Summer Fields School
KAILASH COLONY, NEW DELHI-110048

Roll No.										

A

- Please check that this questionnaire contains **15** printed pages.
- Code A, B or C given on the right hand top corner of the questionnaire should be written on the answer sheet in the space provided.
- Please check that this questionnaire contains **60** questions.

41ST ARYABHATTA INTER-SCHOOL MATHEMATICS COMPETITION – 2024

CLASS - VIII

Time Allowed: **2 Hours** Max. Marks: **100**

GENERAL INSTRUCTIONS:

1. Do not write your name on the questionnaire.
2. Write your roll no. on the questionnaire and the Answer Sheet in the space provided.
3. All the questions are compulsory.
4. Read questions carefully; think twice before you write the answer. **No overwriting or cutting is allowed on the Answer Sheet.** Another copy of the questionnaire or answer sheet will not be provided.
5. Do your rough work in the space provided in the questionnaire.
6. The questionnaire contains four sections. Section A contains **10** questions on Logical Reasoning of 1mark each, Section B contains **20** Multiple Choice Questions of 1 mark each, Section C contains **20** Free Response Type Questions of 2 marks each and Section D contains **10** Free Response Type Questions of 3 marks each
7. No working or descriptive answers of any question is to be given. Only the Answers are to be written on the Separate Answer Sheet provided to you.
8. Use Blue or Black pens to write the answer on the Answer Sheet.
9. Answers should be written clearly in the space provided on the Answer Sheet.
10. Use of calculator is not allowed.

SECTION-A

Write the correct option (A, B, C or D) in the Answer sheet.

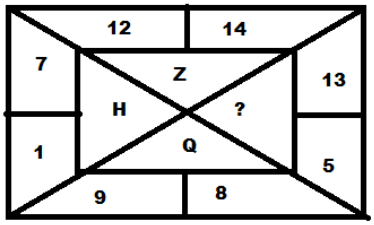
1. In a row of girls if R, who is sixteenth from the left and Q, who is fifth from the right, interchange their positions. As a result Q becomes 20^{th} from the right end. How many girls are there in the row?
   A) 25 B) 35 C)36 D) None of these

2. Virat walked 7m towards South, took a left turn and walked 10m. He then took a right turn and walked 5m. He again took a right turn and walked 15m. How far is he from the starting point and in which direction?
   A) 13m, South West B) $\sqrt{53}$ m, South East C) 12m, South D)None of these

3. Complete the following series: C59U, E39P, _____, I14I, K9G.

   A) G24L B) G19K C) G24K D)None of these

4. Fill out the missing letter in the following figure.



   A) T B) R C) O D)None of these

5. P, Q, R, S and T are five different objects. P and R together weigh 15kg while S and T together weigh 10kg. Q weighs 8kg and R weighs twice as much as P. If Q and S together weigh 15 kg, whose weight is more than thrice of T?
   A) P B) Q C) R D)None of these

SPACE FOR THE ROUGH WORK

6. If m and n are smallest prime number and the smallest odd composite number respectively, and $a \otimes b = \frac{b^2}{a} - \frac{b}{a}$, then find $m \otimes n$.

A) 25 B) 36 C) 45 D)None of these

7. The symbol '+' or '–' is inserted instead of ⊙ such that 5⊙9⊙ 1 ⊙7⊙ 2⊙ 3 = 9. Select the correct order of symbols.

A) $(-,+,-,-,-)$ B) $(-,+,+,+,+)$ C) $(+,+,-,+,+)$ D)None of these

8. A '**PALINDROME**' is a number which reads same in both forward and backward direction. The year 2002 is an example of such a number. Find the difference between the number of year 2002 and the next palindrome year.

