ORANGE GLOBAL OLYMPIAD

MATHEMATICS
Grade 10

National Level Examination

NLE 2025

Subject Code: | 2 | 0 | 1 |

Total Questions: 50 **Total Marks:** 50 **Time:** 1 hour

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED TO DO SO

- All questions are compulsory.
- Read the instructions on the **ANSWER SHEET** and fill in your **NAME**, **CLASS** and **OTHER INFORMATION**.
- To mark your choice of answer by darkening the circles in the **ANSWER SHEET**, use a **BLUE/BLACK BALL PEN** only.
- You **MUST** record your answers on the **ANSWER SHEET** only.
- There are **50 MULTIPLE CHOICE QUESTIONS**. Use the information provided to choose the **BEST** possible answer among the four options. On your **ANSWER SHEET** fill in the circle that matches your answer.
- $\frac{1}{2}$ **MARK** will be deducted for every **WRONG ANSWER**.
- Return the **ANSWER SHEET** to the invigilator at the end of the examination.
- You are **NOT** allowed to use a calculator. You may use a ruler and spare paper for rough work.

This question paper contains a total of 50 questions divided into three sections—A, B and C.
Read the instructions carefully before attempting these questions.

Section A (Logical Reasoning)

1. When a 7-digit number ABCCCDE is multiplied by 4 then it is reversed as EDCCCBA, i.e., ABCCCDE × 4 = EDCCCBA, where each alphabet represents a distinct digit, and the leftmost digit in each number cannot be zero, then the value of (B + E) is

   (A) 6 (B) 9

   (C) 10 (D) 12

2. $t_n = t_{(n-1)} - t_{(n-2)} + t_{(n-3)}$, for all $n \geq 4$, then find the sum of first 102 terms of the given series if $t_1 = 1$, $t_2 = -2$, and $t_3 = 3$.

   (A) 199 (B) 219

   (C) 225 (D) 242

3. In a class of 130 students each student likes at least one of the 3 subjects. If 46 students like Science, 50 like English, and 64 like Maths, then find the maximum number of students who like exactly 2 subjects.

   (A) 58 (B) 40

   (C) 45 (D) 30

4. There are 200 balls which are identical in appearance. 199 are of same weight and one ball is slightly heavier. One has to identify this heavier ball by using a *Tarazu* (weighing scale having two panes). Minimum number of times he/she needs to use *Tarazu* to identify the heavier ball is

   (A) 4 (B) 5

   (C) 6 (D) 7

5. A word arrangement machine when given an input of the words, rearranges them following a particular logic/ rule in each step.

   INPUT: Gold is a chemical element with the symbol Au.

   Step 1: A gold is chemical element with the symbol Au.

   Step 2: A Au gold is chemical element with the symbol.

   Step 3: A Au is gold chemical element with the symbol.

   Step 4: A Au is the gold chemical element with symbol.

   Step 5: A Au is the gold with chemical element symbol.

   Step 6: A Au is the gold with symbol chemical element.

   Step 7: A Au is the gold with symbol element chemical.

   Here, 7th step (Output) is the last step for the given input.

   If below input is given then its output is

   INPUT: Neeraj Chopra First Indian To Win Olympic Gold In Athletics

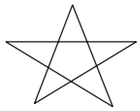
   (A) In To Win Gold First Chopra Indian Neeraj Olympic Athletics

   (B) Athletics Chopra First Gold In Indian Neeraj Olympic To Win

   (C) Athletics Chopra First Gold Indian In Neeraj Olympic To Win

   (D) In To Win First Gold Indian Chopra Neeraj Olympic Athletics

6. How many convex quadrilaterals and pentagons are there in the figure?



(A) 5 (B) 6

(C) 8 (D) 10

7. Write the missing number in EPFQ, GPHQ, IPJQ, _____ .

(A) KPLQ (B) MPNQ

(C) OPQQ (D) JPIQ

8. Find the missing value

3				10
	5		9	
		81	?	
		1	4	
	14		14	
7				5

(A) 36 (B) 25

(C) 49 (D) 81

9. Find the next number in the series: 109, 119, 130, 134, 142, 149, 163, ?

(A) 170 (B) 173

(C) 175 (D) 179

10. Find the missing number.

2	**4**	**7**	**8**
2	4	7	8
4	6	9	4
8	4	3	2
6	6	1	?

