Summer Fields School
KAILASH COLONY, NEW DELHI-110048

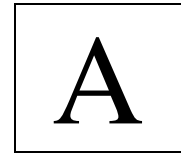Roll No.

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.

36th ARYABHATTA INTER-SCHOOL MATHEMATICS COMPETITION – 2019

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.

Write the correct option (a, b, c or d) in the Answer Sheet.

1. How many such pair of letters are there in the word GOLDEN each of which has as many letters between them in the word as in the English alphabets?

   a) 0   b) 1   c) 2   d) 3

2. P, Q, R, S, T and U are six students studying in a class. Each of them has a different height and weight. The tallest is not the heaviest .T is taller than only P but lighter than R, Q is taller than S and P and heavier than only T and U. P is lighter than only S, T is heavier than U. S is taller than U and Q is not the tallest. Who among them is the tallest?

   a) U   b) P   c) T   d) R

3. Select the correct combination of mathematical signs to replace * signs and to balance the equation
   81*9*8*7*79

   a) $\times - \div =$ b) $\div - + =$ c) $+ - \times =$ d) $\div \times + =$

4. In a certain code DAYLONG is written as ZBEKHOP. How is CORDIAL written in that code?
   a) SPDCMBJ   b) SPDEMBJ   c) DPSCMBJ   d) SPDCJBM

SPACE FOR THE ROUGH WORK

5. Four persons A,B,C and D are standing at the four corners of a square plot as shown:
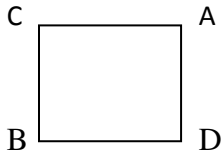

'A' and 'B' move one side clockwise and then cross over to the corners diagonally opposite. 'C' and 'D' move one side anti-clockwise and then cross over to the corners diagonally opposite. The original configuration ABCD has now changed to :

a)CDBA   b) BDAC   c) DACB   d) CDAB

6. Nineteen boys turn out for baseball, out of these 11 are wearing baseball shirts and 14 are wearing baseball pants. There are no boys without one or the other. The number of boys wearing full uniform is:

a)3   b) 5   c) 8   d) 6

7. If 235_n stands for $2n^2 + 3n + 5$, what is the value of 144_{19}.

a)441   b) 242   c) 151   d) 361

SPACE FOR THE ROUGH WORK

8. Find the missing number:
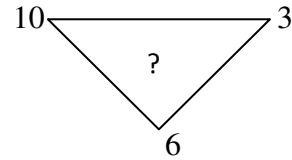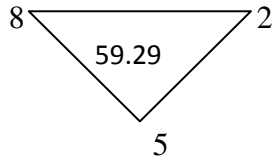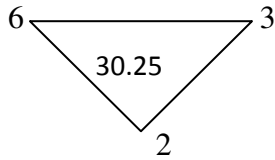
   a) 121.36   b) 98.01   c)121.25   d) 98.75

9. Various operations and arithmetic symbols are assigned new symbols as defined below:

$$+ \quad - \quad \times \quad \div \quad = \quad <$$
$$\vee \quad \wedge \quad (\quad) \quad \cup \quad \cap$$

   Then 24)3∨7(2∧10∪

   a) 10∨2   b) 10)2   c) 18(4   d) 18∨2

10. If each alternate letter beginning with the first in the word WORKING is replaced by the next letter in the English alphabets and each of the remaining letters is replaced by the previous letter in the English alphabets, which of the following will be the fourth letter from the right end after the replacement?

   a) N   b) Q   c) J   d) M

SPACE FOR THE ROUGH WORK

SECTION-B

Write the correct option (a, b, c or d) in the Answer Sheet.

