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.

35th ARYABHATTA INTER-SCHOOL MATHEMATICS COMPETITION – 2018

CLASS - VIII

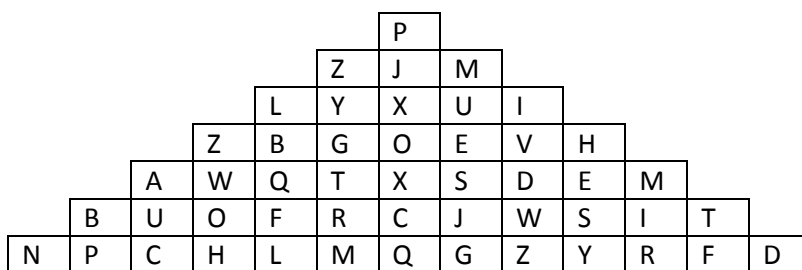Time Allowed: **2** Hours   Max. Marks: **100**

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. Six persons A,B,C,D,E and F are sitting forming a circle and facing towards centre. B is between A and C. E is between F and D. F is straight opposite to A and right to E. D is between which of the following pair?
   a) FE   b) AE   c) AB   d) CF

2. If in a certain code 'ADMIRE' is written as 'AIDRME' then how would 'ADORES' be written in the same code?
   a) AODRSE   b) ASDESO   c) ARDEOS   d) AREDOS

3. If the digits 0,1,2,3,4,5,6,7,8,9 are substituted by a,b,c,d,e,f,g,h,i,j respectively, so that 135 is written as bdf, then $(ijf \times e - bfia) \div baaa$ is :
   a) 2   b) 1   c) 5   d)3

4. A pyramid of letters is given below. Study the pyramid and select the correct alternative to find the next term : LBQFLAWQTX , PJXOXLYXUI, ?

			P							
		Z	J	M						
	L	Y	X	U	I					
Z	B	G	O	E	V	H				
A	W	Q	T	X	S	D	E	M		
B	U	O	F	R	C	J	W	S	I	T
N	P	C	H	L	M	Q	G	Z	Y	R	F	D

   a) ZYGTRBGOEV   b) YGTRMBGOEV   c) IVDWZTXSDE   d) MUESJGOEVH

5. Two numbers given before :: and two numbers after it, are to have the same relationship. Find the correct choice . $48:122::168:?$
   a) 288   b) 290   c) 278   d) 292

SPACE FOR THE ROUGH WORK

6. Select the combination of numbers so that letters arranged accordingly will form a meaningful word :

   V A R S T E
   1 2 3 4 5 6

   a) 2,3,1,6,4,5   b) 4,5,2,3,1,6   c) 6,3,4,5,2,1   d) 3,2,4,5,6,1

7. If $7*11 = 81, 5*3 = 16$, then $19*15$ is :

   a) 361   b) 225   c) 289   d) 324

8. A watch reads 4:30. If the minute hand points East , in which direction will the mirror-image of hour hand point?

   a) North-west   b) North-East   c) South-West   d) South-East

9. Find the next number in the sequence : $6, 14, 31, 67, 141, 293,$

   a) 590   b) 578   c) 485   d) 591

10. Dennis cuts a cake into quarters and cuts one quarter into smaller pieces of equal size. Each of the small piece is twenty grams in weight. If he has seven pieces of cake in all with him how heavy was the original cake?

    a) 140 g   b) 280g   c) 320 g   d) 160 g

SPACE FOR THE ROUGH WORK

SECTION-B

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

11. The sum of 18 consecutive natural numbers is a perfect square. The smallest possible value of this sum is :
    a)144   b) 169   c)225   d)289

12. The perimeter of a regular hexagon and a square are equal. The ratio of the area of the square to the area of the hexagon is:
    a) $3:\sqrt{2}$ b) $2:3\sqrt{3}$ c) $1:\sqrt{3}$ d) $3:2\sqrt{3}$

13. Two circles touch each other externally at point P. AB is the direct common tangent of these two circles. Then $\angle APB$ is :
    a) $30°$ b) $60°$ c) $45°$ d) $90°$