(A) 2 (B) 4

(C) 6 (D) 8

Section B (Subject Specific)

11. Find the value of $\sqrt{132-\sqrt{132-\sqrt{132\ldots\ldots\infty}}}$.

(A) –11 (B) 12

(C) –12 (D) 11

12. The decimal expansion of $\frac{43}{2^4 5^3}$ will terminate after _____.

(A) 3 places (B) 2 places

(C) 4 places (D) 5 places

13. If $\frac{5+9+13+\ldots n \text{ terms}}{7+9+11+\ldots 12 \text{ terms}}=\frac{5}{12}$, then n equal to

(A) 4 (B) 5

(C) 6 (D) 7

14. Find the largest prime factor of N, if $N = 3^{17} + 3^{16} - 12$.

(A) 4153 (B) 5009

(C) 4561 (D) 6091

15. A wire in the shape of an equilateral triangle encloses an area of S sq.cm. If the same wire is bent to form a circle. The area of the circle will be

(A) $\frac{\pi S^2}{9}$ (B) $\frac{3S^2}{\pi}$

(C) $\frac{3S}{\pi}$ (D) $\frac{3\sqrt{3}S}{\pi}$

16. If α, β are the zeroes of the polynomial $f(x) = 3x^2 + 7x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{40}{9}$, then find the value of k for this to be possible.

(A) 1 (B) 2

(C) 3 (D) 4

17. If $x^3 + x^2 - ax + b$ is divisible by $x^2 - 2x$, then the values of a and b are _____.

(A) $a = 0, b = 6$ (B) $a = 0, b = -6$

(C) $a = 6, b = 0$ (D) $a = -6, b = 0$

18. Determine $(6x)^x$ if $16^{x+2} = 16320 + 16^x$

(A) 27 (B) $\frac{3}{2}$

(C) 24 (D) 2

19. If $\tan A + \cot A = 5$, then the value of $\tan^4 A + \cot^4 A$ is

(A) 257 (B) 149

(C) 194 (D) 527

20. The value of p for which the graphs of equations $3x - y - 5 = 0$ and $6x - 2y - p = 0$ represent parallel lines is _____.

(A) 10 (B) –10

(C) $\neq 10$ (D) $\neq -10$

21. ₹720 was divided into A, B, C, D, E. The sum is received in ascending order and in arithmetic progression. If E received ₹40 more than A, how much did B receive?

(A) ₹124 (B) ₹134

(C) ₹144 (D) ₹154

22. If α, β are the roots of $x^2 - mx + 5 = 0$, and γ, δ are the roots of $x^2 - nx + 5 = 0$, then $(\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta)$ is equal to

(A) $5(n^2 - m^2)$ (B) $6(n^2 - m^2)$

(C) $7(m^2 - n^2)$ (D) $8(m^2 - n^2)$

23. If a student had scored 10 more marks in her mathematics test out of 50 marks, 9 times these marks will be equal to the square of the marks obtained by her. The marks scored by her are _____.

(A) 6 (B) –15

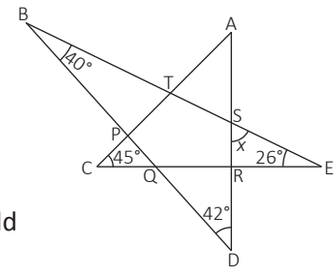
(C) 9 (D) 15

24. A train passes a 352 m long platform in 45 seconds and a man standing on the platform in 25 seconds. Find the speed of the train in km/h.

(A) 63.36 km/h (B) 17.6 km/h

(C) 36.63 km/h (D) 71.6 km/h

25. Find the angle *x* in the given figure:



(A) 42°

(B) 52°

(C) 82°

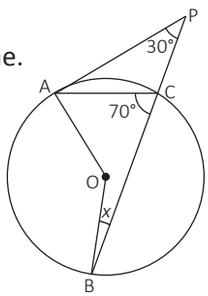
(D) 71°

26. If the sum of first *n* even natural numbers is equal to *x* times the sum of first *n* odd natural numbers, then the value of *x* is _____.

(A) n (B) $n + 1$

(C) $\frac{1}{n}$ (D) $1+\frac{1}{n}$

27. In the figure given alongside, PA is a tangent to the circle with centre O and PCB is a straight line. Find the measure of $\angle OBC$.



(A) 25°

(B) 20°

(C) 15°

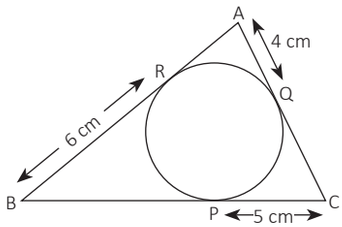
(D) 10°

28. An aeroplane leaves an airport and flies due North at 300 km/h. At that time, another aeroplane leaves the same airport and flies due West at 400 km/h. Then, the distance between aeroplanes after 1 h 30 min will be _____.

