ROLL NO.....

ARYABHATTA INTER-SCHOOL MATHS COMPETITION-2004

SUMMER FIELDS SCHOOL (MIDDLE)
CLASS VIII

Time Allowed : $2\frac{1}{2}$ Hrs. M.M. : 100

GENERAL INSTRUCTIONS:

1. *Participants should not write his/her name on the questionnaire.*
2. *Write your Roll No. on all pages of the paper.*
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. *Marks are indicated at the end of each question.*
6. *Do your rough work on the separate sheet supplied to you and pin up the same with the questionnaire.*
7. *Use of eraser is not allowed.*

PART-I

Answers to questions Numbers 1, 2, and 3 are to be given in the space provided in the questions.

1. Fill in the blanks: **(10 marks)**

   (*i*) See the pattern and write the value of x.

   (*ii*) If $12321 = 111^2$ and $11^2 = 121$ then $(1111)^2 =$ _____.

   (*iii*) $\sqrt{176 - \sqrt{25 + \sqrt{576}}} =$ _____.

   (*iv*) 15 dozens: _____ Scores = 9 : 7.

   (*v*) 101 litre = _____ dm^3.

   (*vi*) If two quantities vary inversely then their_____ is constant.

   (*vii*) Each side of a regular polygon subtends an angle of 72° at the centre of its circumcircle. The number of sides of the polygon is _____.

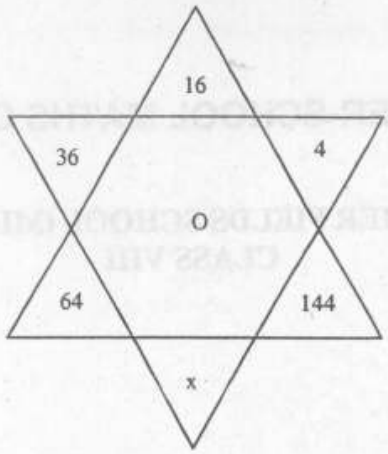

Figure 1

(*viii*) 10% of 15% of 20% of Rs 800 is _____.

(*ix*) If $[(\sqrt{2})^{-3} \times (\sqrt{2})^{7}] = 2^{K}$, then $K =$ _____.

(*x*) The angle in a minor segment of a circle is _____ angle.

2. State True or False: **(10 marks)**

(*i*) Degree measure of a semi-circle is 180^{o}.

(*ii*) $2x-7,\ 2x-5,\ 2x-3,\ 2x-1$ are four consecutive prime numbers.

(*iii*) $|x| = -x$, if x is a negative number.

(*iv*) Reciprocal of $(-8)^{2/3}$ is $\frac{-1}{4}$.

(*v*) The orthocentre of a triangle always lies inside it.

(*vi*) The range of 13, 15, 8, 27, 14, 40, 25, 29 is equal to 40.

(*vii*) Every square is a rhombus.

(*viii*) The multiplicative inverse of $\frac{5}{7}$ is $\frac{35}{25}$.

(*ix*) The perimeter and area of a circle are numerically equal, then the radius of the circle is π units.

(*x*) If $(-5)^{n^2-5} = 625$, then n is equal to ± 9.

3. Tick against the correct answer. **(10 marks)**

(*i*) $0.\overline{1} + 0.1\overline{2}$ is equivalent to

(*a*) $0.\overline{4}$ (*b*) $0.\overline{13}$ (*c*) $0.\overline{2}$ (*d*) None of these.

(*ii*) The number $3 + \sqrt{-2}$ is

(*a*) real (*b*) rational (*c*) irrational (*d*) None of these.

(*iii*) If the base of a triangle is doubled and height is halved its area will be

(*a*) doubled (*b*) halved (*c*) one-fourth (*d*) same.

(*iv*) A horse is tied to a peg fixed at one corner of a square field. If it grazes over an area of 154 square metres the length of the rope is

(*a*) 7 m (*b*) 49 m (*c*) 14 m (*d*) 03.5 m.