11. Chicory is mixed with pure coffee powder in the ratio 1:10. Chicory costs ₹ 5 per kg and coffee powder costs ₹ 126 per kg. The cost price of 1 kg of the mixture in ₹ is :
    a) 115   b) 105   c) 125   d) 121

12. The remainder obtained when $1837 \times 1839 \times 1841$ is divided by 21, is :
    a) 13   b) 9   c) 0   d) 11

13. A car travels along the four sides of a square at speeds $v, 2v, 3v$ and $4v$ respectively. If u is the average speed of the car in its travel around the square, then which of the following is correct :
    a) $u = 2.25v$ b) $u = 3v$ c) $v < u < 2v$ d) $3v < u < 4v$

14. The difference between the prices of an article with marked price ₹ 5000 after a discount of 40% and two successive discounts of 36% and 4% on the same amount (in ₹) is :
    a) 70   b) 27   c) 72   d) 0

15. If A and B are any two points , then set of all the points P such that $\angle APB = 90°$ is:
    a) The line AB   b) the line perpendicular to AB and bisecting it

    c) the point P itself   d) the circumference of the circle with AB as diameter

SPACE FOR THE ROUGH WORK

16. The ratio of the largest integer that divides product of any four consecutive positive integers to the largest integer that divides product of any three consecutive positive integers is :

    a) 2:1   b) 3:1   c) 1:3   d) 4:1

17. In $\triangle ABC, \angle A$ equals two-third of its complement and $\angle B$ equals four-fifth of its supplement. The measure of $\angle C$ is :

    a) 116°   b) 64°   c) 120°   d) 60°

18. The mean of a set of 9 observations is 20.5. If each of the largest 4 observations is increased by 2, the median of the new set is :

    a) Same   b) increased by 2   c) decreased by 2   d) increased by 8

19. The angle that the Earth will turn about its own axis in 4 hours and 12 minutes is :

    a) 64°   b) 63°   c) 72°   d) 65°

20. If $x + y + z = 0,$ then the value of $\dfrac{xyz}{(x+y)(y+z)(z+x)}$ is :

    a) 0   b) 1   c) $xy + yz + zx$ d) –1

SPACE FOR THE ROUGH WORK

21. Many years ago, there were 4 Thursdays and 5 Wednesdays in the month of May. The day of the week on 15th of May in that year was :
   a) Monday   b) Tuesday   c) Wednesday   d) Friday

22. The graph of the equation $a(x-b)+b(y-a)=a^2+b^2$ on XY-plane does not pass through:

   a) $\left(\dfrac{(a+b)^2}{a},0\right)$ b) $\left(0,\dfrac{(a+b)^2}{b}\right)$ c) $(a+b,a+b)$ d) $(-a-b,-b-a)$

23. M is a point on an arc BC of a circle which circumscribes an equilateral triangle ABC, such that AM passes through the centre O of the circle, then :
   a) $AM = BM + CM$ b) $AM < BM + CM$ c) $AM > BM + CM$ d) $AM = BM \times CM$

24. Three circles with centres A , B and C respectively touch each other externally. If AB= 5 cm, BC = 7 cm and CA = 6cm, then the radius of the circle with centre A is :
   a) 2 cm   b) 3 cm   c) 4 cm   d) 1.5 cm

25. If $\alpha = 2^{\frac{1}{3}} - 2^{-\frac{1}{3}}$, then the value of $2\alpha^3 + 6\alpha - 3$ is :

   a) 1   b) -1   c) 0   d) 2

SPACE FOR THE ROUGH WORK

26. The median of $\dfrac{x}{5}, \dfrac{x}{2}, \dfrac{x}{3}, \dfrac{x}{4}, x$ is 8, then x is :

    a) 24   b) 18   c) 27   d) 51

27. The smallest prime number that divides the sum $(7^{11} + 11^{13})$ is :

    a) 2   b) 3   c) 5   d) 7

28. If n is a perfect square, then the next perfect square greater than n is :

    a) $n^2 + 1$ b) $n^2 + n$ c) $n + 2\sqrt{n} + 1$ d) $2n + 1$

29. If a, b, c and d represent digits of the decimal system , then the number $\left(abcd + dcba\right)$ is always divisible by :

    a) 2   b)3   c)7   d)11

30. The base angle of an isosceles trapezium is $45°$. If the shorter side and both the equal sides are 20 cm each, then the area of the trapezium (in sq. cm) is :

    a) $100\sqrt{2} + 100$ b) $100\sqrt{2} + 200$ c) $200\sqrt{2} + 100$ d) $200\sqrt{2} + 200$

SPACE FOR THE ROUGH WORK

SECTION-C

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

31. Evaluate: 11111111×99999999

32. If $(x+2)$ is the G.C.D of the polynomials $(x-4)(2x^2+x-a)$ and $(x+1)(2x^2+bx-12)$, then find the value of $5a-6b$.

