



# Summer Fields School

KAILASH COLONY, NEW DELHI-110048

Roll No.							
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A
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- Please check that this questionnaire contains 10 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.

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## 31<sup>ST</sup> ARYABHATTA INTER-SCHOOL MATHEMATICS COMPETITION – 2014

### CLASS - VIII

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Time Allowed: 2 Hours

Max. Marks: 100

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#### GENERAL INSTRUCTIONS:

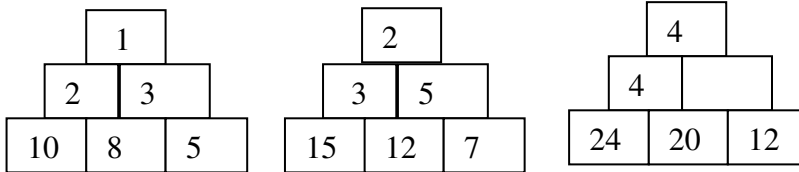
1. Do not write your name on the questionnaire.
  2. Write your roll no. on the questionnaire and the Answer Sheet in the space provided.
  3. All the questions are compulsory.
  4. Read questions carefully; think twice before you write the answer. **No overwriting or cutting is allowed on the Answer 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 1 mark 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 clearly written in the space provided on the Answer sheet.
  10. Use of calculator is not allowed.
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## SECTION -A

## Rough Work

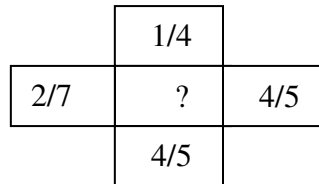
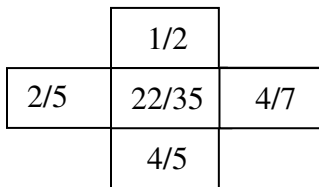
**Write the correct option in the Answer Sheet.**

1. The figures given below are divided into certain parts. Each part bears a number and one part is blank. Numbers follow a certain pattern of rule. You are required to analyse the given figures and then find the correct option.



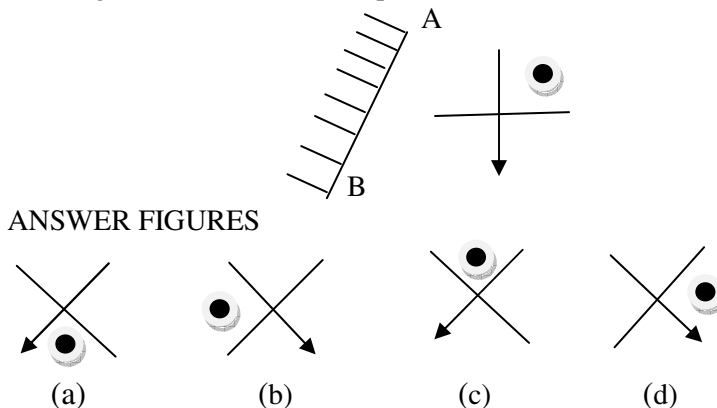
- (a) 4  
(b) 6  
(c) 5  
(d) 8
2. If X stands for addition, Y stands for subtraction, Z stands for division and W stands for multiplication, then what for does  $18 X 9 Y 14 Z 7 W 10$  stand for?  
(a) 4  
(b) 5  
(c) 6  
(d) 7
3. If  $P \Delta Q$  means P is father of Q,  $P \square Q$  means P is son of Q,  $P \delta Q$  means P is mother of Q,  $P=Q$  means P is daughter of Q, then which of the following means z is grand father of y :  
(a)  $z \Delta x = y$   
(b)  $z \delta x \square y$   
(c)  $z \Delta x \delta y$   
(d)  $z \delta x = y$
4. While facing East you turn to your left and walk 3 kms, then turn to your left and walk 4 kms, and now you turn  $45^\circ$  towards your right and go straight to cover 5 kms. Now, in what direction are you from your starting point?  
(a) East  
(b) North  
(c) West  
(d) South
5. If HAD is 32 what is FLAG?  
(a) 504  
(b) 42  
(c) 26  
(d) 405

6. Pointing to a lady in the photograph, Rajesh said “She is my grandmother’s only son’s mother”.  
How is the woman related to Rajesh?  
(a) Daughter  
(b) Grandmother  
(c) Sister  
(d) Mother
7. If  $(a, b, c, d) = ab - cd$  and  $[c, d] = c + d - 1$ , then  $[(-1, 0, 1, 2), [-2, -1]]$  is equal to:  
(a) 0  
(b) -5  
(c) -6  
(d) -7
8. A is shorter than F but taller than B . F is not as tall as D, C is taller than A but shorter than F. E is shorter than A . G is shorter than E. Who stands third in height?  
(a) C  
(b) D  
(c) F  
(d) none of these
9. Numbers in the given figures follow same rules. Identify the number which when substituted for the question mark (?) maintains that rule.



