ORANGE GLOBAL OLYMPIAD

# MATHEMATICS

## Grade 9

**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. If A = 1, B = 5, C = 15, D = 37, E = 83; then F =?
   (A) 161 (B) 177
   (C) 185 (D) 191

2. If 2 + 5 = 825, 1 + 7 = 149, 4 + 3 = 649, and 5 + 8 = *x*, then find *x*.
   (A) 25164 (B) 125256
   (C) 12564 (D) 51224

3. All the alphabets are distinct digits from 0 to 9 and the leftmost digit of a number cannot be 0 in the following addition.

$$\begin{array}{cccc} & & N & O \\ & P & I & N \\ + & & N & O \\ \hline \mathbf{H} & \mathbf{I} & \mathbf{N} & \mathbf{D} \end{array}$$

   The value of N is
   (A) 6 (B) 7
   (C) 8 (D) 9

4. All the alphabets given below are distinct digits from 0 to 9 and the leftmost digit cannot be 0.
   If $(ABC)^2$ = ADEFDC, then the value of A is
   (A) 3 (B) 6
   (C) 8 (D) 9

5. If January 21, 2028, is Thursday, then January 21, 2032, is
   (A) Monday (B) Wednesday
   (C) Tuesday (D) Sunday

6. Observe the pattern and find the missing number.

| | | | |
|---|---|---|---|
| 2 | 3 | 5 | 5 |
| 5 | 1 | 4 | 6 |
| 7 | 6 | 2 | 5 |
| = 142744 | = 101000 | = 111331 | = ? |

   (A) 121728 (B) 132197
   (C) 164096 (D) 174913

7. A cube of side 14 cm is painted red and then cut into smaller identical cubes each of side 2 cm. Find the number of smaller cubes with 2 faces painted red.
   (A) 144 (B) 84
   (C) 60 (D) 72

8. Find the next number in the following series.
   14, 19, 29, 40, 44, 52, ?
   (A) 58 (B) 59
   (C) 62 (D) 63

9. In a certain code language, '851' means 'good sweet fruit', '783' means 'good red rose' and '341' means 'rose and fruit'. Which of the following digits stands for 'sweet' in that language?
   (A) 8 (B) 5
   (C) 1 (D) 3

10. All the alphabets are distinct digits from 0 to 9 and the leftmost digit of any number cannot be 0 in the given addition.

$$\begin{array}{r} D\ O\ U\ N\ T \\ -\ D\ O\ I\ N \\ \hline \mathbf{S\ N\ U\ B} \end{array}$$

   The value of I is
   (A) 5 (B) 7
   (C) 8 (D) 9

## Section B (Subject Specific)

11. A number cannot be both
   (A) natural number and rational number (B) real number and irrational number
   (C) rational and irrational number (D) rational and whole number

12. If $x-\sqrt{5}=2$, then $x-\frac{1}{x}$ is
   (A) $2\sqrt{5}$ (B) $\sqrt{5}$
   (C) 2 (D) 4

13. Let '*a*' be a non-zero rational number and '*b*' be an irrational number. Then *ab* is a/an
   (A) rational number (B) irrational number
   (C) natural number (D) whole number

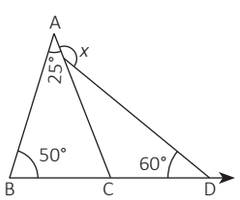
14. If points A(–1, 0), B(3, 4), C(2, –4), D(3, –5) and E(7, 3) are plotted in a Cartesian plane, then the point(s) not lying in any of the quadrants is/are _____.
   (A) B and E (B) A
   (C) C (D) D

15. Find '*x*', if $2^{x-7} \times 5^{x-4} = 1250$.
   (A) 7 (B) 8
   (C) 9 (D) 10

16. If $f(x) = 2x^3 - 13x^2 + 17x + 12$, then $f(-3)$ equals to
   (A) –200 (B) 210
   (C) –210 (D) 220

17. Let *a* and *b* be positive integers satisfying $a^3 - b^3 - ab = 25$. Find the largest possible value of $a^2 + b^3$.
   (A) 43 (B) 45
   (C) 47 (D) 49