33. A ladder rests against a wall with its lower end at a distance x from the wall and its upper end at a height 2x above the floor. If the lower end slides through a distance y perpendicular to the edge between the floor and the wall, then find the distance by which the upper edge of the ladder slides.

34. Write the rationalizing factor of $\sqrt{2}+\sqrt{7}-\sqrt{10}$.

35. PQR is a right triangle with QS as the perpendicular to the hypotenuse. Find the ratio of PS and SR (in terms of the legs of the triangle PQR).

SPACE FOR THE ROUGH WORK

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36. Evaluate $20182019 \times 20192018 - 20182018 \times 20192019$.

37. Find the difference of the mean of first n odd natural numbers and the mean of first n natural numbers.

38. If G is centroid of a ΔABC of area $24 cm^2$, then find area of ΔAGB (in cm^2).

39. Evaluate :

$$\dfrac{\left(1+\dfrac{1}{1+\dfrac{1}{100}}\right)^3 + \left(1-\dfrac{1}{1+\dfrac{1}{100}}\right)^3}{\left(1+\dfrac{1}{1+\dfrac{1}{100}}\right)^2 + \left(1-\dfrac{1}{1+\dfrac{1}{100}}\right)^2 - \left(1+\dfrac{1}{1+\dfrac{1}{100}}\right)\left(1-\dfrac{1}{1+\dfrac{1}{100}}\right)}$$

40. C_1 and C_2 are two congruent circles with centres C and D respectively. Each circle passes through the centre of the other circle. If the circumference of each circle is 2cm, then find the perimeter of the common region (in cm).

SPACE FOR THE ROUGH WORK

41. Evaluate : $\left(\dfrac{1}{2}+\dfrac{2}{3}+\dfrac{3}{4}+\dfrac{4}{5}\right)^2 + \left(\dfrac{1}{2}+\dfrac{2}{3}+\dfrac{3}{4}+\dfrac{4}{5}\right)\times\dfrac{1}{2}-\left(1+\dfrac{1}{2}+\dfrac{2}{3}+\dfrac{3}{4}+\dfrac{4}{5}\right)\left(\dfrac{2}{3}+\dfrac{3}{4}+\dfrac{4}{5}\right).$

42. Within an equilateral triangle of side 6 cm, two other equilateral triangles having the same centroid are so drawn that they divide the triangle into three parts having equal areas. Find the ratio of the sides of the innermost and the middle triangles.

43. The price of a jewel passing through three hands, rises on the whole by 65%. If the first and the second earned 20% and 25% profit respectively, find the percentage profit earned by the third seller?

44. A, B and C can do a piece of work individually in 8, 10 and 15 days respectively. A and B start working but A quits after working for 2 days. After this, C joins B but quits after 3 days. B continues the work till its completion. In how many days will the work be completed?

45. The sum of the perimeter of all the faces of cuboid is 176 cm. The length of the diagonal is 12 cm. Calculate the surface area of the cuboid (in sq.cm).
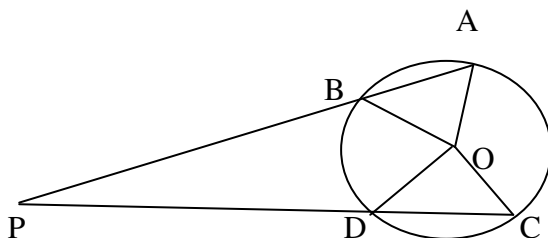

SPACE FOR THE ROUGH WORK

46. Find the value of x if $8.5 - \left\{ 5\dfrac{1}{2} - \left(7\dfrac{1}{2} + 2.8 + x \right) \right\} \times 4.25 \div (0.2)^2 = 306$.

