



# Summer Fields School

KAILASH COLONY, NEW DELHI-110048

## 26<sup>th</sup> ARYABHATTA MATHEMATICS COMPETITION – 2008-09 CLASS = VIII

Time Allowed : 2 ½ Hours

Max.Marks : 100

Roll No. of the Participant : \_\_\_\_\_

### GENERAL INSTRUCTIONS :

- Participant should not write his/her name on the questionnaire.
- Write your roll no. on each page of the questionnaire.
- All the questions are compulsory.
- Read questions carefully; think twice before you write the answer. Another copy of the questionnaire will not be provided.
- Do your rough work on the separate sheet supplied to you and attach the same with the questionnaire.
- Q. Nos. 1 and 2 carry 15 marks each.  
Q. Nos. 3 carries 10 marks.  
Q. Nos. 4 to 13 carry 3 marks each and  
Q. Nos. 14 to 19 carry 5 marks each.
- Answer to Q. Nos. 1,2 and 3 are to be given in the space provided with the questions.
- Q. Nos. 4 to 19 are to be answered in the space provided after Q. No. 19.
- Use of calculator is not allowed.

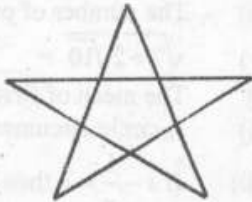
### SECTION – A

1. Fill in the blanks:

- The sum of the digits of a number is subtracted from the number. The resulting number is always divisible by \_\_\_\_\_.
- The last digit of the number  $(373)^{333}$  is \_\_\_\_\_.
- The number of prime factors in the expression  $7^{17} \times 11^{27}$  is \_\_\_\_\_.
- $\sqrt{7+2\sqrt{10}} =$  \_\_\_\_\_.
- The mean of first 10 prime numbers is \_\_\_\_\_.
- A circle circumscribes a square of side 'a'. The area of the circle is \_\_\_\_\_.
- If  $x - \frac{1}{x} = 3$ , then the value of  $x^3 - \frac{1}{x^3} =$  \_\_\_\_\_.
- A single discount percent that is equivalent to the two successive discounts of 15 % and 10 % is \_\_\_\_\_.
- $\frac{x^{2p}}{x^{q+r}} \times \frac{x^{2q}}{x^{p+r}} \times \frac{x^{2r}}{x^{p+q}} =$  \_\_\_\_\_.
- ABCD is a rectangle 15cm long and 10cm wide. A point K is taken on DC such that DK = 7 cm. Join BD and BK. The area of the triangle BDK is \_\_\_\_\_.
- The point of concurrence of the perpendicular bisectors of a triangle is called \_\_\_\_\_.

- xii)  $\frac{3.764 \times 3.764 - (1.236)^2}{3.764 - 1.234} = \underline{\hspace{2cm}}$
- xiii) A train left station A with some passengers. At station B half the passengers got down and 90 passengers boarded the train. At station C again half the passengers got down and only 30 passengers boarded the train. At the next station D. All the passengers numbering 140 got down. The total number of passengers in the train when it left the station A is \_\_\_\_\_.
- xiv) If the difference of two numbers is 'x' and the difference of their squares is 'y'. then the sum of the numbers is \_\_\_\_\_.
- xv) If  $\frac{q}{p} = \frac{1}{4}$ , then  $\frac{p+q}{p-q} = \underline{\hspace{2cm}}$ .

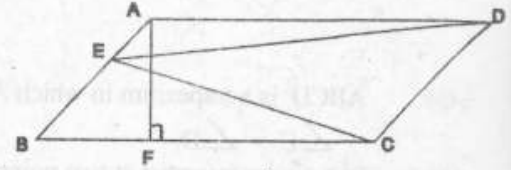
2. Tick against the correct answer :