(*v*) $0.\overline{636}$ is equal to

(*a*) $\frac{63}{90}$ (*b*) $\frac{636}{999}$ (*c*) $\frac{7}{11}$ (*d*) $\frac{7}{9}$.

(*vi*) A circle circumscribes a square of side a. The area of the circle is

(*a*) $a^2\pi$ (*b*) $2a^2\pi$ (*c*) $4a^2\pi$ (*d*) $\frac{1}{2}a^2\pi$.

(*vii*) An arc of a circle of radius 7 cm subtends an angle of 36° at the centre. Its length will be

(*a*) 4.4 cm (*b*) 44 cm (*c*) 440 cm (*d*) None of these.

(*viii*) The length of a tangent from a point 13 cm away from the centre of a circle whose radius is 5 cm will be

(*a*) 65 cm (*b*) 60 cm (*c*) $\sqrt{144}$ cm (*d*) $\sqrt{194}$ cm.

(*ix*) The mean height of 5 students in a class is 150 cm and the mean height of other 4 students of the same class is 152 cm. The mean height of these 9 students will be

(*a*) less than 150 cm

(*b*) more than 152 cm

(*c*) between 150 cm and 152 cm

(*d*) 151 cm.

(*x*) In Figure 2, $l \parallel m$ and t is the transversal. If the supplement of $\angle 3$ is equal to complement of $\angle 5$, then $\angle 4$ is

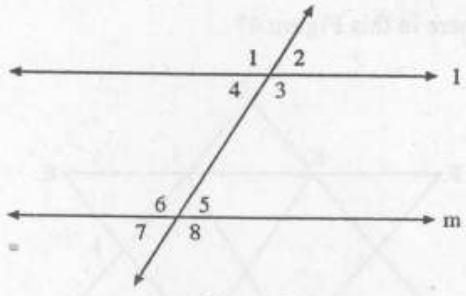

Figure 2

(*a*) 90° (*b*) 45°

(*c*) 135° (*d*) 120°.

4. All the questions carry 2 marks each.

(*i*) A bottle and its cork together cost Rs. 1.10, and the bottle cost Re 1 more than its cork. What is the price of the bottle?

(*ii*) A mule and donkey were going to the market **laden** with wheat. The mule said "If you give me one measure (unit), I should carry twice as much as you, but if I give you one, we should have equal burdens". What were their burdens?

(*iii*) Here is a switch. Please note the order of the positions. If the light is now at medium and it is switched 3922 times, what will be the position of the switch? (Figure 3).

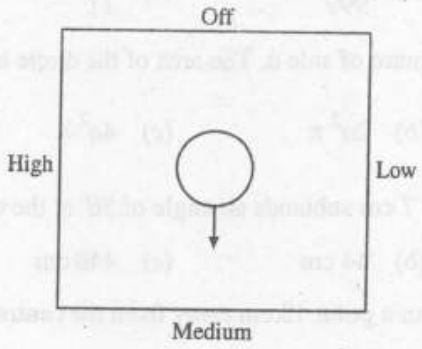

Figure 3

(*iv*) By using only the digits 9, 9, 9 can we get '4' by using mathematical processes such as +, ×, $\sqrt{}$, +.

(*v*) A frog starts climbing a 30 ft high wall. Each hour he climbs 3 ft and slips back 2 feet. How many days does it take him to reach the top and get out?

(*vi*) I was shopping for vegetables at the New market. I saw two pumpkins of the same quality but of different sizes. One was bigger than the other. The bigger one was 60 cm in circumference and the other 50 cm. I asked the vendor the price. The bigger one was one and a half times more expensive; which one do you think would have been a better buy.

(*vii*) If $a^x = b$, $b^y = c$, $c^z = a$. Prove that $xyz = 1$.

(*viii*) How many triangles are there in this Figure 4?