47. Find the sub-triplicate ratio of the sub-duplicate ratio of $4096 x^6 : 729 y^{12}$.

48. Two circles with centres at A and B and of radii 5cm and 3 cm touch each other internally. If the perpendicular bisector of the line segment AB meets the bigger circle in P and Q, then what is the length of PQ (in cm).

49. In the figure chord AB and CD when produced meet at point P. If O is centre of the circle, $\angle AOC = x, \angle BOD = y$, then find $\angle APC$ in terms of x and y.

50. In 2008, Jame's age was the sum of all the digits of his year of birth. How old was he in 2018?

SPACE FOR THE ROUGH WORK

SECTION-D

**Write the Answers only in the space provided on the Answer Sheet.**

51. If $x = \dfrac{\sqrt{a+2b} + \sqrt{a-2b}}{\sqrt{a+2b} - \sqrt{a-2b}}$, then find the value of $bx^2 - ax + b$.

52. Factorize: $a^3(l+m)^3 - \left(\dfrac{al}{3} + \dfrac{2am}{3}\right)^3 - \left(\dfrac{2al}{3} + \dfrac{am}{3}\right)^3$.

53. If *h, C, V, T* are respectively the height, curved surface area , volume and total surface area of a cylinder,

then find $\dfrac{V(\pi h^2 + C)}{h} + \dfrac{V^2}{h^2}$ (in terms of T) .

SPACE FOR THE ROUGH WORK

54. If $\triangle ABC$ *and* $\triangle PQR$ are equilateral triangles, $\angle ABU = 65°$ and $\angle QPV = 75°$, then find the measure of $\angle CXY$.
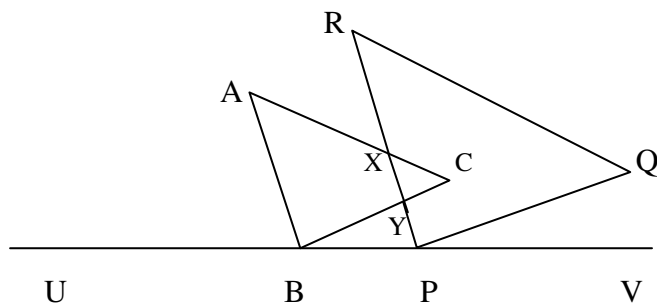
55. There are two mixtures, one containing solutions A,B and C in the ratio 3:5:2 and the other containing A and B in the ratio 4:5. If one litre of the first solution be mixed with two litres of the second solution, then find the ratio A: B: C in the resulting mixture .

56. If $\left(x+\dfrac{1}{x}\right)^{2} = 3$, then evaluate $x^{206} + x^{200} + x^{90} + x^{84} + x^{24} + x^{18} + x^{12} + x^{6} +1$.

SPACE FOR THE ROUGH WORK

57. Gracy and Suzy embarked on a moving escalator to the second floor of a mall. Gracy walked up the escalator at a speed of 2 steps per second. At the same time Suzy walked up the same escalator at the speed of 3 steps every 2 seconds. Gracy arrived at the second floor in 25 seconds. It took Suzy 30 seconds to reach the same floor. How many steps had the escalator when it was stationary?

58. If $p = 28 + 16\sqrt{3}$, then find the value of $p^{1/4} - p^{-1/4}$.

59. ABCD is a trapezium with AB is parallel to CD (CD > AB)and M and N are points on AD and BC such that MN is parallel to DC. If the area of ABNM is half the area of ABCD, then find (MN)^2 in terms of AB and CD.

60. If a and b are positive real numbers such that $a\sqrt{a} + b\sqrt{b} = 332$ and $a\sqrt{b} + b\sqrt{a} = 333$, then find the value of $\dfrac{11(a+b)}{5}$.

SPACE FOR THE ROUGH WORK