac{16}{21}\right)$ then find the value of the fraction. **(6 Marks) (2020 NA)**

26. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.
(4 Marks) (NCERT Exemplar)

5. Arithmetic Progressions

27. The common difference of A.P.: 3, $3 + \sqrt{2}$, $3 + 2\sqrt{2}$, $3 + 3\sqrt{2}$,...will be **(1 Mark) (NCERT Intext) (2025 BX)**

(a) $1 + \sqrt{2}$ (b) $3(1 + \sqrt{2})$ (c) $2\sqrt{2}$ (d) $\sqrt{2}$

28. The sum of first 15 multiples of 8 will be:
(1 Mark) (NCERT Intext) (2024 HX)

(a) 960 (b) 980 (c) 984 (d) 990

29. The eleventh term of the A. P. –62, –59, ... 7, 10 will be
(1 Mark) (2024 IA)

(a) –34 (b) –32 (c) –30 (d) –28

30. How many terms of the *A.P* 21, 18, 15, ... must be taken so that their sum is –81? **(4 Marks) (NCERT Intext) (2025 BW)**

31. Find the sum of 51 terms of an A.P. whose second and third terms are 14 and 18 respectively. **(6 Marks) (NCERT Intext) (2024 IA)**

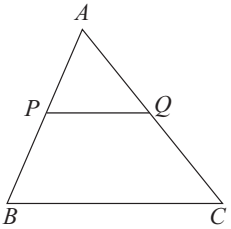
32. How many two-digit numbers are divisible by 3?
(2 Marks) (NCERT Intext) (2020 NA)

6. Triangles

33. If in ΔABC and ΔDEF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar if
(1 Mark) (NCERT Exemplar) (2024 HZ)

(a) $\angle B = \angle E$ (b) $\angle A = \angle F$
(c) $\angle A = \angle D$ (d) $\angle B = \angle D$

34. In the given figure base $BC \parallel PQ$ is drawn in ΔABC. If $PQ : BC = 1 : 3$, the ratio of AP and PB will be
(1 Mark) (2020 NA) (2023 DX)



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

35. In ΔABC if $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm, then measure of $\angle B$ will be **(1 Mark) (2022 RE, HI) (2023 DX)**

(a) 120° (b) 90° (c) 60° (d) 45°

36. A perpendicular is drawn from the vertex to the base of an equilateral triangle of side a. The measure of perpendicular will be: **(1 Mark) (2023 EA)**

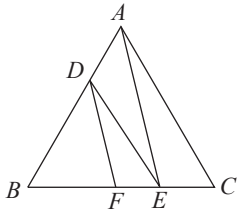
(a) $\frac{\sqrt{3}}{2}a$ unit (b) $\frac{3}{2}a$ unit
(c) $\frac{\sqrt{3}}{4}a$ unit (d) $\frac{3}{4}a$ unit

37. The perimeter of two similar triangles are 10 cm and 15 cm respectively, find ratio of their areas. **(1 Mark) (2023 EB)**

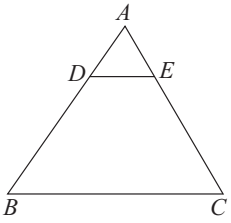
(a) 3 : 4 (b) 4 : 9 (c) 3 : 2 (d) 2 : 1

38. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Prove that $CA^2 = CB \times CD$.
(4 Marks) (NCERT Intext) (2024 IA) (2025 BV)

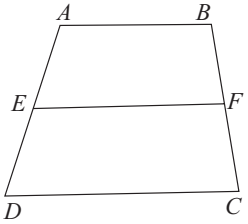
39. In the figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.
(4 Marks) (NCERT Intext) (2025 BX)



40. In the figure, $DE \parallel BC$. If $DB = 10.8$ cm, $AE = 2.7$ cm and $EC = 8.1$ cm, then find AD. **(1 Mark) (2020 MZ) (2022 RE)**



41. In the figure, $ABCD$ is a trapezium with $AB \parallel DC$. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB. Show that $\frac{AE}{ED} = \frac{BF}{FC}$.
(4 Marks) (NCERT Intext) (2022 RE)



7. Coordinate Geometry

42. The vertices of triangle ABC are (7, 5), (5, 7) and (−3, 3) respectively. If the mid-point of BC is D, then the measure of AD will be **(1 Mark) (2024 IB)**

(a) 4 units (b) 5 units (c) 6 units (d) 7 units

43. The distance of the point (–3, 5) from ***y***-axis will be
(1 Mark) (2022 HI) (2023 DX)

(a) – 3 (b) 2
(c) 5 (d) none of these

REAL NUMBERS

1

CONCEPT MAP

Real Numbers

The Fundamental Theorem of Arithmetic:

- Every composite number can be expressed (factorized) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur.