14. How many zeros are there in one googol?
    a) 10   b)100   c)3   d)1

15. If $a+b+c=6$, then $(2-a)^3+(2-b)^3+(2-c)^3-3(2-a)(2-c)(2-b)$ is :
    a) 0   b) 1   c) -1   d) 2

SPACE FOR THE ROUGH WORK

---

16. The sum of digits of a two digit number is subtracted from the number. The resulting number is always divisible by :

    a)9   b) 7   c) 6   d)2

17. If $x + \dfrac{2}{x} = 1$, then the value of $\dfrac{x^2 + x + 2}{x^2(1-x)}$ is :

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

18. Which of the following numbers has a non-terminating recurring decimal expansion:

    a) $\dfrac{3}{8}$ b) $\dfrac{15}{35}$ c) $\sqrt{3}$ d) $\sqrt{\dfrac{7}{175}}$

19. Sides of a triangle are 24cm,7cm and 25cm. The product of its in radius and circum radius is :

    a)37.5 cm^2 b) 35 cm^2 c)27.5 cm^2 d) 25 cm^2

20. Two irrational numbers between $\sqrt{2}$ and $\sqrt{3}$ are:

    a) $\sqrt[4]{6}, \sqrt[4]{12}$ b) $\sqrt[4]{7}, \sqrt[4]{10}$ c) $\sqrt[4]{8}, \sqrt[4]{12}$ d) $\sqrt[4]{8}, \sqrt[4]{6}$

SPACE FOR THE ROUGH WORK

---

21. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$, then

    a) $x^3 + y^3 + z^3 = 0$ b) $x^3 + y^3 + z^3 = 27xyz$ c) $(x+y+z)^3 = 27xyz$ d) $(x+y+z) = 3xyz$

22. If $2^m \, MB = 1GB (gigabyte)$, then 2^{m-4} is :

    a) 32   b) 64   c) 10   d)128

23. The largest among $\sqrt{\frac{1}{2}}, \sqrt{\frac{2}{3}}, \sqrt{\frac{3}{4}}, \sqrt{\frac{3}{5}}$ is :

    a) $\sqrt{\frac{1}{2}}$ b) $\sqrt{\frac{2}{3}}$ c) $\sqrt{\frac{3}{5}}$ d) $\sqrt{\frac{3}{4}}$

24. Through four distinct points of which three points are collinear, the number of lines that can be drawn is :

    a) 2   b)4   c)3   d)6

25. If $x - y = 8$ and $x^2 - y^2 = 16m$, then the product of x and y is :

    a) $16 - m^2$ b) $m^2 - 16$ c) $m^2 - 4$ d) $4 - m^2$

SPACE FOR THE ROUGH WORK

26. The mean proportional between two numbers is 28 and the third proportional between them is 224, the two numbers are :
    a) 7 and 112   b) 14 and 56   c) 28 and 28   d) 21 and 36

27. Sides of a triangle are $6cm, 6\sqrt{3}cm$ and $12cm$. The altitude to the longest side is :
    a) 3 cm   b) $3\sqrt{3}cm$ c) $6cm$ d) $6\sqrt{3}cm$

28. The sum of all the factors of 2500 which are also perfect squares is equal to :
    a) 3250   b) 755   c) 3255   d) 2630

29. A person sold his pen for Rs75 and his profit percent equals the cost price. The cost of the pen is :
    a) Rs.45   b) Rs.50   c) Rs. 65   d) Rs.40

30. Raman is a managing director of a company. He earns Rs. 2 lacs per month and saves Rs. 50,000 per month. If he has Rs.4 lacs in his account, then after how many months will he become a millionaire?
    a)9   b) 8   c)10   d) 5

SPACE FOR THE ROUGH WORK

SECTION-C

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

31. A certain bacterium doubles itself every minute. If in a culture (a collection of bacteria), initially there are 3×10^5 bacteria, how many bacteria will be present after 5 minutes?(Give answer in standard form)

32. If ABCD is an isosceles trapezium inscribed in a semi-circle with diameter AD and AB=CD=2cm and radius of the semi-circle is 4cm. Then find the length of BC (in cm).