18. In the given figure, the value of *x* is _____.
   (A) 135°
   (B) 85°
   (C) 110°
   (D) 155°

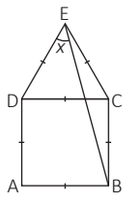


19. The square root of $\left(10+\sqrt{24}-\sqrt{60}-\sqrt{40}\right)$ is

(A) $\sqrt{2}+\sqrt{3}+\sqrt{5}$ (B) $\sqrt{2}+\sqrt{3}-\sqrt{5}$

(C) $\sqrt{2}-\sqrt{3}+\sqrt{5}$ (D) $\sqrt{2}-\sqrt{3}-\sqrt{5}$

20. In the given figure, the value of *x* is _____.




(A) 60°

(B) 45°

(C) 55°

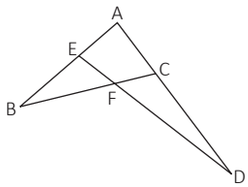
(D) 75°

21. If two distinct points are given, there

(A) is no line passing through them. (B) are two lines passing through them.

(C) are many lines passing through them. (D) is a unique line passing through them.

22. ABC and ADE are isosceles triangles. If ∠BFD = 156°, then ∠A =




(A) 68°

(B) 70°

(C) 76°

(D) 80°

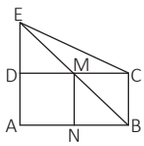
23. The first term of a sequence is 2014. Each succeeding term is the sum of the cubes of the digits of the previous term. What is the 2014th term of the sequence?

(A) 300 (B) 340

(C) 370 (D) 380

24. M and N are the mid-points of the sides DC and AB respectively of a rectangle ABCD.

If ar(ABCD) = 96 cm$^2$, then ar(ΔEMC) is _____.




(A) 72 cm$^2$ (B) 96 cm$^2$

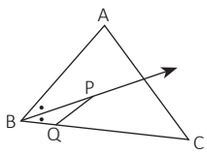
(C) 48 cm$^2$ (D) 24 cm$^2$

25. If AB = *x* + 3, BC = 2*x* and AC = 4*x* – 5, then for what value of *x*, B lies on AC?

(A) 8 (B) 5

(C) 2 (D) 3

26. P is a point on the bisector of ∠ABC. A line through P, parallel to BA meets BC at Q, then _____.



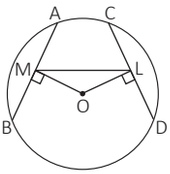

(A) BQ + PQ = BP

(B) BQ > QP

(C) BP = QP

(D) BQ = PQ

27. In the given figure, AB and CD are two equal chords of a circle, and ∠LOM = 130°, then ∠AML is _____.




(A) 30°

(B) 50°

(C) 65°

(D) 55°

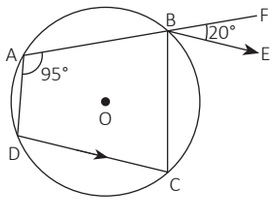
28. AD is the diameter of a circle and AB is a chord. If AD = 34 cm, AB = 30 cm, then find the distance of AB from the centre of the circle.

(A) 6 cm (B) 8 cm

(C) 9 cm (D) 10 cm

29. ABCD is a cyclic quadrilateral in which AB is extended till F and BE || DC.

If ∠FBE = 20° and ∠DAB = 95°, then find ∠ADC.



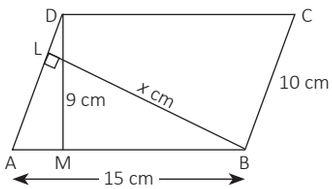

(A) 95°

(B) 105°

(C) 115°

(D) 120°

30. In the given figure, ABCD is a parallelogram. The value of $x$ is _____.




(A) 1.35 cm

(B) 13.5 cm

(C) 6.25 cm

(D) 27 cm

31. If the radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3, the ratio of their curved surface areas is _____.

(A) 20 : 27 (B) 15 : 6

(C) 10 : 9 (D) 2 : 5

32. A bag contains 8 blue balls and some pink balls. If the probability of drawing a pink ball is half of the probability of drawing a blue ball, then find the number of pink balls in the bag.