Note: Fundamental theorem of arithmetic is called a Unique Factorisation Theorem.

Composite number = Product of prime numbers.

e.g. $\therefore 24 = 2 \times 2 \times 2 \times 3$

$= 2^3 \times 3$, where 2 and 3 are prime numbers

Theorems:

- **Theorem 1:** Let p be a prime number. If p divides a^2, then p divides a, where a is a positive integer.
- **Theorem 2:** $\sqrt{2}$ is an irrational number.

Note: The square root of any positive integer is irrational if the number is not a perfect square (whether prime or composite).

Irrational Numbers:

It cannot be expressed as $x = \frac{p}{q}$, $q \neq 0$. where p and q are integers.

e.g.: $\sqrt{2}, \sqrt{3}, \pi, \ldots$

Prime Factorisation Method:

Prime Factorisation is a way of representing a number as a product of its prime factors. It is also used to find out the H.C.F and L.C.M.

For any two positive integers a and b we have,

H.C.F $(a, b) \times$ L.C.M $(a, b) = a \times b$

e.g.: Find H.C.F of 24 and 36.

Prime factorisation of 24 : $2^3 \times 3^1$

Prime factorisation of 36 : $2^2 \times 3^2$

H.C.F $= 2^2 \times 3^1 = 12$

e.g.: Find L.C.M of 12 and 18.

Prime factorisation of 12 : $2^2 \times 3^1$

Prime factorisation of 18 : $2^1 \times 3^2$

L.C.M $= 2^2 \times 3^2 = 36$

Rational Numbers:

It can be expressed as $x = \frac{p}{q}$, $q \neq 0$. where p and q are integers.

e.g.: $\frac{1}{4}, \frac{2}{3}$, 2, …

Integers 'Z' or 'I':

Integers include all whole numbers and negative numbers.

e.g.: … –3, –2, –1, 0,2,3,.....

Negative Integer:

e.g.: –1, –2, –3, …

Whole Number 'W':

The whole number which includes all the non-negative integers.

W: 0, 1, 2, 3, …

Zero

Natural Number 'N':

Natural numbers are all positive integers

N: 1, 2, 3, …

Prime Number:

Prime numbers are natural numbers that are divisible by only 1 and the number itself.

e.g. 2, 3, 5, 7, 11, 13.....

Composite Number:

Composite numbers are numbers that have more than two factors.

e.g. 4, 6, 8, 9, 10, 12....

Co-prime Number:

Co-prime numbers are a pairs of numbers which have a common factor of 1.

e.g. (14,15), (1,99), (8,15)

PRACTICE QUESTIONS

Multiple Choice Questions (1 M)

1. The sum of a rational and an irrational number will be: **(2025 BV)**
(*a*) Rational number (*b*) Natural number
(*c*) Whole number (*d*) Irrational number

2. The prime factorization of number 156 will be: **(2025 BV, BY)**
(*a*) $2 \times 3 \times 13$ (*b*) $2^2 \times 3 \times 13$
(*c*) $2^2 \times 3 \times 11$ (*d*) $2 \times 3^2 \times 13$

3. The HCF of 15 and 25 is 5, then their LCM will be: **(2025 BV)**
(*a*) 150 (*b*) 75 (*c*) 125 (*d*) 100

4. If HCF (35, 49) = 7 then LCM (35, 49) will be: **(2025 BW)**
(*a*) 1715 (*b*) 343 (*c*) 245 (*d*) 175

5. The HCF of two numbers 306 and 657 will be: **(2025 BW)**
(*a*) 3 (*b*) 9 (*c*) 18 (*d*) 73

6. LCM and HCF of two numbers are 168 and 6 respectively. If one number is 24, then second number will be: **(2025 BW)**
(*a*) 12 (*b*) 42 (*c*) 84 (*d*) 126

7. If LCM (35, 63) = 315, the HCF (35, 63) will be: **(2025 BX)**
(*a*) 5 (*b*) 7 (*c*) 9 (*d*) 11

8. The LCM of the numbers 12, 15 and 21 will be: **(2025 BX)**
(*a*) 60 (*b*) 120 (*c*) 210 (*d*) 420

9. The product of $\sqrt{2}$ and $\left(2-\sqrt{2}\right)$ will be: **(2025 BX)**
(*a*) An irrational number (*b*) A rational number
(*c*) An integer (*d*) None of the above