A) 112 B) 100 C) 110 D)None of these

9. In the following series, how many 9's are there which are preceded by 3 but not succeeded by any multiple of 3.

396939393963962392549639312539764 52

A) 1 B) 2 C) 3 D)None of these

10. If the first and the last digit of each of the following numbers are interchanged and one is added to the middle digit and then the numbers are arranged in descending order, then the sum of the digits of the middle number in the new arrangement formed is :

246, 525, 432, 726, 283

A) 14 B) 12 C) 13 D) 16

SPACE FOR THE ROUGH WORK

SECTION-B

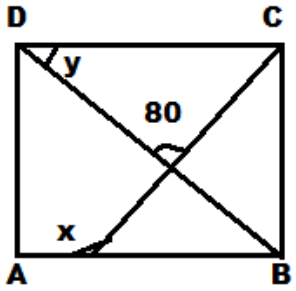
Write the correct option (A, B, C or D) in the Answer sheet

11. The value of $\sqrt{294}-5\sqrt{\frac{3}{2}}+\sqrt{216}-3\sqrt{\frac{1}{6}}+\sqrt[4]{81}-8\sqrt[3]{216}+15\sqrt[5]{32}+\sqrt{225}$ is:

A) 10 B) $11\sqrt{6}$ C) $10\sqrt{6}$ D) None of these

12. ABCD is a square in the given figure. The value of $(5y-x)$ is:

A) 110° B) 100° C) 95° D) None of these



13. The greatest prime factor of 91553 is:

A) 29 B) 11 C) 41 D)None of these

14. If A= 1.3.5.7.9……15 and B = 2.4.6.8…….14, then HCF of A and B is :

A) 35 B) 455 C) 315 D) None of these

15. The length, breadth and height of a room in the shape of cuboid are increased by 10%, 20% and 50% respectively. The change in the volume of cuboid is:

A) 77% B)87% C) 98% D) None of these

SPACE FOR THE ROUGH WORK

16. Evaluate: $(729)^{0.31} \times (243)^{0.18} \times (9)^{0.12} \times \left(\frac{1}{3}\right)^{-1}$

A) 27 B) 3 C) 81 D) None of these

17. If $P = a^{20}b^{23}c^{10}d^{9}, Q = a^{20}b^{24}e^{7}$ and the ratio of their LCM to HCF is $a^{m}b^{n}c^{r}d^{p}e^{q}$, then $2r-(m+p+q)^{n}$ is :

A) 4 B) 12 C) 7 D) None of these

18. Area of a rhombus is 96 sq. cm and the difference in the lengths of diagonals is 4 cm. The sum of the diagonal of the rhombus is :

A) 28 cm B) 22 cm C) 32 cm D) None of these

19. One of the factor of $x^{2}+\frac{1}{x^{2}}+2-2x-\frac{2}{x}$ is :

A) $x+\frac{1}{x}+2$ B) $x+\frac{1}{x}-2$ C) $x-\frac{1}{x}+2$ D) None of these

20. Which of the following is called 'Pythagoras' constant:

A) $\sqrt{3}$ B) $\sqrt{2}$ C) π D) None of these

SPACE FOR THE ROUGH WORK

21. A letter 'H' is made by sticking together three cuboids, each of dimensions $7cm \times 2cm \times 2cm$. The difference in the numerical values of its total surface area and volume is :

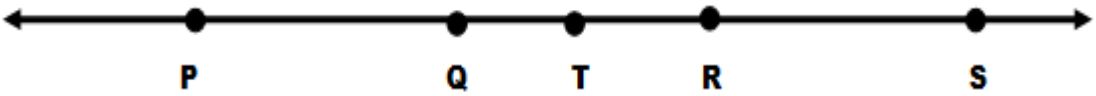
A) 120 B) 108 C) 100 D) None of these

22. The average of 'm' numbers is 'x'. If a number 'y' is removed from the sequence, then the average increases by 4. The value of 'y' is :

A) $x+m+2$ B) $x-m-2$ C) $x-4m+4$ D) None of these

23. P, Q, T, R and S are collinear points as shown in the figure below. If PQ:QR = 1:3 and QR:RS = 5:8 then PR:RS is

A) 1:5 B) 4:1 C) 5:6 D) None of these



24. One of the factor of $\left(3a-\frac{1}{b}\right)^2+16+\left(c+\frac{1}{b}-2a\right)\left(3a-\frac{1}{b}-4\right)-8\left(3a-\frac{1}{b}\right)$ is:

