Reader's Sign _____ Date _____

ORANGE GLOBAL OLYMPIAD

School Level Examination
SLE 2024

SET: I

GRADE 9

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 BALLPAN** 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.

Reader's Sign _____ Date _____

GRADE 9

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

Section A (Logical Reasoning)

1. Identify the term which does NOT fit in the given series.

   1BU, 5FQ, 9JM, 13NI, 16RD, 21VA

   (A) 9JM (B) 13NI

   (C) 16RD (D) 21VA

2. Read the information carefully and answer the following question.

   'M + N' means 'M is the son of N'

   'M – N' means 'M is the wife of N'

   'M * N' means 'M is the brother of N'

   What does P + Q – R mean?

   (A) R is the father of P (B) R is the brother of P

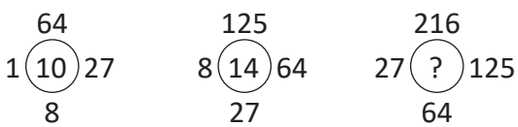
   (C) R is the uncle of P (D) R is the son of P

3. Six books A, B, C, D, E and F are placed side by side. B, C and E have blue cover and the other books have red cover. Only D and F are new books and the rest are old. A, C and D are law reports and other Gazeteers. Which book is a new law report with a red colour?

   (A) B (B) D

   (C) E (D) F

4. The given set of figures carries certain characters. Assuming that characters in the set follow a similar pattern, find the missing character.



   (A) 9 (B) 2

   (C) 17 (D) 18

5. In the following question, a matrix of certain characters is given. These characters follow a certain trend, row-wise or column-wise. Find out this trend and choose the missing character accordingly.

1	7	9
2	14	?
3	105	117

   (A) 26 (B) 20

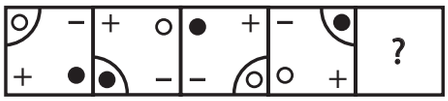
   (C) 16 (D) 12

6. An analogue clock is set right at 6 am. The clock gains 20 seconds in 3 minutes. On the same day, what is the true time when the clock reads 6 pm?

   (A) 5:48 pm (B) 4:48 pm

   (C) 3:48 pm (D) 4:12 pm

7. 6 is related to 18 in the same way as 8 is related to _____.
   (A) 32 (B) 16
   (C) 48 (D) 64
8. P, Q and R are three points on the ground. Point P is North of point Q and ∠PQR is 135° in anticlockwise direction. In which direction is point R from point Q?
   (A) South-West (B) South-East
   (C) North-West (D) North-East
9. The position of how many letters will remain unchanged, if each of the letters in the word ACTIVELY is arranged in alphabetical order?
   (A) 5 (B) 4
   (C) 3 (D) 2
10. Select a figure from the options given below that continues the same series as established by the four problems figures.



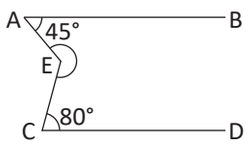
   (A) 
   (B) 
   (C) 
   (D) 

Section B (Subject Specific)

11. The simplified form of $3\sqrt{45}-\sqrt{125}+\sqrt{200}-\sqrt{50}$ is _____.
   (A) $5\sqrt{2}$ (B) $4\sqrt{5}$
   (C) $4\sqrt{5}-5\sqrt{2}$ (D) None of these
12. If $x + y = -4$, then the value of $x^3 + y^3 - 12xy + 64$ is _____.
   (A) 1 (B) –1
   (C) 0 (D) None of these
13. At what point does the linear equation $x = 3y + 5$ cut the x-axis?
   (A) $\left(0, \frac{3}{5}\right)$ (B) (5, 0)
   (C) $\left(\frac{3}{5}, 0\right)$ (D) (0, 5)
14. If (3, –4) is a solution of the equation $-5x + ky = 3$, then the value of k is _____.
   (A) $-\frac{9}{2}$ (B) $\frac{9}{2}$
   (C) $\frac{19}{3}$ (D) $-\frac{19}{3}$
15. Proved statements based on deductive reasoning, by using postulates and axioms are known as _____.
   (A) a statement only (B) a proposition only
   (C) a theorem only (D) both proposition and theorem

16. If $(a, 5) = (1, b + 2a)$, then the value of b is _____.
    (A) 0 (B) 2
    (C) 3 (D) None of these

17. In the given figure, AB || CD, $\angle BAE = 45°$, and $\angle ECD = 80°$. Then measure of reflex $\angle AEC$ is _____.