10. The HCF of the numbers 175 and 91 will be **(2025 BY)**
(*a*) 5 (*b*) 7 (*c*) 9 (*d*) 25

11. Which of the following numbers will be a rational number? **(2025 BY)**
(*a*) $\frac{\sqrt{3}}{\sqrt{5}}$ (*b*) $\sqrt{2}\times\sqrt{7}$
(*c*) $\left(\sqrt{5}+\sqrt{7}\right)\left(\sqrt{5}-\sqrt{7}\right)$ (*d*) $\sqrt{12}$

12. HCF of the numbers 96 and 404 is 4. Value of their LCM will be **(2025 BZ)**
(*a*) 1616 (*b*) 2424 (*c*) 3636 (*d*) 9696

13. If LCM of 26, 156 is 156, then the value of HCF will be: **(2024 HX) (2023 DY)**
(*a*) 156 (*b*) 26 (*c*) 13 (*d*) 6

14. Which one of the following is a pair of co-prime numbers? **(2024 HX)**
(*a*) (14, 35) (*b*) (18, 25) (*c*) (31, 93) (*d*) (32, 62)

15. The least number which when divided by 35, 56 and 91 leaves the same remainder 7 in each case will be: **(2024 HX)**
(*a*) 3640 (*b*) 3645 (*c*) 3647 (*d*) 3740

16. Irrational number in the following will be **(2024 HY)**
(*a*) $\sqrt{25}$ (*b*) $\sqrt{81}$ (*c*) $\frac{5}{3}$ (*d*) $5+\sqrt{2}$

17. Rational number will be **(2024 HZ)**
(*a*) $\sqrt{2}$ (*b*) $\sqrt{3}$ (*c*) $\sqrt{9}$ (*d*) $\sqrt{7}$

18. The HCF of the numbers 182 and 78 will be **(2024 IA)**
(*a*) 13 (*b*) 26 (*c*) 28 (*d*) 39

19. If HCF of 65 and 117 is expressed as $65\boldsymbol{p} - 117$, then the value of $\boldsymbol{p}$ will be **(NCERT Exemplar) (2024 IB)**
(*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4

20. LCM of 15, 18 and 24 is **(2024 IB)**
(*a*) 90 (*b*) 120 (*c*) 240 (*d*) 360

21. Simplest form of $\frac{148}{185}$ is **(2024 IB)**
(*a*) $\frac{4}{5}$ (*b*) $\frac{5}{7}$ (*c*) $\frac{5}{4}$ (*d*) $\frac{7}{5}$

22. The sum of powers of prime factors of the factorization of the number 144 will be **(2023 EB, EZ) (2022 HI)**
(*a*) 3 (*b*) 4 (*c*) 5 (*d*) 6

23. Given that LCM of (132, 288) = 3168, then HCF (132, 288) will be **(2023 DX) (2022 RE)**
(*a*) 288 (*b*) 132 (*c*) 48 (*d*) 12

24. The largest number which divides 245 and 1037, leaving remainder 5 in each case, will be: **(2023 DY)**
(*a*) 22 (*b*) 23 (*c*) 24 (*d*) 25

25. From the given numbers the prime number will be: **(2023 EA)**
(*a*) 0 (*b*) 1 (*c*) 2 (*d*) 8

26. Which one is a pair of co-prime numbers? **(2023 EB)**
(*a*) (18, 25) (*b*) (5, 15) (*c*) (7, 21) (*d*) (31, 93)

27. The biggest number which divides 125 and 70, and gives remainder 8 and 5 respectively will be: **(NCERT Exemplar) (2023 ZZ)**
(*a*) 15 (*b*) 13 (*c*) 17 (*d*) 14

28. The LCM of 15, 18, and 24 is **(2020 MZ)**
(*a*) 90 (*b*) 120 (*c*) 240 (*d*) 360

29. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x, y are prime numbers, then HCF (a, b) is **(NCERT Exemplar)**
(*a*) xy (*b*) xy^2 (*c*) x^3y^3 (*d*) x^2y^2

30. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; where a, b being prime numbers, then LCM (p, q) is equal to **(NCERT Exemplar)**
(*a*) ab (*b*) a^2b^2 (*c*) a^3b^2 (*d*) a^3b^3

31. The product of a non-zero rational and an irrational number is **(NCERT Exemplar)**
(*a*) always irrational (*b*) always rational
(*c*) rational or irrational (*d*) one

32. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is **(NCERT Exemplar)**
(*a*) 10 (*b*) 100 (*c*) 504 (*d*) 2520

Descriptive Questions (2M, 4M or 6M)