- i) A certain number is divided by 899 gives a remainder of 63. The remainder when the number is divided by 29 is  
 a) 23                      b) 5                      c) 11                      d) 27
- ii) Three cubes whose edges are 3cm, 4cm and 5cm respectively are melted to form a single cube. The surface area of the new cube formed is  
 a) 210 cm<sup>2</sup>              b) 213 cm<sup>2</sup>              c) 224 cm<sup>2</sup>              d) 216 cm<sup>2</sup>
- iii) 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. The relation between x and y is:  
 a)  $y = \frac{5}{2}x + \frac{4}{x}$       b)  $y = 4x + \frac{5}{x}$       c)  $y = \frac{5}{2}x - \frac{4}{x}$       d)  $y = \frac{5}{2}x - \frac{5}{x}$
- iv) Two ropes of length 28cm and 36 cm are to be cut into bits of the same length. The greatest possible length of each is:  
 a) 7cm                      b) 3cm                      c) 4 cm                      d) 5 cm
- v) A circle is inscribed in a square of side 'a'. The area of the circle is  
 a)  $\frac{a^2\pi}{4}$                       b)  $\frac{a^2\pi}{2}$                       c)  $a^2\pi$                       d)  $4a^2\pi$
- vi) In the figure, sum of all the angles is equal to k right angles. Then k is equal to:  
 a) 10                      b) 12                      c) 14                      d) 16
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- vii) A train 150m long is moving at a speed of 30km/hr. It will cross a cyclist coming at a speed of 10 km/hr in the opposite direction in:  
 a) 11.5 seconds      b) 13.5 seconds      c) 14.25 seconds      d) 15.75 seconds
- viii) If C and A stand for circumference and area of a circle respectively, then :  
 a)  $A^2 = 4\pi C$       b)  $C = 4\pi A$       c)  $C^2 = 4\pi A$       d)  $A = 4\pi C$
- ix) In an isosceles triangle with base b and length of equal sides a, the altitude on the base is given by :  
 a)  $\sqrt{b^2 - \frac{a^2}{4}}$       b)  $\sqrt{b^2 + \frac{a^2}{4}}$       c)  $\sqrt{a^2 - \frac{b^2}{4}}$       d)  $\sqrt{a^2 + \frac{b^2}{4}}$

- x) A chord 10cm long is drawn in a circle of radius 13cm. Its distance from the centre will be :  
 a)  $\sqrt{69}$  cm      b)  $\sqrt{269}$  cm      c) 24 cm      d) 12 cm.

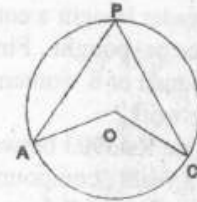
- xi) The ratio of areas of a square and a rectangle of length 4cm and width 3cm is 4 : 3.  
 The side of the square will be:  
 a) 3cm      b) 4cm      c) 12cm      d) 9 cm

- xii) In the figure, ABCD is a parallelogram,  
 BC = 9 cm, AF = 5 cm and CD = 6cm.  
 Area of the triangle CDE is:



- a)  $22.5 \text{ cm}^2$       b)  $45 \text{ cm}^2$       c)  $30 \text{ cm}^2$       d)  $37.5 \text{ cm}^2$   
 xiii) Volume of a circular cone is  $2200/7$  cubic cm and its diameter is 10cm. Its curved surface area in  $\text{cm}^2$  is:

- a)  $65\pi$       b)  $1320/7$       c)  $60\pi$       d)  $1540/7$   
 xiv) In the figure, if O is the centre of the circle and  
 $\angle OAP = 32^\circ$ ,  $\angle OCP = 47^\circ$ , then  $\angle AOC$  is



- a)  $158^\circ$       b)  $79^\circ$       c)  $(79/2)^\circ$       d)  $(79/4)^\circ$

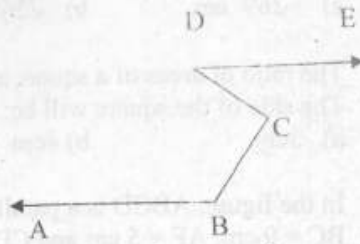
- xv) The side of a square field is 850dm. By how much square meters does it short fall of a hectare ?  
 a)  $2775 \text{ m}^2$       b)  $2770 \text{ m}^2$       c)  $1275 \text{ m}^2$       d)  $1270 \text{ m}^2$

3. State true or false :

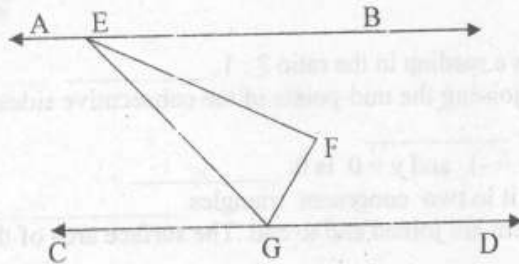
- i) In a triangle, centroid divides a median in the ratio 2 : 1. \_\_\_\_\_  
 ii) The quadrilateral formed by joining the mid-points of the consecutive sides of a parallelogram is a rhombus. \_\_\_\_\_  
 iii) The value of  $(x^y)^x$ , when  $x = -1$  and  $y = 0$  is 0. \_\_\_\_\_  
 iv) In a triangle, median divides it in two congruent triangles. \_\_\_\_\_  
 v) Two cubes, each of edge 12 cm are joined end to end. The surface area of the resulting cuboid is  $1440 \text{ cm}^2$ . \_\_\_\_\_  
 vi) A circle can pass through three collinear points. \_\_\_\_\_  
 vii) The next number in the series 2,9,28,65,126 is 215. \_\_\_\_\_  
 viii) A man walks 30m towards south. He turns to his right and walks 30m. Then turning to his left, he walks 20m. Again turning to his left, he walks 30m. He is 50m away from the starting point. \_\_\_\_\_  
 ix) The least number which when divided by 5,6,7 and 8 leaves remainder 3, but leaves no remainder when divided by 9 is 1683. \_\_\_\_\_  
 x) ABCD is a cyclic quadrilateral in which AD is the diameter and  $\angle BCD = 125^\circ$ , then  $\angle ADB = 45^\circ$ . \_\_\_\_\_

**SECTION - B**

- Q4. In the figure,  $AB \parallel DE$ .  
Prove that  $\angle ABC + \angle BCD = 180^\circ + \angle CDE$ .