- (a) 1/7  
(b) 2/7  
(c) 3/7  
(d) 4/7

10. Which one of the answer figures is exactly the mirror image of the problem figure when the mirror is placed at AB?



## SECTION – B

## Rough Work

Write the correct option in the answer sheet.

11. The unit's digit in the expansion of  $(44)^{44} + (55)^{55} + (88)^{88}$  is :
- a) 2
  - b) 5
  - c) 7
  - d) 4
12. The number of factors of 1080 is :
- a) 16
  - b) 32
  - c) 28
  - d) 8
13. The value of  $|x-2| + |x+2|$ , if  $0 < x < 2$  is :
- a)  $2x$
  - b) 4
  - c)  $2(2-x)$
  - d) 0
14. When 616 is divided by a certain positive number, which is  $66\frac{2}{3}\%$  of the quotient, it leaves 16 as the remainder. The divisor is :
- a) 30
  - b) 34
  - c) 32
  - d) 33
15. Greatest number out of  $5^{879}, 3^{1172}, 2^{1465}, 8^{586}$  is :
- a)  $5^{879}$
  - b)  $3^{1172}$
  - c)  $2^{1465}$
  - d)  $8^{586}$
16. The age of a boy is one fifth of the age of his mother and the sum of their ages is equal to the age of the father. After 15 years, the sum of the ages of the son and his mother will be four-third of the father's age. The ratio of the present ages of son , mother and father respectively is :
- a) 2:5:6
  - b) 1:3:4
  - c) 2:5:7
  - d) 1:5:6
17. The value of  $(256)^{0.125} + (625)^{0.25}$  is ::
- a) 7
  - b) 31
  - c) 17
  - d) 45

18. If  $5^x = 3^y = 45^z$ , then  $\frac{1}{z}$  is equal to :
- a)  $\frac{1}{x} + \frac{1}{y}$
  - b)  $\frac{1}{x} + \frac{2}{y}$
  - c)  $\frac{2}{x} + \frac{2}{y}$
  - d)  $\frac{2}{x} + \frac{1}{y}$
19. If  $a^2 - 2a - 1 = 0$ , then the value of  $a^2 + \frac{1}{a^2}$  is :
- a) 4
  - b) 1
  - c) 6
  - d)  $2\sqrt{2}$
20. By what percent is the sum of Rs. 100 more than the sum of Rs. 90?
- a) 12
  - b)  $11\frac{1}{9}$
  - c) 10
  - d)  $6\frac{2}{9}$
21. AD, BE and CF are medians of the triangle ABC.  $p_1$  and  $p_2$  are the lengths of the perpendiculars from the vertices B and C to AD;  $p_3$  and  $p_4$  are the lengths of the perpendiculars from the vertices C and A to BE and  $p_5$  and  $p_6$  are the lengths of the perpendiculars from the vertices A and B to CF. The area of the triangle is :
- a)  $\frac{1}{2}(p_1 + p_3) AD$
  - b)  $\frac{1}{2}(p_4 + p_3) CF$
  - c)  $\frac{1}{2}(p_5 + p_6) BE$
  - d)  $\frac{1}{2}(p_1 + p_2) AD$
22. The angles of a triangle are in the ratio 1:1:2. If the smaller side is 8cm, then the longest side is :
- a)  $8\sqrt{2}$
  - b)  $4\sqrt{3}$
  - c) 16
  - d) 8

23. If  $2^{x-1} + 2^{x+1} = 320$ , then  $x =$
- a) 7
  - b) 3
  - c) 5
  - d) 6
24. A man's age is now four times that of his son and it is also three times that of his daughter. In six years time it will be three times that of his son. How old was he when his daughter was born?
- a) 30 years
  - b) 22 years
  - c) 32 years
  - d) 54 years
25. A number is increased by 20% and then again by 20%. By what percent should the number be reduced so as to get back the original number?
- a)  $10\frac{4}{9}$
  - b) 20
  - c) 24
  - d)  $30\frac{5}{9}$
26. The radius of the circle is 20 cm. Three more concentric circles are drawn inside it in such a way that it is divided in four equal parts. The circumference (in cm) of the smallest circle is
- a)  $20\pi$
  - b)  $10\pi$
  - c)  $5\pi$
  - d)  $40\pi$
27. Triangle ABC is a right angled triangle with  $\angle A = 90^\circ$ . A circle is inscribed in it. The length of two sides containing the right angle are 6 cm and 8 cm. The radius (in cm) of the incircle of the triangle is:
- a) 5
  - b) 4
  - c) 3
  - d) 2
28. Two trains 160 km apart are traveling toward each other along the same track. The first train goes 70 kmph; the second train rushes along at 90 kmph. A fly is hovering just above the nose of the first train. It buzzes from the first train to the second train, turns around immediately, flies back to the first train, and turns around again. It goes on flying back and forth between the two trains until they collide. If the fly's speed is 130 kmph, how far will it travel (in km)?
- a) 160
  - b) 20
  - c) 130
  - d) 150