A) $3a-\frac{1}{b}-4c$ B) $a+c-4$ C) $3a+c-4$ D) None of these

25. The length of three sides of a triangle are 40 cm, 24cm and 32 cm respectively. The length of the altitude of the triangle corresponding to the smallest side (in cm) is:

A) 32 B) 18 C) 30 D) 12

SPACE FOR THE ROUGH WORK

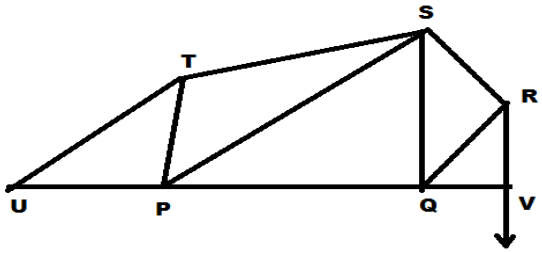
26. If α and β are roots of the equation $ax^2+bx+c=0$, then the value of $\frac{\alpha}{a\beta+b}+\frac{\beta}{a\alpha+b}$ is:

A) $\frac{2}{3a}$ B) $\frac{-2}{a}$ C) $\frac{2}{a}$ D) None of these

27. The given figure shows a pentagon in which TU drawn parallel to SP to meet QP produced at U and RV is parallel to SQ, meet PQ produced at V, then :

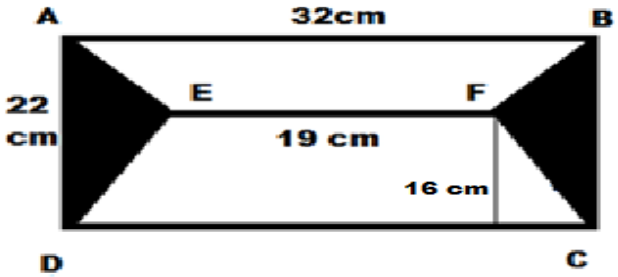
A) $ar\left(\text{pentagon } PQRST\right)=ar(\Delta STU)+ar(\Delta QVR)$ B) $ar\left(\text{pentagon } PQRST\right)=ar(\Delta SUV)$

C) $ar\left(\text{pentagon } PQRST\right)=ar(\Delta SUV)+ar(\Delta QVR)$ D) None of these



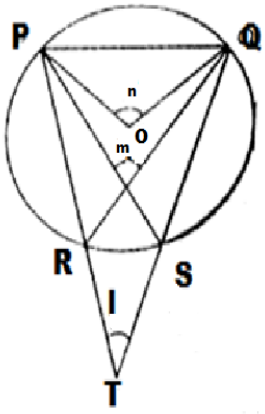
28. Find the area (in sq. cm) of the shaded region in the figure given below, where ABCD is a rectangle and $EF \parallel DC$

A) 133 B) 143 C) 153 D) 163



SPACE FOR THE ROUGH WORK

29. In the given figure, O is the centre of the circle. Which of the following relations is correct:



A) $n = m - l$ B) $m = n - l$

C) $l = m + n$ D) None of these

30. In ΔPQR, PS, QT and RU are the medians. Then

A) $(PQ + QR + PR) < (PS + QT + RU)$ B) $3(PQ + QR + PR) > 2(PS + QT + RU)$

C) $(PQ + QT + PR) > (PS + QR + RU)$ D) None of these

SPACE FOR THE ROUGH WORK

SECTION-C

Write the Answers only in the space provided on the Answer sheet.

31. A two-digit number is obtained by either multiplying the sum of digits by 8 and adding 1 or by multiplying the difference of digits by 13 and adding 2. Find the number.

32. If the radius and height of a cone are in the ratio 3:4 and its volume is $301.44cm^3$, then find its slant height in cm. $(use\ \pi = 3.14)$

33. If ***A*** and ***B*** are roots of the equation: $7x^2 - \dfrac{1}{1-\left(\dfrac{2^4 - 2\times 7^0 \times 5}{2^3 + 2^2 - 2^2 \times 3 \times 7^0 + 7 \times 5^0}\right)} = 0$, then evaluate : $A^{2024} + B^{270124}$.

