



# Summer Fields School

KAILASH COLONY, NEW DELHI-110048

## 25<sup>th</sup> Aryabhata Mathematics Competition -2008

CLASS - VIII

Time Allowed :  $2\frac{1}{2}$  Hours

Max. Marks : 100

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

### GENERAL INSTRUCTIONS :

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

### SECTION - A

#### 1. Fill in the blanks:

- (i) If a number is divided by 45, then the remainder is 32. if the same number is divided by 15, then the remainder is \_\_\_\_\_.
- (ii) If two parallel lines are intersected by a transversal, then the bisectors of the interior angles always enclose a \_\_\_\_\_.
- (iii) If  $a^x = b$ ,  $b^y = c$ ,  $c^z = a$ , then  $xyz =$  \_\_\_\_\_.
- (iv) If  $x + \frac{1}{x} = 4$ , then  $x^3 + \frac{1}{x^3} =$  \_\_\_\_\_.
- (v)  $\sqrt{3} \times \sqrt[3]{4} =$  \_\_\_\_\_.
- (vi) The largest number which is a factor of 66 and 110 is \_\_\_\_\_.
- (vii) The cost price of 6 oranges is equal to the selling price of 4 oranges, then the gain percent is \_\_\_\_\_.
- (viii) Sum of all angles of a pentagon is \_\_\_\_\_.

- (ix) If  $a^x = b^y = c^z$ , and  $b^2 = ac$ , then  $\frac{1}{x} + \frac{1}{z} =$  \_\_\_\_\_.
- (x) The greatest value of  $5 - |x - 3|$  for any integral value of  $x$  is \_\_\_\_\_.
- (xi) In  $\triangle ABC$ ,  $D$  is a point on  $AB$  such that  $AD : DB = 2 : 3$  then area of  $\triangle ADC$  : area of  $\triangle ABC =$  \_\_\_\_\_.
- (xii) One angle of a regular polygon is  $144^\circ$ , the number of sides are \_\_\_\_\_.
- (xiii)  $\triangle ABC \cong \triangle PQR$  then  $\angle PRQ =$  \_\_\_\_\_.
- (xiv) The ratio of the areas of a circle and an equilateral triangle, whose perimeters are equal, is \_\_\_\_\_.
- (xv) The length of the median of an equilateral triangle of side 8cm is \_\_\_\_\_.

2. Tick against the correct answer:

- (i) The number of small spheres of radius 1 cm, that can be made out of a cube of edge 22 cm is  
 (a) 2541 (b) 1044 (c) 2056 (d) none
- (ii)  $\sqrt{2x + \sqrt{2x + 4}} = 4$ , then  $x$  is equal to  
 (a) 4 (b) 6 (c) 3 (d) 8
- (iii) If  $x - y = 2$ ,  $xy = 24$ , then  $\left| \frac{1}{x} + \frac{1}{y} \right|$  is equal to  
 (a)  $\frac{5}{2}$  (b) 12 (c)  $\frac{5}{12}$  (d) 3
- (iv) If the diameter of a cone is doubled and height is halved, then its volume becomes  
 (a) eight times (b) four times (c) half (d) twice
- (v) The greatest perfect cube of four digit is  
 (a) 9898 (b) 9801 (c) 9261 (d) none
- (vi) Two number are in the ratio 3 : 4, if 4 is added to each of them, then the ratio becomes 4 : 5, then smaller of the two numbers is  
 (a) 12 (b) 16 (c) 20 (d) 24
- (vii)  $6^3 - 5^3$  is divisible by  
 (a) 1 (b) 7 (c) 8 (d) 5
- (viii) The smallest multiple of 11 which leaves remainder 3 when divided by 6, 15, 8 and 12 is  
 (a) 110 (b) 220 (c) 363 (d) 264

- (ix) The sum of a two digit number and its reciprocal is always divisible by  
 (a) 3 (b) 9 (c) 2 (d) 11
- (x) The least perfect square which is exactly divisible by 16, 15, 24 is  
 (a) 2304 (b) 14400 (c) 3600 (d) 2456
- (xi) The mean proportional of two numbers is 12 and their third proportional is 96. the second of the two numbers is  
 (a) 24 (b) 36 (c) 32 (d) none
- (xii) The cost of 15 bags is Rs.3375. The number of bags which can be purchased from Rs4050 is  
 (a) 20 (b) 18 (c) 16 (d) 24
- (xiii) The single discount equivalent to the discount series of 20%, 15% and 5% is  
 (a) 28.6% (b) 35% (c) 35.6% (d)  $30\frac{1}{3}\%$
- (xiv)  $0.\bar{3} + 0.\bar{4} + 0.\bar{5} + 0.\bar{6}$  is equal to  
 (a) 1.8 (b)  $\frac{15}{9}$  (c) 2.4 (d) 2
- (xv) The foot of a 17m long ladder is 8 m away from the wall and the top of the ladder reaches the top of the wall. The height of the wall in metres is  
 (a) 15 (b) 12 (c) 6 (d) none