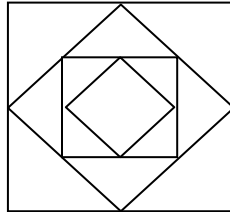
29. If  $[x]$  means the greatest integer less than or equal to  $x$ , then

$$\left[ \frac{-1}{3} \right] + [4.5 - 2.1 + 2] + [(1 + 0.8)^2] \text{ is equal to :}$$

- a) 4
- b) 5
- c) 6
- d) 7

30. The given figure consists of all squares, the side of the innermost square is  $\frac{1}{\sqrt{2}} a$  units. The diagonal of the outermost square in the fig. is :

- a)  $2a$  units
- b)  $\sqrt{2} a$  units
- c)  $a$  units
- d)  $2\sqrt{2} a$  units



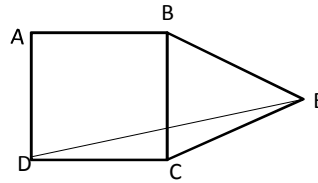
### SECTION – C

**Write the answer in the answer sheet.**

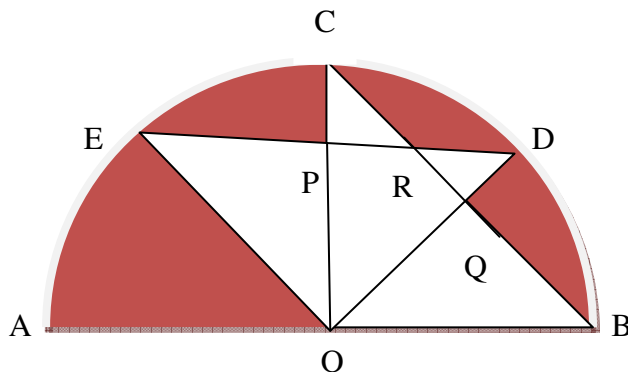
31. There are 3 rivers and after each river lies a temple. So there are 3 rivers and 3 temples. A man wants to leave the same number of flowers at each temple, and be left with none at the end. What happens though is that each time he passes through one of the rivers the number of flowers he has doubles. So he has to start off with what minimum number of flowers, taking into consideration that they double, so that he is left with no flowers whatsoever at the end?
32. Pranshi is cycling around a circular track at 15 kmph. Anita starts at the same time, but only goes at 12 kmph. How many minutes after they start, will Pranshi pass Anita if the track is  $\frac{1}{2}$  km long while they are moving in the same direction?
33. Find the sum of three three-digit square numbers that together use each of the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 exactly once.
34. If  $a^4 + \frac{1}{a^4} = 1154$  then find  $a^3 + \frac{1}{a^3}$  given that  $a > 0$ .
35. If  $\sqrt{\frac{19+8\sqrt{3}}{7-4\sqrt{3}}} = a + b\sqrt{3}$ , then find  $a + b$ .
36. A wire is bent so as to form a square. The length of 4 cm is cut from it and the remainder is again bent to form four sides of the square. If the difference in areas of square is 25sqcm, how long (in cm) was the wire before being cut?
37. A father gives 1% of his monthly salary to his two sons as pocket money. The elder get 80% of the total amount given to the two sons and he spends 80% of his share. If he saves Rs 20 every month, then find the monthly salary of his father.

## Rough Work

38. A reduction of 20% in the price of sugar enables a purchaser to obtain 2.5 kg more for Rs 160. Find the original price per kg of sugar.
39. By selling 90 ball pens for Rs 160 a person loses 20%. How many ball pens must be sold for Rs 96 so as to have a profit of 20%?
40.  $\triangle ABC$  is a right triangle with  $\angle A = 90^\circ$  and AD is the altitude of BC.  $AB : BC = 3:4$ , then find the ratio of AD:DC.
41. D is the point on the side BC of triangle ABC such that  $\angle ADC = \angle BAC$ . If  $BC = 18\text{cm}$  and  $CD = 8\text{cm}$ , find AC (in cm).
42. ABCD is a square and triangle EBC is an equilateral triangle. Find  $\angle BED$ .



