Reader's Sign _____ Date _____

ORANGE GLOBAL OLYMPIAD

School Level Examination
SLE 2024

SET: I

GRADE 10

MATHEMATICS

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**. Each question carries **ONE** mark. 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.
- Marks are **NOT** deducted for incorrect answers.
- 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.

GRADE
10

This question paper contains a total of 50 questions divided into three sections – A, B and C.

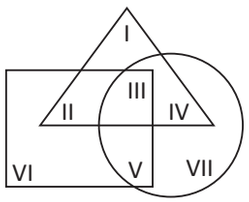
Section A (Logical Reasoning)

1. In a dairy, there are 90 cows and buffaloes. The number of cows is twice that of buffaloes. Buffalo Heera ranked seventeenth in terms of milk delivered. If there are 9 cows ahead of Buffalo Heera, how many buffaloes are after in rank in terms of milk delivered?

   (A) 22 (B) 23

   (C) 24 (D) 25

2. In the given figure, the triangle, square and circle represent the rural, hard-working and educated people respectively. Which one of the areas marked is represented by the rural educated people who are not hard-working?



   (A) I (B) II

   (C) III (D) IV

3. If in a certain code, STUDENT is written as UVWBGPV, then how would TEACHER be written in same code?

   (A) VGCEJGT (B) VGCBJGT

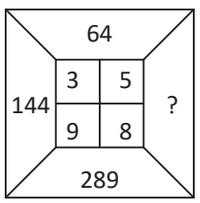
   (C) VGCAJGT (D) VGCAJGR

4. A, B, C, D, E, F, G, H are sitting on a merry-go-round facing at the centre. D is second to the left of H, who is third to the left of A. B is fourth to the right of C, who is immediate neighbour of H. G is not a neighbour of B or C. F is not a neighbour of B. Who is third to the left of B?

   (A) A (B) C

   (C) F (D) G

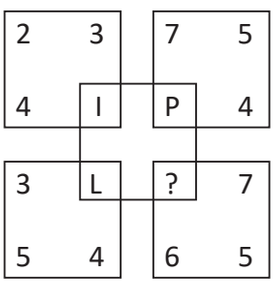
5. The numbers in the figures are according to some rules. Observe the figure and find the value of the question mark.



   (A) 40 (B) 64

   (C) 169 (D) 117

6. Find the letter to be kept in place of '?' in the given figure.



   (A) P (B) R

   (C) Q (D) M

7. A, B and C are three cities. The distance between A and B is 60 km, whereas the distance between A and C is 80 km. B is in the West of A and C is in the South of A. What is the distance between B and C?

(A) 120 km (B) 100 km

(C) 130 km (D) 110 km

8. Arrange the given words in the sequence in which they occur in the dictionary.

I. Republic II. Reunion

III. Reptile IV. Reputation

(A) III, I, II, IV (B) III, II, IV, I

(C) III, I, IV, II (D) None of these

9. Question given below has a problem and two statements I and II. Decide if the information given in the statement is sufficient for answering the problem. P, Q, R and S are four friends in group. Who is the oldest among them?

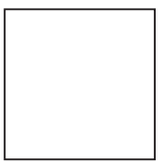
I. The total age of P and S together is less than that of R.

II. The total age of Q and S together is equal to R.

(A) Data in statement I alone is sufficient (B) Data in statement II alone is sufficient

(C) Data in both statements together is not sufficient (D) Data in both statements together is sufficient

10. Which among the following pieces will not be required to complete the given square?



I II III IV

(A) IV (B) II

(C) III (D) I

Section B (Subject Specific)

11. Which of the following is not irrational?

(A) $\left(3+\sqrt{7}\right)$ (B) $\left(3-\sqrt{7}\right)$

(C) $\left(3+\sqrt{7}\right)\left(3-\sqrt{7}\right)$ (D) $3\sqrt{7}$

12. For the positive integer n, the expression $14^n - 6^n$ is always divisible by _____.

(A) 8 (B) 20

(C) 14 (D) 6

13. The pairs of equations $x + 2y - 7 = 0$ and $-3x - 6y + 21 = 0$ have:

(A) Infinitely many solutions (B) Exactly two solutions

(C) Unique solution (D) No solution

14. If the lines $3x + 2ky - 2 = 0$ and $5x + 6y + 1 = 0$ are parallel, then what is the value of k?

(A) $\frac{5}{9}$ (B) $\frac{9}{5}$

(C) $\frac{18}{5}$ (D) $\frac{5}{18}$

15. If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal, then

(A) c and b have opposite signs (B) c and a have opposite signs

(C) c and b have the same signs (D) c and a have the same signs

16. The angles of cyclic quadrilateral ABCD are: $\angle A = (5x + 10)°$, $\angle B = (5x + y)°$, $\angle C = (2x + y)°$ and $\angle D = (2y - 10)°$. The values of x and y are:

(A) $x = 20°$ and $y = 10°$ (B) $x = 20°$ and $y = 30°$

(C) $x = 44°$ and $y = 15°$ (D) $x = 15°$ and $y = 15°$

17. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 17 cm, the other two sides of the triangle are equal to:

(A) Base = 10 cm and Altitude = 8 cm (B) Base = 15 cm and Altitude = 8 cm

(C) Base = 15 cm and Altitude = 10 cm (D) Base = 12 cm and Altitude = 10 cm

18. If the 2nd term of an AP is 18 and the 5th term is 39, then its 10th term is

(A) 53 (B) 67

(C) 47 (D) 74

19. The expression $4x^2 + 16x + m$ is divisible by $(x + 3)$. Then, m is a divisor of _____.

(A) 4 (B) 16

(C) 20 (D) 12

20. Corresponding sides of two similar triangles are in the ratio of 2 : 3. If the area of the smaller triangle is 48 sq. cm, then the area of the larger triangle is:

(A) 230 sq. cm. (B) 106 sq. cm

(C) 107 sq. cm. (D) 108 sq. cm

21. The next term of the sequence $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}, \ldots, (x \neq 1)$ is _____.

(A) $1+2\sqrt{x}$ (B) $1-2\sqrt{x}$

(C) $\frac{1-2\sqrt{x}}{1-x}$ (D) $\frac{1+2\sqrt{x}}{1-x}$

22. The points (3, 0), (4, 5), (–1, 4) and (–2, –1) taken in order are the vertices of a _____.

(A) Square (B) Rhombus

(C) Trapezium (D) Rectangle

23. If in two triangles DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true?

(A) $\frac{EF}{PR} = \frac{DF}{PQ}$ (B) $\frac{DE}{QR} = \frac{EF}{QP}$

(C) $\frac{DE}{QR} = \frac{DF}{PQ}$ (D) $\frac{EF}{RP} = \frac{DE}{QR}$

24. If $\cos A = \frac{4}{5}$, then $\tan A = ?$

(A) $\frac{3}{5}$ (B) $\frac{3}{4}$

(C) $\frac{4}{3}$ (D) $\frac{4}{5}$

25. The mid-point of the line segment joining the points A (–2, 8) and B (–6, –4) is _____.

(A) (– 4, –6) (B) (2, 6)

(C) (–4, 2) (D) (4, 2)

26. If $\sin\theta + \cos\theta = a$ and $\sin^3\theta + \cos^3\theta = b$, then the value of $3a - 2b$ is _____.

(A) a^3 (B) b^3

(C) 0 (D) 1

27. An observer 1.5 m tall is 20.5 m away from a tower 22 m high. Determine the angle of elevation of the top of the tower from the eye of the observer.

(A) 30° (B) 45°

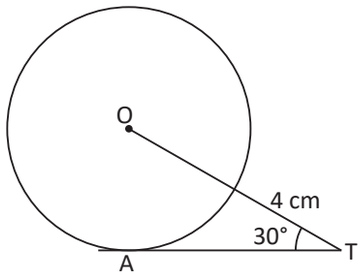
(C) 60° (D) 90°

28. The angle of elevation of the top of a tower from a certain point is 30°. If the observer moves 20 m towards the tower, the angle of elevation of the top increases by 15°. Find the height of the tower

(A) $10\left(\sqrt{3}+1\right)$ m (B) $5\sqrt{3}$ m

(C) $5\left(\sqrt{3}+1\right)$ m (D) $10\sqrt{3}$ m

29. In the given figure, AT is tangent to the circle with centre O such that OT = 4 cm and $\angle OTA = 30°$. Then AT is equal to



(A) 4 cm

(B) 2 cm

(C) $2\sqrt{3}$ cm

(D) $4\sqrt{3}$ cm

30. If the height of a tower and the distance of the point of observation from its foot, both, are increased by 10%, then the angle of elevation of its top
(A) increases (B) decreases
(C) remains unchanged (D) have no relation.

31. The distance between two parallel tangents of a circle of radius 4 cm is
(A) 2 cm (B) 4 cm
(C) 6 cm (D) 8 cm

32. Find the lateral surface area of a rectangular box with a height of 22 cm, length of 27 cm and breadth of 23 cm.
(A) 4793 cm^2 (B) 2263 cm^2
(C) 2200 cm^2 (D) 4783 cm^2

33. If 35 is removed from the data, 30, 34, 35, 36, 37, 38, 39, 40 then the median increases by:
(A) 2 (B) 1.5
(C) 1 (D) 0.5

34. If $u_i = x_i - 900$, $\Sigma f_i u_i = -400$ and $\Sigma f_i = 100$, then $\bar{x}$ is equal to
(A) 896 (B) –4
(C) 890 (D) 904

35. One card is drawn from a well-shuffled deck of 52 cards. The probability that the card will not be an ace is
(A) $\frac{1}{13}$ (B) $\frac{4}{13}$
(C) $\frac{12}{13}$ (D) $\frac{2}{13}$