(A) 600 km (B) 450 km

(C) 750 km (D) 900 km

29. In the figure, the perimeter of ΔABC is



(A) 30 cm (B) 60 cm

(C) 45 cm (D) 15 cm

30. If $b \sin\theta = a$, then the value of $\cos\theta$ is _____.

(A) $\frac{b}{\sqrt{b^2-a^2}}$ (B) $\frac{b}{a}$

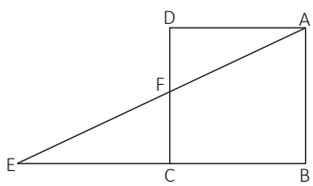
(C) $\frac{\sqrt{b^2-a^2}}{b}$ (D) $\frac{a}{\sqrt{b^2-a^2}}$

31. Find the value of $\sin^2 5° + \sin^2 15° + \sin^2 25° + \ldots + \sin^2 85°$.

(A) $3\frac{1}{2}$ (B) 4

(C) $4\frac{1}{2}$ (D) 5

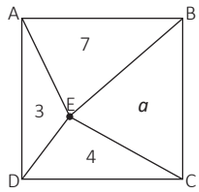
32. In the given figure (not to scale), ABCD is a square of side 10 cm. If CE = 15 cm, then find the length of FE (in cm).



(A) $2\sqrt{29}$ (B) $3\sqrt{21}$

(C) $3\sqrt{29}$ (D) $2\sqrt{21}$

33. In the given figure, ABCD is a square and the point E is inside of the square. The numbers shown are the areas of the corresponding triangles. Find the number in the place of '*a*'.



(A) 4 (B) 8

(C) 12 (D) 16

34. Cards with numbers 2 to 101 are placed in a box. A card is drawn at random, the probability that the number on the card is a perfect square is _____.

(A) $\frac{9}{100}$ (B) 0.09

(C) 9% (D) All of these

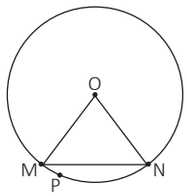
35. If $\operatorname{cosec}\theta - \sin\theta = m$, and $\sec\theta - \cos\theta = n$, then the value of $(m^2n)^{2/3} + (mn^2)^{2/3}$ is

(A) 4 (B) 3

(C) 2 (D) 1

Instruction: Q. 36 to 40 are two-key based questions having four options A, B, C, and D, out of which TWO are correct.

36. A circle with centre O is shown alongside. Chord MN subtends an angle *x* at O.

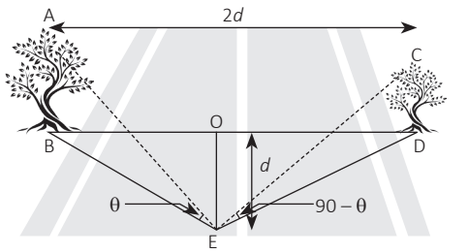


Which of these is/are true for the given circle?

(A) $\frac{x}{360^\circ} = \frac{\text{Length of arc MPN}}{\text{Circumference of the circle}}$ (B) $\frac{x}{360^\circ} = \frac{\text{Minor sector area}}{\text{Area of the circle}}$

(C) $\frac{x}{360^\circ} = \frac{2\times \text{length of arc MPN}}{\text{Circumference of the circle}}$ (D) $\frac{360^\circ}{x} = \frac{\text{Minor sector area}}{\text{Area of the circle}}$

37. Two trees are 2*d* metres apart. Ajay stood at a point midway between them and started walking in a direction perpendicular to the line connecting the two trees. After walking *d* metres, he observed the angle of elevations to the tops of the two trees and found them to be complementary.



If one of the trees is thrice as tall as the other, find the height of the taller tree, in terms of *d*.

(A) $3\times d\sqrt{\frac{2}{3}}$ (B) $2\times d\sqrt{\frac{3}{2}}$

(C) $d\sqrt{3}$ (D) $d\sqrt{6}$

38. If the points (p, q), (m, n) and $(p - m, q - n)$ are collinear, then _____.

(A) $pm = qn$ (B) $pn = qm$

(C) $p : m = n : q$ (D) $p : m = q : n$

39. Find the values of *a* and *b* so that $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $(x^2 - 1)$.

(A) –1 (B) –7

(C) –9 (D) –12

40. $53^3 - 46^3 - 7^3$ is divisible by _____.

(A) 9 (B) 21

(C) 23 (D) None of these

Section C (Competency Enhancement)

Read the following description and answer the questions 41 to 43:

Tossing a coin is one of the most important events before the start of a cricket match. There is no sure, whether the head or tail will come. Both head and tail have 1 out of 2, i.e., 50% chances to occur. Hence, the probability of getting the desired outcome is 0.5. Similarly, while playing with dice, there are 1 out of 6 chances, that the required number will come.