33. How many years will you take to count a billion if you were to count one number per second and count 8 hours per day?

34. The diagonal of a square ABCD is $2\sqrt{2}$ cm and E is any point on AB. F,G,H and K are the mid-points of DE,CF,DG and CH respectively. Find the area of ΔKDC .
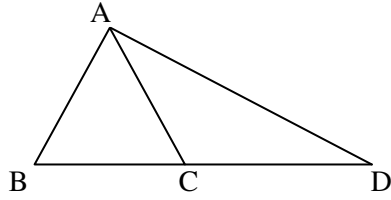

SPACE FOR THE ROUGH WORK

---

35. If $\dfrac{a}{b+c} = \dfrac{b}{c+a} = \dfrac{c}{a+b}$ and $a+b+c \neq 0$, then what will be the value of each ratio .

36. A varies directly as x and B varies inversely as x. Also y is equal to the sum of A and B. It is given that , when x=2 then y=3 and when x=4,y=9. Find the relationship between x and y.

37. In $\triangle ABC$, DE ∥ BC. P is a point on DE such that BP bisects $\angle ABC$ and CP bisects $\angle ACB$. If AD=5cm, AB=10cm and AC=12 cm , then find the length of DE (in cm).

38. In the given figure , if AB=BC and AC=CD, then find the ratio of $\angle BAD$ and $\angle ADB$.

SPACE FOR THE ROUGH WORK

---

39. M is the median of 160,144,155,145,147,152,148,150 and 149. The mean of first five prime numbers is 'm' and 'R' is range of 7,9,7,5,9,9,18,6,8,17 then evaluate : $R^2 - 5m - M$.

40. A litre of water was evaporated from six litres of salt solution containing 5% salt. How much percentage of salt is left in the remaining solution ?

41. A person weighing 40kg has about three litres of blood. In a drop of blood (1 cu. mm), there are nearly 5×10^6 red blood cells each of which is about 0.07 mm in diameter. We are to form a chain of red blood cells in a person weighing 80kg. Find the length of this chain (in kms) .

42. If $(x+a)$ is the H.C.F of $x^2 + px + q$ and $x^2 + lx + m$, then find the value of 'a' .

SPACE FOR THE ROUGH WORK

---

43. A clock is set to show the correct time at 11 a.m. The clock gains 12 minutes in 12 hours, what will be the true time when the watch indicates 1 p.m. on the 6th day?

44. ΔABC is an equilateral triangle of side $2\sqrt{3}$ cm. O is any point in the interior of ΔABC. If x, y and z are perpendicular distances of point O from the sides of the triangle, then find $(x + y + z)$ (in cm).

45. Two numbers a and b are in the ratio $\dfrac{3}{5} : \dfrac{4}{3}$. By what percent is b more than a?

46. What must be added to $\dfrac{3x^2}{16} + \dfrac{23}{9} - \dfrac{\sqrt{78}x}{3}$ to make it a perfect square.

SPACE FOR THE ROUGH WORK

---

47. PQRS is a square of side 6cm and T is the mid-point of QR. What is the radius of circle inscribed in $\triangle$TPQ (in cm).

48. The radius of the base and the height of a right circular cylinder are each increased by 20%. By what percent will the volume of the cylinder will increase?

49. If $x^2 - 3x + 2$ is a factor of $x^4 - px^2 + q$, then find the value of $(-p + q)$.

50. The length of the hypotenuse of a right angled triangle is 17cm and its area is 60 sq.cm. Find the difference of the square of the lengths of the remaining sides (in cm).
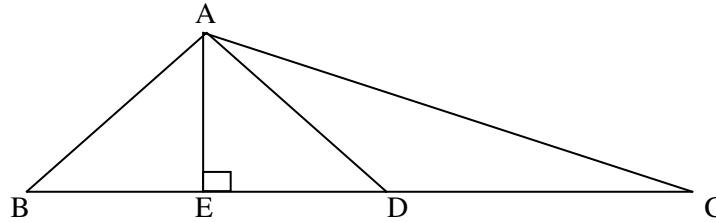

SPACE FOR THE ROUGH WORK

# SECTION-D

<u>Write the Answers only in the space provided on the Answer sheet.</u>

51.   If a right circular cone , with slant height l and a right circular cylinder have the same radius r, same total surface area and height h and h' respectively , then find the value of $\dfrac{l-r}{l+r}$.