1. Find the HCF of the 96 and 404 by the prime factorization method. *(2 Marks)* (2025 BV) (2020 NA)
2. Prove that $6 - \sqrt{2}$ is irrational. *(2 Marks)* (2025 BW)
3. Prove that $6\sqrt{3}$ is irrational. *(2 Marks)* (2025 BX)
4. Prove that $7\sqrt{5}$ is an irrational number. *(2 Marks)* (2025 BY)
5. Prove that $3\sqrt{2}$ is an irrational number. *(2 Marks)* (NCERT Intext) (2025 BZ)
6. Find the LCM of the numbers 120 and 315. *(2 Marks)* (2025 BZ)
7. Given that HCF (99, 153) = 9, find the value of LCM (99, 153). *(2 Marks)* (2024 HX)
8. (*i*) Find the LCM of 867 and 255. *(2 Marks)*
   (*ii*) Find the HCF of 867 and 255. *(2 Marks)*
9. Prove that $\sqrt{2}$ is an irrational number. *(2 Marks)* (NCERT Intext) (2024 HY) (2023 EA) (2022 HI)
10. Find the LCM and HCF of 2520 and 10530 by prime factorization method. *(2 Marks)* (2024 HZ)
11. Prove that $2\sqrt{3}$ is an irrational number. *(2 Marks)* (2024 HZ, IB)
12. Find the LCM of the numbers 92 and 510. *(2 Marks)* (2024 IA)
13. Prove that $\sqrt{3}$ is an irrational number. *(2 Marks)* (NCERT Intext) (2024 IA) (2023 DX) (2020 NA)
14. Given that HCF (255, 867) = 51, find the value of LCM (255, 867). *(2 Marks)* (2023 EA)
15. Prove that $5 + \sqrt{3}$ is an irrational number. *(2 Marks)* (2023 EB)
16. Prove that $2 - \sqrt{5}$ is an irrational number. *(2 Marks)* (2022 RE)
17. Prove that $3 + \sqrt{5}$ is an irrational number *(2 Marks)* (2020 MZ)
18. Prove that $3\sqrt{2}$ is an irrational number. *(4 Marks)* (2020 NA)
19. The numbers 525 and 3000 are both divisible only by 3, 5, 15, 25 and 75. What is HCF (525, 3000)? Justify your answer. *(2 Marks)* (NCERT Exemplar)
20. Can two numbers have 18 as their HCF and 380 as their LCM? Give reasons. *(2 Marks)* (NCERT Exemplar)
21. Prove that $\sqrt{3} + \sqrt{5}$ is irrational. *(2 Marks)* (NCERT Exemplar)
22. On a morning walk, three persons step 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 the same distance in complete steps? *(2 Marks)* (NCERT Exemplar)
23. If HCF (336, 54) = 6, find L.C.M (336, 54). *(2 Marks)*
24. Find the HCF and LCM of 480 and 720 using the Prime factorisation method. *(2 Marks)*
25. Prime factorisation of three numbers A, B and C is given below:
    $A = (2^r \times 3^p \times 5^q)$
    $B = (2^p \times 3^r \times 5^p)$
    $C = (2^q \times 3^q \times 5^p)$ such that, $p < q < r$ and p, q and r are natural numbers.
    - The largest number that divides A, B and C without leaving a remainder is 30.
    - The smallest number that leaves a remainder of 2 when divided by each of A, B and C is 5402.

    Find A, B and C. Show your work. *(4 Marks)*
26. A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also, he wants to make distinct rows of the trees (only one type of tree in one row). Find the minimum number of rows required. *(2 Marks)*
27. Four bells ring at an interval of 4, 7, 12 and 14 seconds respectively. If the four bells begin to ring at 12 O'clock when will this next ring together and how often will they do so in the next 14 minutes? *(2 Marks)*
28. Write the smallest number which is divisible by both 306 and 657. *(2 Marks)*

Competency Based Questions

1. In a formula racing competition, the time taken by two racing cars A and B to complete 1 round of the track is 30 minutes and p minutes respectively. If the cars meet again at the starting point for the first time after 90 minutes and the H.C.F (30, p) = 15, then the value of p is *(1 Mark)*
   (a) 45 minutes (b) 60 minutes
   (c) 75 minutes (d) 180 minutes
2. During a chemical experiment, two solutions need to be added together in such a way that the total volume of the mixture is a rational number. If one solution has a volume of $\sqrt{3}$ liters and the other has a volume of $\sqrt{12}$ liters, prove that the mixture cannot have a rational volume. *(2 Marks)*
3. National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same artform and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room? *(2 Marks)*
4. Grow More Plantations have two rectangular fields of the same width but different 2 lengths. They are required to plant 84 trees in the smaller field and 231 trees in the larger field. In both fields, the trees will be planted in the same number of rows but in different numbers of columns. *(4 Marks)*
   (*i*) What is the most number of rows that can be planted in this arrangement? Show your work.
   (*ii*) If the trees are planted in the number of rows obtained in part (*i*), how many columns will each field have?
5. Rahul and Priya are working on a math project about prime factorization. They decide to create a game where they choose a number and then find its prime factors. Rahul chooses the number 2520, and Priya chooses 3960. They want to find out which number has more prime factors and calculate the HCF and LCM of these two numbers. *(4 Marks)*
   (*i*) Help Rahul and Priya find the prime factorization of their chosen numbers.
   (*ii*) Determine which number has more prime factors.
   (*iii*) Calculate the HCF and LCM of 2520 and 3960 using their prime factorization.
   (*iv*) If they were to find a number between 2520 and 3960 that has exactly 20 factors, how would they approach this problem?