41. Two fair dice are rolled. What is the probability that their 'Sum is less than 4'?

(A) $\frac{5}{12}$ (B) $\frac{7}{36}$

(C) $\frac{5}{36}$ (D) $\frac{1}{12}$

42. In a leap year, what is the probability of not getting 53 Sundays?

(A) $\frac{5}{7}$ (B) $\frac{2}{7}$

(C) $\frac{6}{7}$ (D) $\frac{1}{7}$

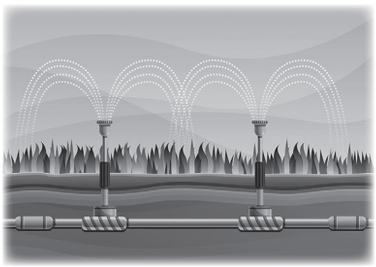
43. A single letter is selected at random from the word 'MATHEMATICS'. What is the probability that it is a vowel?

(A) $\frac{4}{11}$ (B) $\frac{3}{11}$

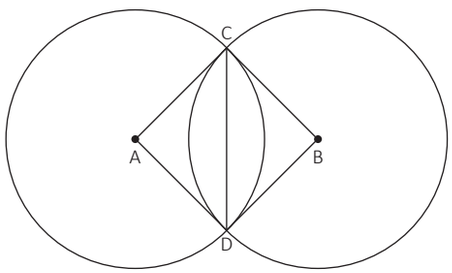
(C) $\frac{2}{11}$ (D) $\frac{1}{11}$

Read the following description and answer the questions 44 and 45:

Sprinklers are crop irrigation equipment that rotate around a central point and spray water on the crops in the circular region. Two such high-power sprinklers, occupying negligible areas are installed in a straight line in a field such that they spray water on a common area. The diagram drawn on the right side below is the top view where points A and B are the sprinklers.



Side view of the sprinklers



Top view of the region sprayed

Both sprinklers spray over an equal area. It is given that, CD = 40 m and $\angle CAD = \angle CBD = 90°$.

44. Find the radius of the circular region sprayed by the sprinkler.

(A) $10\sqrt{2}$ m

(B) $15\sqrt{2}$ m

(C) $18\sqrt{2}$ m

(D) $20\sqrt{2}$ m

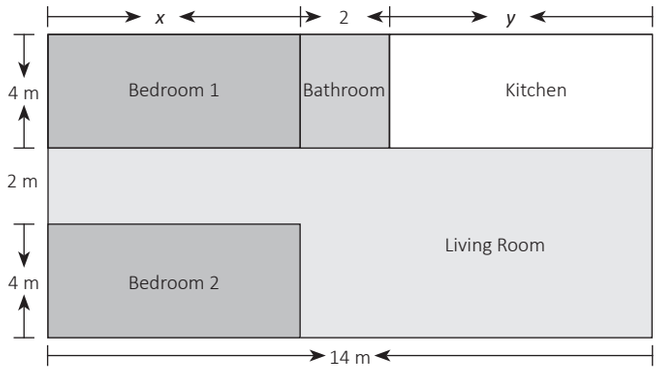
45. Find the area of the overlapping region.

(A) 456 m^2 (B) 465 m^2

(C) 228 m^2 (D) 282 m^2

Read the following description and answer the questions 46 to 48:

Apartments have increasingly become the most supplied property type across cities in India. Their popularity can be attributed to reasons including but not limited to contemporary looks, modern-day amenities, in-house maintenance, and better security. Vandana is planning to buy a 2BHK apartment and the layout is given below. The design and the measurement have been made such that the area of bedrooms and kitchen together is 68 m^2.



46. Which pair of linear equations in two variables describe this situation?

(A) $x + y = 16,\ 3x + y = 15$ (B) $x + y = 14,\ 3x + 4y = 68$

(C) $5x + 2y = 14,\ x + 4y = 10$ (D) $2x + y = 17,\ x + y = 12$

47. What is the area of the bedroom 1?

(A) 30 m^2 (B) 20 m^2

(C) 35 m^2 (D) 25 m^2

48. What is the cost of laying tiles in the kitchen at the rate of ₹100 per sq. m?

(A) ₹3000 (B) ₹3250

(C) ₹2800 (D) ₹2750

Read the following description and answer the questions 49 and 50:

Sahil bought a pair of glasses with wiper blades. He was curious to know the area being cleaned by each of the wiper blades. With the help of a ruler and a protractor, he found the length of each blade as 3 cm and the angle swept as 60°.

49. Find the area that each wiper cleans in one swipe, in terms of π.

(A) $\frac{1}{2}\pi$ cm^2 (B) $\frac{1}{3}\pi$ cm^2

(C) $\frac{3}{2}\pi$ cm^2 (D) $\frac{2}{3}\pi$ cm^2

50. If the diameter of each circular glass is 5 cm, what per cent of the area of the glass will be cleaned by the blade in one swipe?

(A) 21% (B) 22%

(C) 23% (D) 24%