34. Find the value of $(2024)^0 - 0.75^3 - 0.25^3$.

35. ABCD is a trapezium with $AB \| DC$. If P and Q are the mid-points of AD and BC respectively, DC=3cm and AB = 5 cm, then find the ratio of the area of ABQP and area of PQCD.

SPACE FOR THE ROUGH WORK

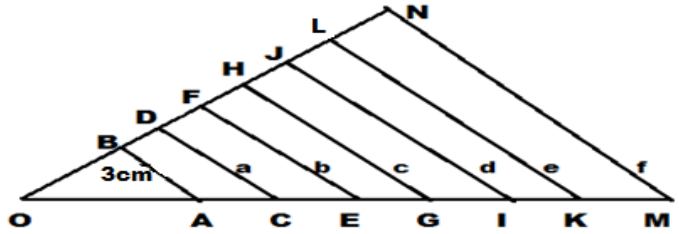
36. Find the digit at unit's place of $\left[\sqrt[3]{\frac{-1728}{2744}}\times\frac{11}{\pi}\right]^{2024}$. $(use\ \pi=\frac{22}{7})$

37. If x and y are the quotient and the remainder respectively, which are obtained on dividing $-13m^2+15m+5m^3+7$ by $4+m^2-3m$, then find the value of $(x-5y)^3$.

38. If $x+\frac{1}{x}=\alpha$, where α is the remainder obtained on dividing (x^3+3x^2-5x+4) by $(x-1)$, then find the value of $x^3+\frac{1}{x^3}$.

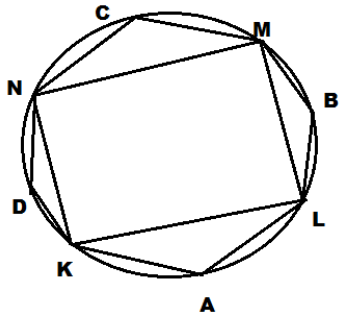
39. A rectangular room of length 'x', breadth 'y' and height 'z' contains sufficient air for 13 persons. Each person requires 20cu. m of air. If $x+y+z=22$ and each edge of the room is a whole number greater than 3 m, then what is the largest possible area of the face of the room (in sq. m)?

40. In the given figure $AB\|CD\|EF\|GH\|IJ\|KL\|MN$ and $AC=CE=EG=GI=IK=KM=1cm$. $OA=4cm$, find $4(b-a+d-c+f-e)$.



SPACE FOR THE ROUGH WORK

41. In the given figure, *KLMN* is a rectangle. What is the sum of the angles A, B, C and D in degrees.



42. If $y = \sqrt[4]{5+\sqrt{3}}$, then find $11\left[\frac{y^4}{22}+\frac{1}{y^4}\right]$.

43. If $\frac{\sqrt{\pi}-\sqrt{7}}{\sqrt{\pi}+\sqrt{7}} = x+\sqrt{22}y$, then find the number which is nine times $(x+y)$. (*use* $\pi = \frac{22}{7}$)

44. If $x+y+z=9$ and $xy+yz+zx=23$, then find $x^3+y^3+z^3-3xyz$.

45. If $\frac{9^x \times 3^2 \times \left(3^{\frac{-x}{2}}\right)^{-2} - 27^x}{3^3 y \times 2^3} = \frac{1}{27}$, then find $\left(y-3^{3x}\right)$.