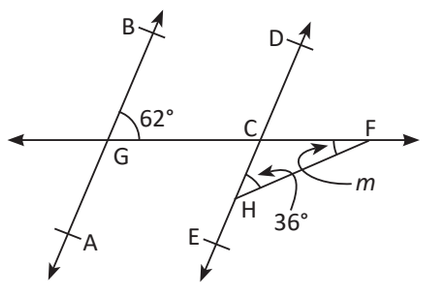


    (A) 125° (B) 235°
    (C) 55° (D) None of these

18. Which of the following is a false statement?
    (A) An infinite number of lines can be drawn through a given point.
    (B) A unique line can be drawn through two given points.
    (C) Ray $\overrightarrow{AB}$ is same as ray $\overrightarrow{BA}$.
    (D) A ray has one end-point.

19. Which one of the following statements is incorrect?
    (A) If 'a' is a rational number and 'b' is irrational, then $a + b$ is irrational.
    (B) The product of a non-zero rational number with an irrational number is always irrational.
    (C) Addition of two irrational numbers can be rational.
    (D) Division of any two integers is always an integer.

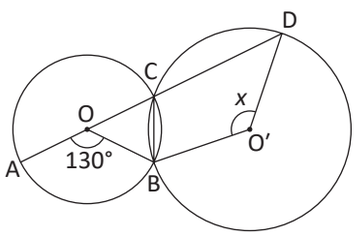
20. In the given figure AB || ED, find m.



    (A) 26°
    (B) 36°
    (C) 62°
    (D) 98°

21. If $a^2 + b^2 + c^2 = 2(a - b - c) - 3$, where a, b, c are non-zero real numbers, then $2a - 3b + 4c$ = ?
    (A) 2 (B) 1
    (C) 0 (D) –1

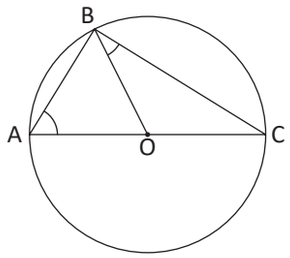
22. In the given figure, O and O′ are centres of two circles intersecting at B and C. ACD is a straight line, find x.



    (A) 125°
    (B) 130°
    (C) 260°
    (D) 65°

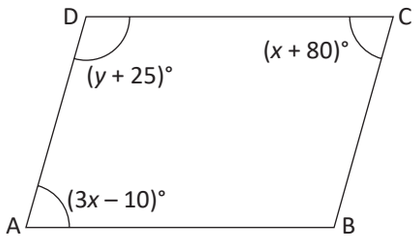
23. P is the midpoint of the side CD of a parallelogram ABCD. A line through C parallel to PA intersects AB at Q and DA produced at R. Then CQ = _____.
    (A) DP (B) QR
    (C) BC (D) PC

24. In the given figure, if O is the circumcentre of ΔABC, then find the value of $\angle OBC + \angle BAC$.



(A) 85° (B) 100°
(C) 90° (D) 120°

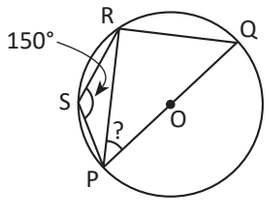
25. The quadrilateral ABCD given below is a parallelogram. Find the values of x and y .



(A) 75, 25 (B) 45, 30
(C) 45, 35 (D) 55, 25

26. If the lengths of the sides of a triangle are in the ratio 3 : 4 : 5 and its perimeter is 96 cm, find its area.
(A) 96 cm^2 (B) 192 cm^2
(C) 384 cm^2 (D) 480 cm^2

27. PQRS is a cyclic quadrilateral as shown and O is the centre of the circle. If $\angle PSR = 150°$, then $\angle RPQ$ equals _____.