ANSWER KEY

1. (*d*)	**2.** (*b*)	**3.** (*b*)	**4.** (*c*)	**5.** (*b*)	**6.** (*b*)	**7.** (*b*)	**8.** (*d*)	**9.** (*a*)	**10.** (*b*)
11. (*c*)	**12.** (*d*)	**13.** (*b*)	**14.** (*b*)	**15.** (*c*)	**16.** (*d*)	**17.** (*c*)	**18.** (*b*)	**19.** (*b*)	**20.** (*d*)
21. (*a*)	**22.** (*d*)	**23.** (*d*)	**24.** (*c*)	**25.** (*c*)	**26.** (*a*)	**27.** (*b*)	**28.** (*d*)	**29.** (*b*)	**30.** (*c*)
31. (*a*)	**32.** (*d*)								

EXPLANATIONS

Descriptive Questions

1. Prime factorisation of both numbers

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^5 \times 3$ *(½ M)*

$404 = 2 \times 2 \times 101 = 2^2 \times 101$ *(½ M)*

Hence, HCF of 96 and 404 $= 2^2 = 4$ *(1 M)*

2. Let us assume to the contrary that $6 - \sqrt{2}$ is a rational number.

Hence, $6 - \sqrt{2}$ can be written in the form of $\frac{a}{b}$ where a and b are co-prime positive integers such that $b \neq 0$.

$$6 - \sqrt{2} = \frac{a}{b}$$

$$\sqrt{2} = 6 - \frac{a}{b}$$

$$\sqrt{2} = \frac{6b - a}{b}$$ *(1 M)*

$\because$ a and b are integers then $\frac{6b - a}{b}$ is a rational number.

$\Rightarrow \sqrt{2}$ is rational.

This contradicts the facts that $\sqrt{2}$ is irrational.

Our assumption is wrong.

Hence, $6 - \sqrt{2}$ is an irrational number. *(1 M)*

3. Let us assume to the contrary that $6\sqrt{3}$ is a rational number.

Hence, $6\sqrt{3}$ can be written in the form of $\frac{a}{b}$ where a and b are co-prime positive integers such that $b \neq 0$.

$$\therefore 6\sqrt{3} = \frac{a}{b}$$

$$\sqrt{3} = \frac{a}{6b}$$ *(1 M)*

$\because$ a and b are integers then $\frac{a}{6b}$ is a rational number.

$\Rightarrow \sqrt{3}$ is rational.

This contradicts the fact that $\sqrt{3}$ is irrational.

Our assumption is wrong.

Hence, $6\sqrt{3}$ is an irrational number. *(1 M)*

4. Let us assume to the contrary that $7\sqrt{5}$ is a rational number.

Hence, $7\sqrt{5}$ can be written in the form of $\frac{a}{b}$ where a and b are co-prime positive integers such that $b \neq 0$.

$$7\sqrt{5} = \frac{a}{b}$$

$$\sqrt{5} = \frac{1}{7} \times \frac{a}{b}$$ *(1 M)*

$\because$ a and b are integers then $\frac{a}{7b}$ is a rational number.

$\Rightarrow \sqrt{5}$ is rational.

This contradicts the fact that $\sqrt{5}$ is irrational.

Our assumption is wrong.

Hence, $7\sqrt{5}$ is an irrational number. *(1 M)*

5. Let us assume to the contrary that $3\sqrt{2}$ is a rational number.

Hence, $3\sqrt{2}$ can be written in the form of $\frac{a}{b}$ where a and b are co-prime positive integers such that $b \neq 0$.

$$3\sqrt{2} = \frac{a}{b}$$

$$\sqrt{2} = \frac{1}{3} \times \frac{a}{b}$$

$$\sqrt{2} = \frac{a}{3b}$$ *(1 M)*

$\because$ a and b are integers then $\frac{a}{3b}$ is a rational number.

$\Rightarrow \sqrt{2}$ is rational.

This contradicts the facts that $\sqrt{2}$ is irrational.

Our assumption is wrong.