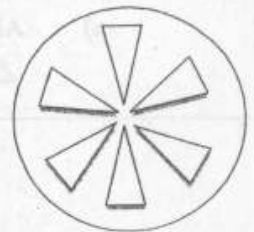


- Q5. ABCD is a trapezium in which  $AB \parallel CD$  and  $AD = BC$ . Show that  $\angle A = \angle B$  and  $\angle C = \angle D$ .
- Q6. Two circles intersect at two points B and C. Through B two line segments ABD and PBQ are drawn intersecting the first circle at A and P respectively and the second circle at D and Q respectively. Prove that  $\angle ACP = \angle QCD$ .
- Q7. The total cost of making a spherical ball is Rs. 33957 at the rate of Rs. 7 per cubic meter. What will be the radius of this ball?
- Q8. A trader bought a computer at 25% discount. He sold it with a 50% increase on the price he bought. Find the profit percent he made on the original price?
- Q9. If 6 men or 8 women can finish a work in 12 days. In how many days will 9 men and 12 women complete the work?
- Q10. Divide Rs.3903 between A and B, so that A's share at the end of 7 years is equal to B's share at the end of 9 years, compound interest being at 4% p.a.
- Q11. Factorise :  $8x^2 + 2x^2 - 45$ .
- Q12. The length of an arc of a circle, having measure  $72^\circ$  is 44cm. Find the area of the circle.
- Q13. In the figure,  $x : y = 3 : 2$ ,  $y + z = 100^\circ$ ,  $AB \parallel CD$ ,  $\angle F = 90^\circ$ ,  $\angle BEF = a^\circ$ ,  $\angle FEG = x^\circ$ ,  $\angle EGC = p^\circ$ ,  $\angle EGF = y^\circ$  and  $\angle FGD = z^\circ$ , then find the value of  $a$ .



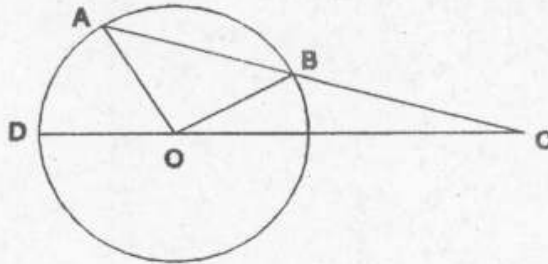
**SECTION - C**

- Q14. Water is flowing at the rate of 7m/s through a circular pipe of whose internal diameter is 2cm into a cylindrical tank, the radius of whose base is 40cm. Determine the increase in the water level in  $\frac{1}{2}$  hour.
- Q15. Two identical circles with same inside design as shown in the figure are to be made at the entrance. The identical triangular leaves are to be painted red and the remaining area to be painted green. Find the total area to be painted red and the total area to be painted green, if sides of each triangular leaf are of length 15cm, 41cm and 28cm and radius of the circle is 49cm.



Roll No. of the Participant : \_\_\_\_\_

- Q16. A certain sum invested at compound interest becomes Rs. 6500 after a period of 6 years and Rs. 7800 after a further period of 2 more years. Find the amount due after the further period of 2 more years.
- Q17. The sides PQ and PR of  $\triangle PQR$  are produced to points E and D respectively. If bisectors QO and RO of  $\angle RQE$  and  $\angle QRD$  respectively meet at O, then prove that  $\angle QOR = 90^\circ - \frac{1}{2} \angle QPR$ .
- Q18. In the given figure, AB is the chord of a circle with centre O. AB is produced to C such that  $BC = OB$ . CO is joined and produced to meet the circle in D. If  $\angle ACD = y^\circ$  and  $\angle AOD = x^\circ$ , then prove that  $x = 3y$ .



- Q19. Marks obtained by 10 students in a class test are as follow :  
15, 29, 17, 11, 24, 23,  $a$ ,  $a-1$ , 12, 16, where  $a$  is the mean of 10, 20, 30, 40, 50.  
Find the following:
- Value of  $a$ .
  - Median of the given data.
  - Mean of the data.
  - Mode of the data.
  - Range of the data.

Space for writing the answers from Q.Nos 4 to 19 :-