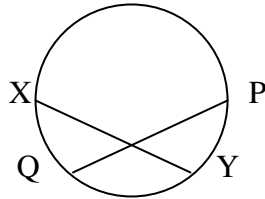
43. PR is the diameter of the circle and points Q and S lie on the opposite sides of PR.  $PQ = 7\text{cm}$ ,  $QR = 6\text{cm}$ ,  $RS = 2\text{cm}$ . Find the area of quadrilateral PQRS (in sq cm).
44. A square and a regular hexagon have equal perimeters. Find the ratio of their area.
45. If the area of a circle inscribed in the equilateral triangle is  $4\pi\text{cm}^2$ , find the area of triangle (in sq cm).
46. In the figure, the area of the shaded region is  $44\text{cm}^2$ . O is centre of the semi-circle.  $OE \perp OD$ ,  $OC \perp AB$  and  $OE = 7\text{cm}$ . Find the area of the region POQR (in sq cm).



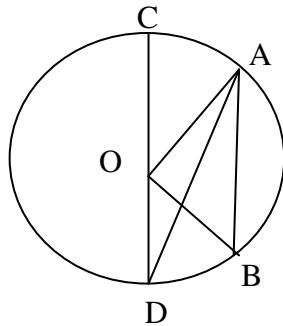
47. A circle is passing through three vertices of a rhombus of side 8 cm with its centre on the fourth vertex of the rhombus. Find the length of the longest diagonal of the rhombus (in cm).



48. Two chords XY and PQ are intersecting at the point A. The line segment joining X and P is a diameter of the circle.  $\angle XAP = 120^\circ$  and  $XY = PQ = 18\text{cm}$ . Find the distance between the centre of the circle and the point A (in cm).



49. The mean of  $n$  numbers is  $x$ . If each of these observations is increased by  $2, 4, 6, 8, \dots, 2n$  respectively, find the new mean.
50. In the given figure O is centre of the circle and  $CD \parallel AB$ . If  $\angle DAO = 20^\circ$ , then find  $\angle AOB$ .

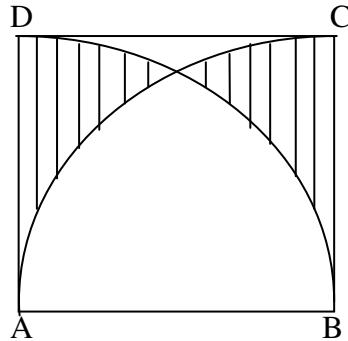


**SECTION – D**

**Write the answer in the answer sheet.**

51. A certain number of men can do a work in 15 days working 8 hours a day. If the number of men is decreased by one-third, then in how many days can twice the previous work be completed by remaining men working 5 hours a day?
52. A sum was divided in three parts. The first was lent at 10 % p.a. for 4 years, second at 20% for 6 years and third at 25% for 6 years . Each part was lent at simple interest and the same amount of simple interest was received from each. Find the ratio of the first, second and the third part.
53. A milkman took out one third of the pure milk and added the same quantity of the water. Again he took out one third of the mixture and added the same quantity of the water. He did the same thing once more. Find the ratio of the milk and the water in the final mixture.
54. A cone is surmounted on a cylinder of radius and height 1 cm each, and the radius and height of the cone are 2cm and 1 cm respectively. Find the total surface area (in  $\text{cm}^2$ ) of the solid in terms of  $\pi$ .

55. In the given figure, ABCD is a square and two quadrants have been drawn with A and B as centres and AB as the radius. If  $AB = 42$  cm, find the area (in sq cm) of the shaded region. (Use  $\pi = \frac{22}{7}$ ,  $\sqrt{3} = 1.7$ )



56. Sohan Lal divided Rs.25000 between his two sons Amit and Sumit. Amit invests amount at 8%p.a. Compounded annually. Sumit invests the amount at 10% p.a. simple interest. At the end of two year the interest received by Sumit is Rs1336 more than the interest received by Amit. Find Amit's share.
57. An absentminded cashier switches the rupees and paise when he cashed a cheque for Mr. Amit, giving him rupees instead of paise, and paise instead of rupees. After giving a five paisa coin to a beggar, Mr. Amit discovered that he has exactly twice as much as his original cheque amount. What was the amount of the cheque?
58. Two boats on the opposite shores of a river start moving towards each other. When they pass each other they are 750 m from one shoreline. They each continue to the opposite shore, immediately turn around and start back. When they meet again they are 250 m from the other shoreline. Each boat maintains a constant speed throughout. How wide is the river (in m)?
59. Two people stand back to back next to the track in a small railway station. As the head of the express train that passes the station reaches them, they start to walk parallel to the track. As the tail of the train reaches each of them, they stop, having walked 30m and 40m respectively. If they both walked with identical, constant speed and the train kept its speed as well, find the length of the train (in m).
60. A metal cube of dimension  $49 \times 22 \times 14$  cm<sup>3</sup> is melted and cast into 7 cylinders of radius 7cm. These cylinders are again melted and cast into cubes such that the side of each cube is equal to half of the height of each cylinder. Find the number of cubes thus formed. ( use  $\pi = \frac{22}{7}$  )