SPACE FOR THE ROUGH WORK

46. A, B and C are moving on a circular track. A is the only one moving in the anti-clockwise direction and moves at a speed twice that of B and thrice that of C, and takes 10s to cover the entire track. If all the three start simultaneously, after how many seconds would they meet for the second time at the starting point.
47. Hands of a clock run anticlockwise. When set at 12o'clock, it completes the first hour normally in 60 minutes and then slows down by 5 minutes each hour for three consecutive hours. Afterwards it keeps on repeating the same cycle. If the time displayed on the clock is 7:30, how many hours have passed in the real world?
48. While selling a watch, a shopkeeper gives a discount of 5%. If a discount of 7% is given, he earns Rs.15 less as profit. Find the marked price of the watch (in Rs.).
49. A sum of Rs.1300 is divided amongst P,Q, R and S such that : $\frac{P's\ share}{Q's\ share} = \frac{Q's\ share}{R's\ share} = \frac{R's\ share}{S's\ share} = \frac{2}{3}$. Then find the amount of P's share (in Rs.).
50. A sum of money invested at compound interest amounts to Rs. 10,890 in two years and 11,979 in three years. How much sum (in Rs.) was invested in the beginning?

SPACE FOR THE ROUGH WORK

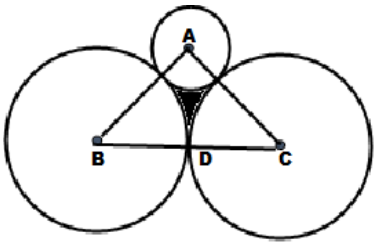
SECTION-D

Write the Answers only in the space provided on the Answer sheet.

51. The surface area of a sphere of radius 5 cm is 348.54 sq. cm less than the curved surface area of a cylinder of radius 10 cm. Find the volume of the cylinder in cubic cm. ($use\ \pi = 3.14$)
52. If '***a***' is the smallest number by which we must divide 8788 so that it becomes a perfect cube and '***b***' is the least number by which 3087 must be multiplied to make it a perfect cube, then evaluate: $(b-a)^{2701}$.
53. If $x^6 + 4x^3 - 1 = (x^2 + x - 1)(ax^4 + bx^3 + cx^2 + dx + e)$, then find $(a+b+c+d+e)$
54. A dog at point A goes in pursuit of fox 40m away. The dog takes leap of 2m against 1m long leap of the fox. If the dog makes two leaps to the fox's three, at what distance from A (in metres) will the dog catch up with the fox?

SPACE FOR THE ROUGH WORK

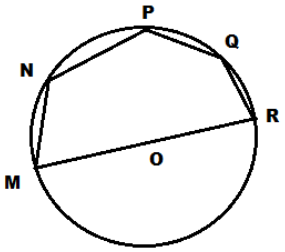
55. ABC is an isosceles triangle. Taking A, B and C as centres, three circles are drawn. If $AB = AC = 5\text{ cm}$, $BC = 8\text{ cm}$, $BD = DC$ and $\angle A = 106°$, then find the area of the shaded region enclosed between the circles correct to two places of decimals in sq. cm. (*use* $\pi = 3.14$)



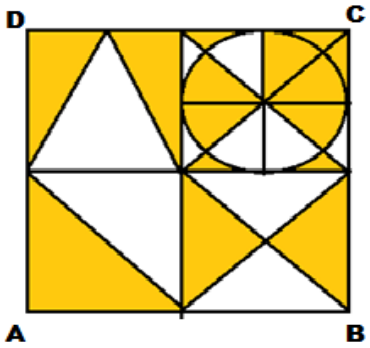
56. Find the difference between the area of a regular hexagon of side 72cm and area of its inscribed circle in square cm, correct to two places of decimals. (*use* $\pi = 3.14$, $\sqrt{3} = 1.73$)
57. A leak in the bottom of a tank can empty it in 6 hours. A pipe fills the tank at the rate of 4 litre per minute. When the tank is full, the inlet is opened, but due to the leak, the tank is emptied in 8 hours. Find the capacity of the tank in litres?

SPACE FOR THE ROUGH WORK

58. A man takes 5hr and 45 min to walk down and return by riding to a certain place. He would have gained 2 hours by riding both ways. Find the time he would take to walk both ways(in minutes).
59. In the given figure, O is the centre of the circle. If $\angle MNP = 102°$ and $PQ = QR$, then find the measure of $\angle QRP$ in degrees.



60. If ABCD is a square, find the fraction represented by the shaded portion in the given figure.



SPACE FOR THE ROUGH WORK