(A) 3 (B) 4

(C) 5 (D) 6

33. If $a$, $b$ and $c$ are all not equal to zero, and $a + b + c = 0$, then $\frac{a^2}{bc}+\frac{b^2}{ac}+\frac{c^2}{ab}$ is equal to _____.

(A) $3abc$ (B) $a^3 + b^3 + c^3$

(C) 3 (D) 1

34. The mean of 100 observations is 50. If one of the observations which was 50 is replaced by 150 then what will be the resulting mean?

(A) 51 (B) 50.5

(C) 51.5 (D) 52

35. There are 50 numbers. Each number is subtracted from 53 and the mean of obtained numbers is –3.5. Find the mean of the given numbers.

(A) 55 (B) 55.5

(C) 56 (D) 56.5

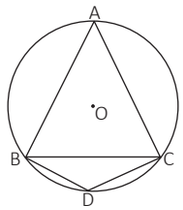
**Instruction: Q. 36 to 40 are two-key based questions having four options A, B, C, and D, out of which TWO are correct.**

36. A rational number equivalent to the rational number $\frac{5}{7}$ is _____.

(A) $\frac{15}{21}$ (B) $\frac{10}{14}$

(C) $\frac{14}{10}$ (D) $\frac{25}{49}$

37. In the given figure, $\Delta ABC$ is an equilateral triangle and ABDC is a cyclic quadrilateral.




Which of the following statements are correct?

(A) $\angle BDC$ and $\angle BAC$ are supplementary. (B) $\angle ABC$ and $\angle ACD$ are supplementary.

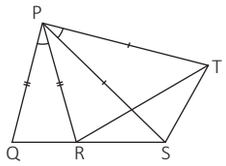
(C) $\angle ABD = \angle ACD = 90°$ (D) $\angle ABD + \angle ACD = 180°$

38. In an office, where 42 staff members work, 7 staff members use cars, 20 staff members use two-wheelers and the remaining 15 staff members use bicycles. Find the difference between the probabilities between staff members uses two wheelers and that of cars and also the sum of probabilities of staff members uses car and that of bicycles.

(A) $\frac{13}{42}$ (B) $\frac{9}{42}$

(C) $\frac{11}{21}$ (D) $\frac{13}{21}$

39. In the given figure, PQ = PR and PS = PT, $\angle QPR = \angle SPT$, then _____.




(A) $\angle QPS = \angle RPT$ (B) QR = ST

(C) QS = RT (D) None of these

40. The mirror image of a point $(x, y)$ about the $x$-axis is $(x, -y)$. Which of the following pairs are mirror images of each other about the $x$-axis?

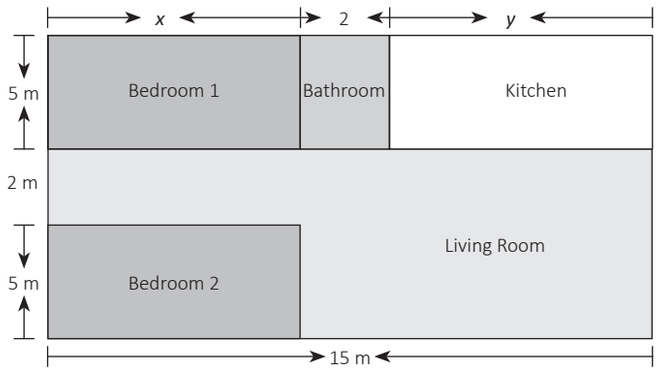
(A) (2, 4), (2, –4) (B) (–3, 5), (3, –5)

(C) (7, –9), (7, 9) (D) (8, 8), (–8, –8)

## Section C (Competency Enhancement)

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

It has been designed the layout of a house and kept the measurements as shown below. The area of two bedrooms and kitchen together is 95 $m^2$.