Hence, $3\sqrt{2}$ is an irrational number. *(1 M)*

6. Prime factorisation of 120 and 315 are

$120 = 2^3 \times 3 \times 5$ *(½ M)*

$315 = 3^2 \times 5 \times 7$ *(½ M)*

$\therefore$ $LCM = 2^3 \times 3^2 \times 5 \times 7 = 8 \times 9 \times 5 \times 7 = 2520$ *(1 M)*

7. Given, HCF (99, 153) = 9

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

$\therefore$ LCM (99, 153) $\times$ HCF (99, 153) $= 99 \times 153$

LCM (99, 153) $\times 9 = 15147$ *(1 M)*

MODEL PAPER

3

Time: 3 hours 15 minute **Max. Marks: 70**

Note: First 15 minutes has been allotted for the candidates to read the question paper.

GENERAL INSTRUCTIONS:

(*i*) All questions are compulsory.

(*ii*) There are two sections in this question paper.

(*iii*) In Section 'A' 20 Multiple Choice Questions are of 20 marks whose answers are given to be in OMR sheet.

(*iv*) Do not cut the answers after mentioned in OMR sheet and do not use the eraser and whitener.

(*v*) Section 'B' has been descriptive questions of 50 marks.

(*vi*) There are five questions in this section.

(*vii*) In the beginning of each question, it has been clearly mentioned that how many parts of it are to be attained.

(*viii*) Marks allotted to each question are mentioned against them.

(*ix*) Start from the first question and proceed to the last. Do not waste your time over a question which you cannot solve.

Section-A

Multiple Choice Questions

1. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x, y are prime numbers, then HCF (a, b) is 1

(*a*) xy (*b*) xy^2 (*c*) x^3y^3 (*d*) x^2y^2

2. Three alarm clocks ring their alarms at regular intervals of 20 min, 25 min and 30 min respectively. If they first beep together at 12 noon, at what time will they beep again for the first time? 1

(*a*) 4:00 pm (*b*) 4:30 pm

(*c*) 5:00 pm (*d*) 5:30 pm

3. Aruna has only Rs. 1 and Rs. 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is Rs. 75, then the number of Rs. 1 and Rs. 2 coins are, respectively 1

(*a*) 35 and 15 (*b*) 35 and 20

(*c*) 15 and 35 (*d*) 25 and 25

4. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is 1

(*a*) 10 (*b*) 100 (*c*) 504 (*d*) 2520

5. The 21st term of the AP whose first two terms are –3 and 4 is 1

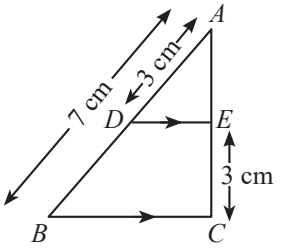
(*a*) 17 (*b*) 137 (*c*) 143 (*d*) –143

6. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and –3, then 1

(*a*) $a = -7, b = -1$ (*b*) $a = 5, b = -1$

(*c*) $a = 2, b = -6$ (*d*) $a = 0, b = -6$

7. In the given figure, $DE \parallel BC$. If $AD = 3$ cm, $AB = 7$ cm and $EC = 3$ cm, then the length of AE is: 1



(*a*) 2 cm (*b*) 2.25 cm (*c*) 3.5 cm (*d*) 4 cm

8. Values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is 1

(*a*) 0 only (*b*) 4 (*c*) 8 only (*d*) 0, 8

9. $AOBC$ is a rectangle whose three vertices are $A(0, 3)$, $O(0, 0)$ and $B(5, 0)$. The length of its diagonal is 1

(*a*) 5 (*b*) 3 (*c*) $\sqrt{34}$ (*d*) 4

10. It is given that $\Delta ABC \sim \Delta DFE$, $\angle A = 30°$, $\angle C = 50°$, $AB = 5$ cm, $AC = 8$ cm and $DF = 7.5$ cm. Then, the following is true: 1

(*a*) $DE = 12$ cm, $\angle F = 50°$ (*b*) $DE = 12$ cm, $\angle F = 100°$

(*c*) EF = 12 cm, $\angle$D = 100° (*d*) $EF = 12$ cm, $\angle D = 30°$

4000-5000	15
5000-6000	5
Total	**600**

Compute the median income.

3. In the centre of a rectangular lawn of dimensions 50 m × 40 m, a rectangular pond has to be constructed, so that the area of the grass surrounding the pond would be 1184 m^2 [see Fig.]. Find the length and breadth of the pond. 6

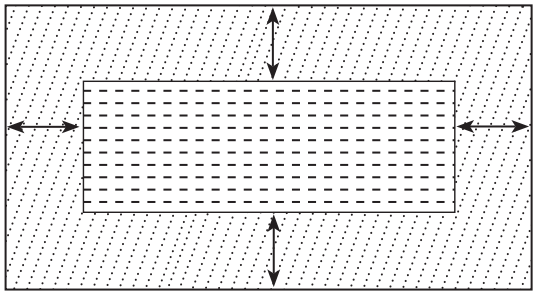


Fig.