(A) 30° (B) 45°
(C) 60° (D) 75°

28. An isosceles right triangle has area 16 cm^2. The length of its hypotenuse is _____.
(A) 4 cm (B) 8 cm
(C) $4\sqrt{2}$ cm (D) $8\sqrt{2}$ cm

29. In a circle of radius 20 cm, three nails are fixed at equal distance on its boundary. A thread is tied across the nails to form a triangle. The length of the string on each side of the triangle is _____.
(A) $18\sqrt{3}$ cm (B) $20\sqrt{3}$ cm
(C) $21\sqrt{3}$ cm (D) $23\sqrt{3}$ cm

30. The sum of $(x + 3)$ observations is $x^4 - 81$. The mean of $(x + 3)$ observations is _____.
(A) $x^2 + 9$ (B) $x^3 - 27$
(C) $x^2 - 9$ (D) $(x - 3)(x^2 + 9)$

31. The perimeter of an equilateral triangle having an area of $9\sqrt{3}$ cm^2 is _____.
(A) 8 cm (B) 6 cm
(C) 24 cm (D) 18 cm

32. If the radius of a sphere is increased by 50%, then the percentage increase in its surface area is _____.
(A) 200% (B) 150%
(C) 175% (D) 125%

33. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 21 cm.
(A) 4851 cm^3 (B) 2425.5 cm^3
(C) 2524.5 cm^3 (D) 5148 cm^3

34. The temperatures recorded in a city for a month is given below (in °C):

32.5, 30.5, 33.8, 30.5, 33.8, 31.0, 24.0, 24.8, 31.0, 24.0, 24.8, 33.4, 32.3, 32.5, 33.4, 32.3, 30.9, 30.9, 32.5, 37.8, 35.6, 35.7, 36.1, 34.9, 32.5, 37.8, 35.6, 35.5, 36.2, 34.8

For how many days the temperature was above 34°C?
(A) 4 (B) 11
(C) 10 (D) 7

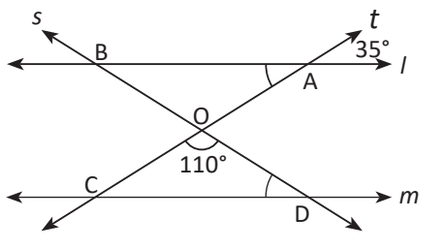
35. The width of each of nine classes in a frequency distribution is 2.5. The lower class boundary of the lowest class is 10.6. Then, the upper class boundary of the highest class is _____.
(A) 30.3 (B) 33.1
(C) 34.5 (D) 35.4

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 few irrational number(s) between $\frac{1}{7}$ and $\frac{2}{7}$ is/are _____.
(A) 0.141441444... (B) 0.292292229...
(C) 0.161161116... (D) 0.272772777...

37. Factor(s) of the polynomial $2x^3 + 2y^3 + 2z^3 - 6xyz$ are _____.
(A) $(x + y + z)$ (B) $(x - y)^2 - (y - z)^2 + (z - x)^2$
(C) $-(x - y)^2 - (y - z)^2 + (z - x)^2$ (D) $(x - y)^2 + (y - z)^2 + (z - x)^2$

38. In the given figure, $l \parallel m$, s and t are two transversals to l and m that intersect at O making an angle of 110°. Which of the following is/are true?



(A) ∠ODC = 35°
(B) ∠ODC = 40°
(C) OC – OD > CD
(D) OC = OD

39. The diagonals of a rhombus are 8 cm and 6 cm in length. The length of its side is _____ and its perimeter is _____.
(A) 4 cm (B) 5 cm
(C) 18 cm (D) 20 cm

40. The difference in the outside and inside area of a cylindrical metallic pipe of length 14 cm is 44 cm^2. The pipe is made up of a material of volume 99 cm^3. The outer and inner radii are _____ and _____ respectively.
(A) outer radius 2.5 cm (B) outer radius 3 cm
(C) inner radius 2.5 cm (D) inner radius 2 cm

Section C (Competency Enhancement)

Read the text given below and answer the questions from 41 to 42.

If 'a' is a positive real number and 'n' is a positive integer, then the principal n^{th} root of 'a' is the unique positive real number 'x' such that $x^n = a$. If $\frac{p}{q}$, where $q > 0$, is a rational number, we define $a^{\frac{p}{q}} = \left(a^p\right)^{\frac{1}{q}}$.