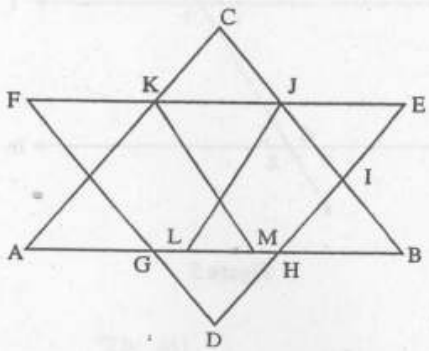

Figure 4

(*ix*) A dishonest dealer uses a false weight of 800 gm for a Kg but sells his goods at cost price. Find his gain percent.

(*x*) In Figure 5; $AB = AC$, $AE = AD$ and $\angle BAD = 30°$, find x.

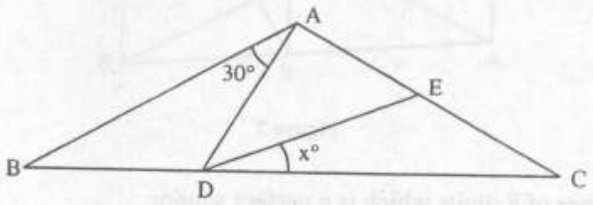

Figure 5

5. All the questions carry 4 marks each.

(*i*) Eighteen equal conical caps of hard black paper are required for the clowns of a circus company. Each cap is to be 24 cm high and of 14 cm base diameter. Considering the caps to be right circular cones, calculate the area of paper required allowing 10% wastage in making. If the clowns fill their caps with water, how much water does each cap contain?

(*ii*) Factorise $2x^2 + 4y^2 + 3z^2 + 4\sqrt{2}xy - 4\sqrt{3}yz - 2\sqrt{6}xz$.

(*iii*) Find the measure of x in Figure 6 given below.

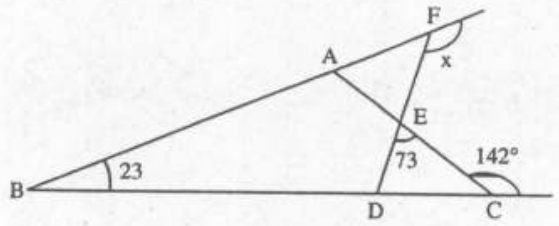

Figure 6

(*iv*) In a 36 litre mixture; the milk and water are in the ratio 7.3. How much water is to be added to the mixture so that the ratio is 3:7?

(*v*) The perimeter of a triangle measurers 49 cm. One side is 7 cm longer than the other and 5 cm shorter than the third. Find the length of each side of the triangle.

6. All the questions carry '5' marks each.

(*i*) The age of Diaphantus a brilliant Greek Mathematician of about 2500 AD may be calculated from an epitaph which reads as follows. He passed one-sixth of his life in childhood, one-twelfth in youth and one seventh more as a bachelor. Five years after his marriage, a son was born, who died four years before his father at half his final age. At what age did Diaphantus die?

(*ii*) The minute and hour hands of a clock are of lengths 12 cm and 9 cm respectively. Find, to the nearest $(\text{cm})^2$, the difference of the areas of the sectors described by the hands between 9 am and 9.45 am.

(*iii*) In the Figure 7; points P, Q, R and S are respectively the midpoints of side AB, side CD, diagonal BD and diagonal AC of quad $ABCD$. Prove that quad $PRQS$ is a parallelogram.

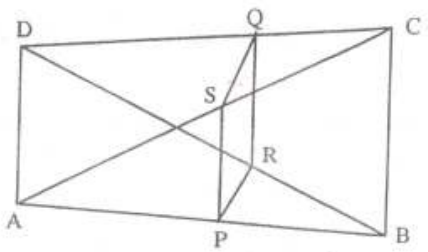

Figure 7

(*iv*) Find the least number of 8 digits which is a perfect square.

(*v*) A man purchased some eggs at 3 for Rs 5 and sold them at, 5 for Rs 12. Thus, he gained Rs 143 in all. How many eggs did he purchase?

(*vi*) Find the values of a and b so that $ax + b + 8x^2 + x^3 + x^4$ is divisible by $x^2 + 1$.

SPACE FOR ANSWERING QUESTION NOS. 4 TO 9 FROM HERE ONWARDS