OR

At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha. 6

4. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height h. At a point on the plane, the angles of elevation of the bottom and the top of the flag staff are α and β respectively. Prove that the height of the tower is $\frac{h\tan\alpha}{\tan\beta - \tan\alpha}$. 6

OR

The shadow of a tower standing on a level plane is found to be 50 m longer when Sun's elevation is 30° than when it is 60°. Find the height of the tower. 6

5. How many cubic centimetres of iron is required to construct an open box whose external dimensions are 36 cm, 25 cm and 16.5 cm provided the thickness of the iron is 1.5 cm . If one cubic centimetre of iron weights 7.5 g, find the weight of the box. 6

OR

Water flows at the rate of 10 m/minute through a cylindrical pipe 5 mm in diameter. How long would it take to fill a conical vessel whose diameter at the base is 40 cm and depth 24 cm. 6

ANSWER KEY

1. (*b*)	**2.** (*c*)	**3.** (*d*)	**4.** (*d*)	**5.** (*b*)	**6.** (*d*)	**7.** (*b*)	**8.** (*d*)	**9.** (*c*)	**10.** (*b*)
11. (*a*)	**12.** (*a*)	**13.** (*c*)	**14.** (*b*)	**15.** (*c*)	**16.** (*b*)	**17.** (*a*)	**18.** (*c*)	**19.** (*d*)	**20.** (*b*)

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UP BOARD (BX)

2025

Time : 3 hours 15 minutes **Max. Marks : 70**

Note: First 15 minutes time has been allotted for the candidates to read the question paper.

INSTRUCTIONS:

(*i*) All questions are compulsory.

(*ii*) This question paper has two sections 'A' and 'B'

(*iii*) Section 'A' contains 20 multiple choice type questions of 1 mark each that have to be answered on OMR answer sheet by darkening completely the correct circle with blue or black ballpoint pen.

(*iv*) After giving answer on OMR answer sheet, do not cut or use eraser, whitener etc.

(*v*) Section 'B' contains descriptive type questions of 50 marks.

(*vi*) Total 5 questions are there in this section.

(*vii*) In the beginning of each question, it has been mentioned how many parts of it are to be attempted.

(*viii*) Marks allotted to each question are mentioned against it.

(*ix*) Start from the first question and go up to the last question. Do not waste your time on the question you cannot solve.

(*x*) If you need place for rough work do it on the left page of your answer book and cross (X) the page. Do not write any solution on that page.

SECTION-A

Multiple Choice Type Questions

1. If $\tan\theta = \frac{3}{4}$, then the value of $\cos\theta$ will be: ***(1 Mark)***

(*a*) $\frac{4}{5}$ (*b*) $\frac{3}{5}$ (*c*) $\frac{4}{3}$ (*d*) $\frac{5}{4}$

2. A die is thrown once, the probability of getting an even number will be: ***(1 Mark)***

(*a*) 1 (*b*) $\frac{1}{2}$ (*c*) $\frac{1}{3}$ (*d*) $\frac{1}{6}$

3. The median class of the following frequency distribution will be: ***(1 Mark)***

Class-Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 –50
Frequency	7	8	15	10	5

(*a*) 10–20 (*b*) 30–40 (*c*) 20–30 (*d*) 40–50

4. The modal class of the following table will be: ***(1 Mark)***

Class-Interval	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency	2	7	11	8	6

(*a*) 20 – 25 (*b*) 15 – 20 (*c*) 0 – 5 (*d*) 10 – 15

5. Which of the following cannot be the probability of any event? ***(1 Mark)***

(*a*) 1 (*b*) −1 (*c*) $\frac{1}{2}$ (*d*) $\frac{1}{3}$

6. If $3\cot A = 4$, then the value of $\frac{1-\tan^2 A}{1+\tan^2 A}$ will be: ***(1 Mark)***

(*a*) $\frac{7}{25}$ (*b*) $-\frac{7}{25}$ (*c*) $\frac{8}{17}$ (*d*) $\frac{9}{41}$

7. The value of $\cos 60°$ is: ***(1 Mark)***

(*a*) $\frac{\sqrt{3}}{2}$ (*b*) $\frac{1}{\sqrt{2}}$ (*c*) $\frac{1}{2}$ (*d*) 1