41. Form a linear equation to show the area of two bedrooms and the kitchen.

(A) $x + 2y = 19$ (B) $x - 2y = 19$

(C) $2x + y = 19$ (D) $2x - y = 19$

42. Length of outer boundary layout is

(A) 52 m (B) 54 m

(C) 56 m (D) 58 m

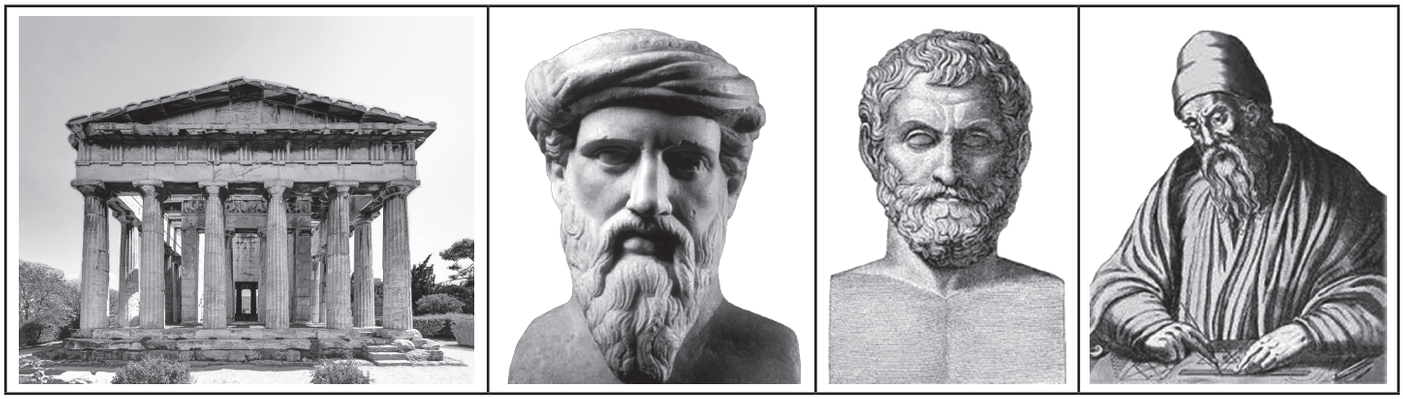
43. The area of the living room is

(A) 71 $m^2$ (B) 73 $m^2$

(C) 75 $m^2$ (D) 77 $m^2$

**Read the following description and answer the questions 44 to 46:**

A National Public School organised an educational trip to a museum. Almost all the students of class IX went on the trip with their Mathematics teacher. They saw many pictures of mathematicians and read about their contributions in the field of Mathematics. After visiting the museum, the teacher asked the following questions from the students.



44. Pythagoras was a student of

(A) Euclid (B) Thales

(C) Archimedes (D) Both (A) and (B)

45. The name of the mathematician who is visible in the last picture on the right side is

(A) Euclid (B) Pythagoras

(C) Thales (D) None of these

46. Which of the following needs a proof?

(A) Definition (B) Theorem

(C) Axiom (C) Postulate

**Read the following description and answer the questions 47 and 48:**

Mohan has a box of coloured pens. He takes the pens at random from the box. The probability that he takes a red pen from the box is 0.4, where the box contains a total 50 pens of red, blue, and green colour and there are 15 blue pens.

47. Find the number of red pens in the box.

(A) 15 (B) 20

(C) 25 (D) 30

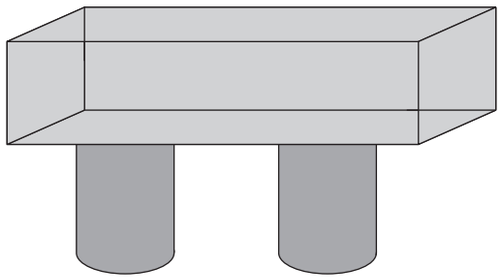
48. Find the probability of getting a green pen from the box.

(A) 0.3 (B) $\frac{1}{3}$

(C) 0.5 (D) 1.5

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

The following shape is cuboidal which is standing on two cylindrical beams. The dimensions of the cuboid are 3 m × 1.5 m × 0.5 m. The diameters of the cylinders are 0.7 m and their heights are 2 m each.



49. What is the total volume of two cylinders?

(A) 1.2 $m^3$ (B) 1.54 $m^3$

(C) 2.4 $m^3$ (D) 3.08 $m^3$

50. If the cuboidal shape needs to be painted, approximately how much area needs to be painted?

(A) 5.2 $m^2$ (B) 12.73 $m^2$

(C) 6.75 $m^2$ (D) 13.5 $m^2$