The laws of exponents: $(ab)^m = a^m b^m$ and $\left(\frac{a}{b}\right)^m = \left(\frac{a^m}{b^m}\right)$; where a, b are positive real numbers, and m, n are rational numbers.

41. The simplified form of $\left(\sqrt{x}\right)^{\frac{-2}{3}} \sqrt{y^4} \div \sqrt{xy^{\frac{-1}{2}}}$ is _____.

(A) $\frac{y^{\frac{9}{4}}}{x^{\frac{5}{6}}}$ (B) $\frac{y^{\frac{9}{4}}}{x^{\frac{6}{5}}}$

(C) $\frac{x^{\frac{9}{4}}}{y^{\frac{5}{6}}}$ (D) $\frac{x^{\frac{4}{9}}}{y^{\frac{-6}{5}}}$

42. If $9^{x+2} = 240 + 9^x$, then x equals _____.

(A) 0.2 (B) 0.3

(C) 0.4 (D) 0.5

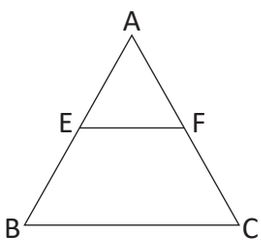
43. The polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ leave the same remainder when divided by $x - 4$. Then 'a' equals _____.

(A) 0 (B) –1

(C) 1 (D) 2

Read the text given below and answer the questions from 44 to 45.

'The Midpoint Theorem' states that the line segment joining the midpoints of two sides of a triangle is parallel to the third side and is half of it, *i.e.*, in ΔABC, EF || BC and EF = $\frac{1}{2}$BC, where E and F are the mid points of AB and AC respectively.



Conversely, if a line drawn through the midpoint of one side of a triangle is parallel to another side, it bisects the third side.

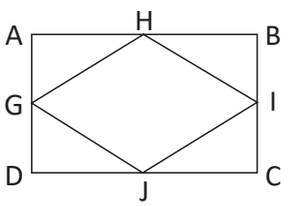
44. ABCD is a rectangle and G, H, I, J are the midpoints of AD, AB, BC and CD respectively, then quadrilateral GHIJ is a _____.

(A) Square

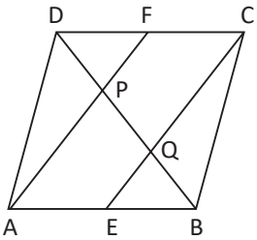
(B) Rhombus

(C) Rectangle

(D) Any quadrilateral



45. In a parallelogram ABCD, E and F are the midpoints of sides AB and CD respectively. Then, which of the following is false?



(A) P is the midpoint of AF.
(B) AECF is a parallelogram.
(C) DP = PQ
(D) PQ = QB

46. In a parallelogram ABCD, AB = 10 cm. The altitudes corresponding to the sides AB and AD are 6 cm and 8 cm respectively. Then, perimeter of ABCD equals _____.

(A) 24 cm
(B) 32 cm
(C) 35 cm
(D) 36 cm

47. Find k so that $x^2 + 2x + k$ is a factor of $2x^4 + x^3 - 14x^2 + 5x + 6$.

(A) 1
(B) –3
(C) 3
(D) –2

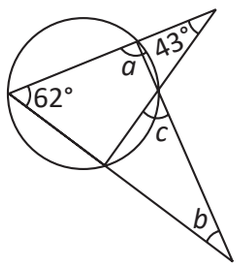
48. The image of the triangle formed by the points (0, 0), (3, 2) and (1, –2) taken along y-axis is _____.

(A) (0, 0), (–3, 2), (–1, –2)
(B) (0, 0), (3, –2), (–1, 2)
(C) (0, 0), (–3, –2), (1, –2)
(D) (0, 0), (3, –2), (1, 2)

49. If $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + 7\sqrt{5}b$, then _____.

(A) $a = 1$
(B) $b = 11$
(C) $a = -1$
(D) $b = \frac{1}{11}$

50. In the given figure, the values of a, b and c respectively are _____.



(A) 70°, 15°, 43°
(B) 80°, 40°, 80°
(C) 100°, 20°, 55°
(D) 105°, 13°, 62°