8. The value of $\frac{1+\cot^2\theta}{1+\tan^2\theta}$ will be: ***(1 Mark)***

(*a*) $\sec^2\theta$ (*b*) $\text{cosec}^2\theta$ (*c*) $\tan^2\theta$ (*d*) $\cot^2\theta$

9. If LCM (35, 63) = 315, the *HCF*(35, 63) will be: ***(1 Mark)***

(*a*) 5 (*b*) 7 (*c*) 9 (*d*) 11

10. The LCM of the numbers 12, 15 and 21 will be: ***(1 Mark)***

(*a*) 60 (*b*) 120 (*c*) 210 (*d*) 420

11. The product of $\sqrt{2}$ and $\left(2-\sqrt{2}\right)$ will be: ***(1 Mark)***

(*a*) An irrational number (*b*) A rational number

(*c*) An integer (*d*) None of the above

OR

The length of a rectangular field is 9 m more than the twice of its width. If the area of the field is 810 m^2, find the length and width of the field. **(*6 Marks*)**

4. The shadow of a tower standing on level ground to be 30 m longer when the sun's altitude is 30° than when it is 60°. Find the height of the tower. (Use $\sqrt{3} = 1.732$) **(*6 Marks*)**

OR

Prove that: $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \sec\theta + \tan\theta$ **(*6 Marks*)**

5. A cubical block of side 14 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid. **(*6 Marks*)**

OR

A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 2 cm and the slant height of the cone is $2\sqrt{2}$ cm. Find the volume of the solid. (Use $\pi = 3.14$) **(*6 Marks*)**

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FREQUENTLY ASKED QUESTIONS (FAQs)

1 **What is the total duration of the exam?**
The total duration of the exam is 3 hours and 15 minutes (first 15 minutes for reading the paper and the remaining 3 hours for answering).

2 **How are the marks distributed between theory and internal assessment?**
The theory paper carries 70 marks, and internal assessment carries 30 marks.

3 **What types of questions are included in the theory paper?**
The paper includes multiple-choice questions (MCQs) and descriptive questions.

4 **What is the minimum passing criterion?**
Students must secure at least 33% marks in each subject to pass.

5 **Which is the official website for updates and notifications?**
The official website of the Uttar Pradesh Madhyamik Shiksha Parishad (UPMSP) for updates and notifications is upmsp.edu.in.

6 **Can answer sheets be rechecked or re-evaluated?**
Yes. UP Board Class 10 students can apply for scrutiny (rechecking) for totaling or evaluation errors by paying about ₹500 per subject within the official deadline after results are declared.

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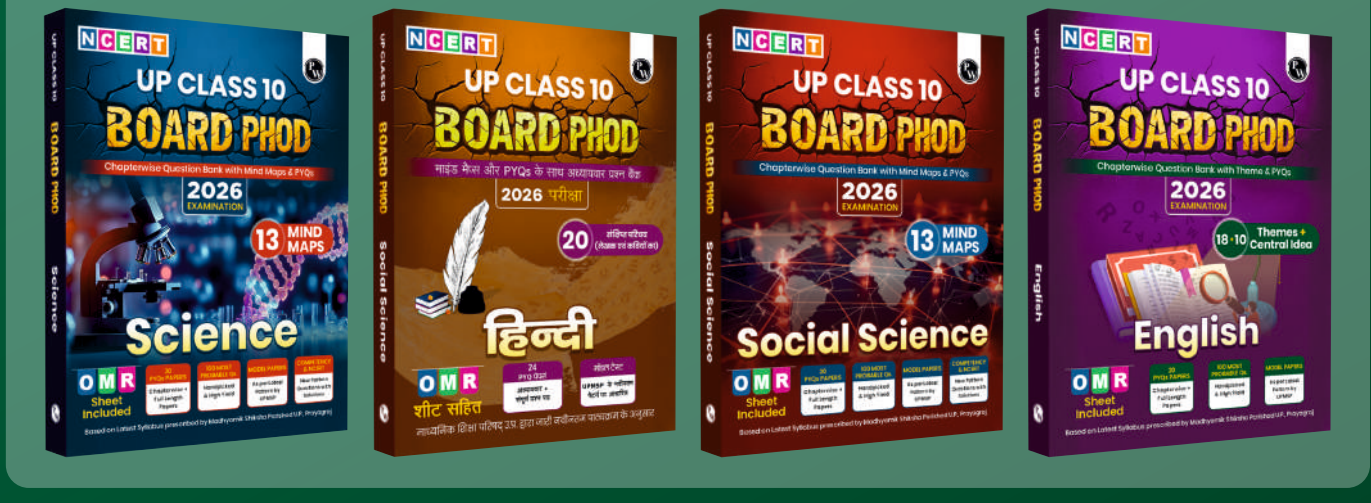

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