## 3. State true or false :

- (i) In an equilateral triangle the orthocentre divides the altitude in the ratio 2 : 1. \_\_\_\_\_
- (ii) The triangle formed by joining the midpoints of the sides of an isosceles triangle is also an isosceles triangle. \_\_\_\_\_
- (iii)  $\left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}} \left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \left(\frac{x^c}{x^a}\right)^{\frac{1}{ca}} = 0$  \_\_\_\_\_
- (iv) In a triangle, the difference of two sides is always less than the third side. \_\_\_\_\_
- (v) The altitude of a triangle always divides it into two triangles of equal area. \_\_\_\_\_
- (vi) P is any point in the interior of the triangle ABC, then  
 $PA+PB+PC > \frac{1}{2} \times \text{perimeter of } \triangle ABC$ . \_\_\_\_\_
- (vii) The circumcentre of a triangle is equidistant from the sides of the triangle. \_\_\_\_\_
- (viii) Two similar triangle are always congruent. \_\_\_\_\_
- (ix) The mode of the data 15, 12, 8, 7, 3, 20, 48, 30, 12, 15, 23, 12, 30, 15, 12 is 12. \_\_\_\_\_

- (x) The area of an equilateral triangle that can be inscribed in a circle of radius  $r$  is

$$\frac{3\sqrt{3}}{4} r^2 \text{ square units.}$$

**SECTION - B**

4. Find the perfect square nearest to 462458.
5. Solve  $\frac{x^2+5x+8}{x+3} + \frac{x^2+x-3}{x-2} = 2x+5$ .
6. If  $a+b+c \neq 0$ , and  $a^3+b^3+c^3-3abc=0$  then show that  $a=b=c$ .
7. Factorize:  $x^3-y^3+3xy+1$
8. Factorize:  $(x+1)(x+3)(x+5)(x+7)+15$ .
9. The income of A is more than that of B by 25% and the income of B is less than that of C by 10%. By what percent is the income of A more than that of C?
10. A trader buys goods at 10% off the list price. He wants to get a profit of 15% after allowing a discount of 5%. Find at what percent above the list price should he mark the goods.
11. In  $\triangle ABC$ , AD and BE are the medians. F is a point on AC such that  $DF \parallel BE$ . Prove that  $AC = 4 CF$ .
12. AB and BC are two equal chords of a circle of radius 5 cm. Find AC if  $AB = 6$  cm.
13. AP and DP are bisectors of two adjacent angles A and D of a quadrilateral ABCD. Prove that  $2\angle APD = \angle B + \angle C$ .

**SECTION - C**

14. Distance between two stations A and B is 220 km. Three trains P, Q and R travel on this track at the rate of 25 kmph, 20 kmph and 30 kmph, respectively. P and Q leave A at 7 am and 8:15 am respectively towards B and R leaves B at 10:30 am towards A. When and where will P be equidistant from Q and R?
15. An article is sold at 20% profit. If its cost price is increased by Rs. 50 and at the same time if its selling price is also increased by Rs. 30, the profit percent decreases by  $3\frac{1}{3}\%$ . Find the cost price of the article.
16. A roll of aluminum foil contains 9.9m of foil which is 30 cm wide and 0.2 mm thick.
  - (i) How many lunch packets of size 15 cm  $\times$  10 cm  $\times$  3 cm. can be wrapped by this roll if there is no wastage?
  - (ii) The roll is melted and recast into spherical balls of diameter 1 cm. Find the number of balls.

Roll No. \_\_\_\_\_

17. ABC is a triangle in which  $\angle B = 2\angle C$ . D is a point on side BC such that AD bisects  $\angle BAC$  and  $AB = CD$ . Prove that  $\angle BAC = 72^\circ$ .
18. The radii of two circles are 14 cm and 28 cm. The sector angle of a segment of the first circle is  $120^\circ$  and the sector angle of a segment of the second circle is  $60^\circ$ . Find the difference between the areas of the two segments. (use  $\sqrt{3} = 1.73$ )
19. The data in increasing order is 40, 42, 45, 49,  $x, x+2$ , 58, 62, 64, 68.
- Find the range of the data.
  - Find the value of  $x$  if the mean of the data is 53.
  - Find the value of  $x$  if the median of the data is 53.

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*Space for answering the Q.Nos.4 – 19 :*

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