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. Which of the following are the numbers that are divisible by all the numbers from 1 to 7 (both inclusive)?
(A) 840 (B) 2521
(C) 8 (D) 420

37. If α and β are the roots of the quadratic polynomial $f(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, then the values of k are _____.
(A) $k = -1$ (B) $k = 1$
(C) $k = 4$ (D) $k = \frac{2}{3}$

38. If a, b, c, are in AP, then $8b^3 - c^3 - a^3$ is equal to _____.
(A) $3a(a + c)^2$ (B) $3b^2(a^2 + c^2)$
(C) $6abc$ (D) $3ac(a + c)$

39. If the area of a circle is A, radius of circle is *r* and circumference is C, then which of the two relations are true?

(A) $\frac{A}{r}=\frac{C}{2}$ (B) $\frac{C}{A}=\frac{r}{2}$

(C) $\pi A=\frac{C^2}{4}$ (D) $\frac{A}{r}=C$

40. In a box, there are 8 orange, 7 white, and 6 blue balls. If a ball is picked up randomly, what is the probability that it is neither orange nor blue? Also find the probability of getting an orange ball.

(A) $\frac{1}{3}$ (B) $\frac{1}{21}$

(C) $\frac{8}{21}$ (D) $\frac{13}{21}$

Section C (Competency Enhancement)

Read the text given below and answer the questions from 41 to 43.

In a race, the racing track is circular and the participants are positioned in different lanes. The participants are positioned in such a way that they are ahead of the participants in the inner lane, to maintain the same distance that has to be run. The difference in the position of participants is same as the difference between their respective circumferences of the lanes. The end point of the race is the same. This is done so as to make the participants sure that they are running the constant distances and for easy judgement of the winner.

41. If the radius of the innermost circle is 31.85 m and the width of each lane is 1 m, then the third participant should be positioned ahead of first by a distance of

(A) 10.2 m (B) 12.56 m

(C) 10 m (D) 14.4 m

42. In a race of 400 m for 6 participants, the radius of the outermost circle having width of each lane 1 m is

(A) 67.7 m (B) 63.7 m

(C) 69.7 m (D) 73.7 m

43. If the radius of the innermost circle is 35 m and the width of each lane is 1.5 m, then the area between 3rd lane and 4th lane is

(A) 335.25π m^2 (B) 228π m^2

(C) 400π m^2 (D) 116.25π m^2

44. An observer observed from the top of a 150 m tall lighthouse that the angles of depression of two ships approaching it are 30° and 45°. If one ship is directly behind the other, the distance between the two ships is _____.

(A) 119.5 m (B) 109.5 m

(C) 129.5 m (D) None of these

45. An electric pole subtends an angle of 30° at a point on the same level as its foot. At a second point, '*b*' metres above the first, the depression of the foot of the pole is 60°. The height of the pole (in metres) is equal to _____.

(A) $\sqrt{3}b$ (B) $\frac{b}{3}$

(C) $\frac{b}{2}$ (D) $\frac{b}{\sqrt{3}}$

46. In what ratio is the line segment joining the points A(–6, 15) and B(3, 5) is divided by the *y*-axis internally?

(A) 3 : 1 (B) 2 : 1

(C) 1 : 3 (D) 2 : 5

47. For the following distribution:

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	3	12	27	57	75	80

The class mark of the modal class is _____.

(A) 15 (B) 25

(C) 35 (D) 55

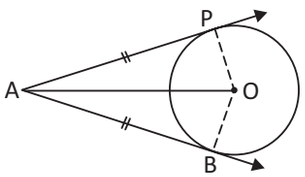
48. In a two-dice game, a player throws two dice simultaneously. A player scores the sum of the two dice thrown and gradually reaches a higher score as they continue to roll. The probability of the difference between the numbers on the two dice is 3, is _____.

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

(C) $\frac{1}{6}$ (D) None of these

Read the text given below and answer the questions 49 and 50.

The lengths of two tangents drawn from an external point to a circle are equal. For instance, in the figure alongside, AP and AB are two tangents from a point A to a circle of centre O. According to the above theorem, AP = AB.

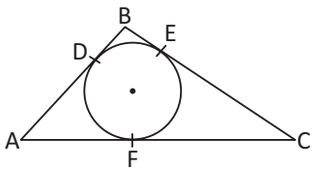


49. If AP and AB are tangents to a circle with centre O at points P and B respectively, then quadrilateral PABO is a

(A) rectangle (B) square

(C) parallelogram (D) cyclic quadrilateral

50. A circle is inscribed in ΔABC, having AB = 10 cm, BC = 12 cm and CA = 18 cm touching sides at D, E and F respectively. Then AD + BE + CF is equal to



(A) 16 cm (B) 20 cm

(C) 22 cm (D) 24 cm