52.   In the figure , $AE \perp BC, D$ is the mid-point of BC. If $AB = c, AE = h, AD = d, BC = a$ and $AC = b$,then find ED(in terms of a, b and d) .

53.   A circle is inscribed in a square PQRS of side $\sqrt{2}$ units each. In the gap remaining at each corner a square of maximum possible area is drawn. Find the radius of the circle that can be inscribed in each of the smaller squares.
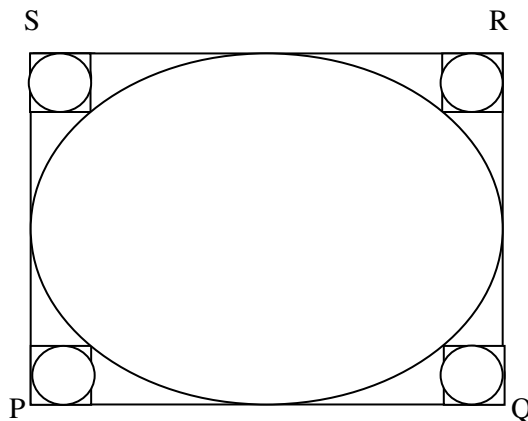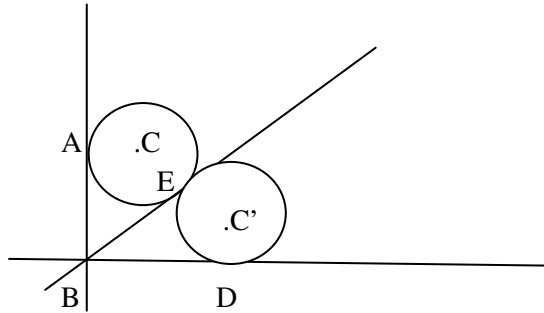

SPACE FOR THE ROUGH WORK

54. In the figure, two identical circles are drawn of radius 12 cm each with centres C and C' with AB and BD being respective tangents at A and D. If BE is their common tangent and $AB \perp BD$, then find length of BD.


55. ABC is a triangle in which AB=AC. P is any point on BC. $CS \perp AB$, $PQ \perp AB$ and $PR \perp AC$, then find the length of CS (in terms of PQ and PR).

56. ABCD is a trapezium in which $AB \parallel DC$, DC= 30cm and AB= 50 cm. If M and N are the respective mid-points of AD and BC, then find $ar(DCMN):ar(MNBA)$.

57. The external length, breadth and height of a closed rectangular box are 18cm, 10cm and 6cm respectively and the thickness of the wood is 0.5 cm .When the box is empty, it weighs 15kg and when filled with sand it weighs 100 kg. Find the ratio of the weight of one cubic cm of wood to one cubic cm of sand.

SPACE FOR THE ROUGH WORK

58. In the figure, A is a point in the interior of square PQRS. ABCR is also a Square. If RC=27cm and QB=28 cm, then find the length of BS (in cm).
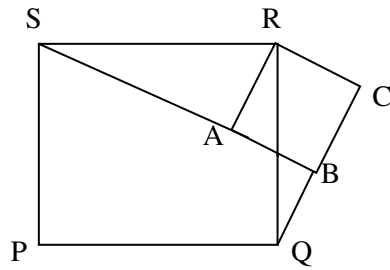
59. Express $\dfrac{\sqrt{a^2-b^2}+a}{\sqrt{a^2+b^2}+b} \div \dfrac{\sqrt{a^2+b^2}-b}{a-\sqrt{a^2-b^2}}$ in the simplest form.

60. There are only 2 questions in a Maths test. Problem I was solved by 70% of the students. Problem II was solved by 60% of them. Every student solved at least one of the problems. Nine students solved both the problems. How many students appeared in the test?

SPACE FOR THE ROUGH WORK