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**ARYABHATTA INTER-SCHOOL MATHS COMPETITION-2002**

**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 Question Nos. 1, 2 and 3 are to be given in the space provided in the questions.

1. Fill in the blanks:

(i) Find the missing number in the series:

$$1, \frac{3}{4}, \frac{5}{16}, \dots, \frac{9}{256}$$

(ii) The length of the longest rod that can be put in a room 12m long, 9m wide and 8m high is.....

(iii) If  $3^{-n+1} = \sqrt[4]{81^{-3}}$  then  $3^{n-1} = \dots$

(iv)  $(2a - b - c)^3 + (2b - c - a)^3 + (2c - a - b)^3 = \dots$

(v) 250ml : 2 litres = ..... : 16.

(vi) 63 kmph = ..... m/sec.

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(vii) When 25 is subtracted from 25% of a number, we get 25. The number is.....

(viii) The mean of 11 numbers is 10. The mean of first 6 numbers is 12 and mean of last 6 numbers is 9, then the 6th number is.....

(ix)  $\triangle ABC$  is similar to  $\triangle PQR$  and  $\angle A = 60^\circ$ ,  $\angle B = 40^\circ$  then  $\angle R =$ .....

(x) The incentre of a triangle is.....from the sides of the triangle.

2. State True or False:

(i) The angles of a triangle are in the ratio 1 : 2 : 3, then the triangle is a right triangle.

(ii) The H.C.F of any four numbers is always a factor of their L.C.M.

(iii) Every rhombus is a square.

(iv) If  $2^x = a$ ,  $3^x = b$  and  $6^{2x} = c$  then  $c = a^2 b^2$ .

(v) The difference between the squares of two consecutive numbers is always the sum of the numbers.

(vi) Mean proportional of 4 and 36 is  $2x^2 + 4$  then  $x$  is 2.

(vii)  $2 + \frac{1}{2 + \frac{1}{2}} = \frac{5}{12}$

(viii) The perimeter of a square, the sum of the lengths of whose diagonals is 144 cm is  $144\sqrt{2}$  cm.

(ix) 1 is the smallest prime number.

(x)  $(x + 5)^2 - (x + 1)^2$  is a multiple of 8 where  $x$  is a natural number.

3. Tick ( $\checkmark$ ) against the correct answer:

(i)  $\sqrt{176 - \sqrt{25 + \sqrt{576}}} =$ .....

(a) 12

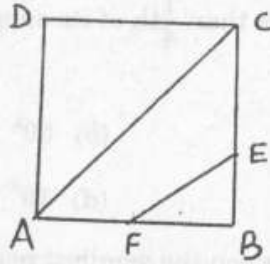
(b) 13

(c) 24

(d) 11.

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- (ii) In Figure,  $ABCD$  is a square.  $AF = \frac{1}{2}AB$ ,  $BE = \frac{1}{3}BC$ ,  $AC = 36\sqrt{2}$ , then area of  $\triangle BEF$  is



- (a)  $72 \text{ cm}^2$  (b)  $144 \text{ cm}^2$   
(c)  $108 \text{ cm}^2$  (d)  $216\sqrt{2} \text{ cm}^2$

- (iii)  $0.02 \overline{63}$  is equal to

- (a)  $\frac{261}{9000}$  (b)  $\frac{263}{9990}$   
(c)  $\frac{261}{9900}$  (d)  $\frac{263}{10000}$

- (iv) If  $x + \frac{1}{x} = 3$  then  $\frac{x}{x^2 + 1}$  is

- (a) 9 (b)  $\frac{1}{3}$   
(c) 13 (d)  $\frac{1}{13}$

- (v) If a number is increased by 10% and then decreased by 10%, the number

- (a) remains same (b) decreases by 1%  
(c) increases by 1% (d) increases by 0.1%.

- (vi) How many 3-digit numbers can be formed by using the digits 0, 2, 3 without repetition.

- (a) 4 (b) 3  
(c) 5 (d) 6.

- (vii) The volume of a largest sphere cut out of a cube of edge 14 cm is

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(a)  $\frac{1372}{3} \pi \text{ cm}^3$

(b)  $\frac{343}{3} \pi \text{ cm}^3$

(c)  $\frac{686}{3} \pi \text{ cm}^3$

(d)  $343 \pi \text{ cm}^3$

(viii) An angle is  $20^\circ$  less than  $\frac{1}{4}$ th of its supplement. The complement of the angle is

(a)  $30^\circ$

(b)  $50^\circ$

(c)  $70^\circ$

(d)  $10^\circ$

(ix) The difference between the smallest perfect square of 5-digits and greatest perfect square of 4-digits is

(a) 89

(b) 12 cm.

(c) 189

(d) 199

(x) If  $PT$  is a tangent to a circle at  $T$  whose centre is  $O$  and  $OP = 17 \text{ cm}$ ,  $OT = 15 \text{ cm}$ . Then  $PT$  is equal to

(a) 8 cm

(b) 12 cm.

(c) 14 cm

(d) 18 cm.

## PART — II

4. (i) Find the largest number which divides 1630, 525 and 1280 leaving remainders 6, 3 and 4 respectively. (2)

(ii) Prove that:

$$(x^{a-b})^{\frac{1}{ab}} \times (x^{b-c})^{\frac{1}{bc}} \times (x^{c-a})^{\frac{1}{ca}} = 1 \quad (2)$$

(iii) If  $x^2 + \frac{1}{x^2} = 7$  then find  $x^3 + \frac{1}{x^3}$ . (3)

(iv) Find  $\sqrt{\frac{3}{7}}$  upto 3-places of decimals. (3)

5. (i) Factorize  $x^8 + \frac{1}{x^8} - 2$ . (2)

(ii) The cost of 50 copies of 92 pages each is Rs. 500. What is cost of 115 copies of 60 pages each? (2)

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(iii) Solve  $1 - \frac{1 + \frac{1-x}{2}}{3} = 1$

(iv) If  $a^2 + b^2 + c^2 - ab - bc - ca = 0$  then prove that  $a = b = c$ . (3)

6. (i) A cyclist crosses a bridge 495 m long in 3.3 minutes. Find his speed in kmph. (2)

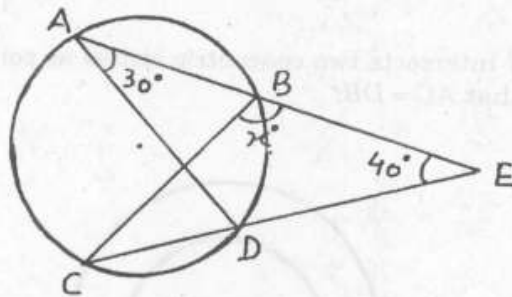
(ii) By what number should  $\left(\frac{3}{5}\right)^5$  be divided to get  $\left(\frac{3}{5}\right)^2$ ? (2)

(iii) Three numbers are in the ratio 2 : 3 : 4. The sum of their cubes is 0.334125. Find the numbers. (3)

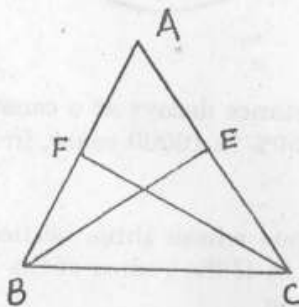
(iv) Five years ago, a man was seven times as old as his son. After 5 years, he will be 3 times as old as his son. Find their present ages. (3)

7. (i) In  $\triangle ABC$ ,  $AB = BC$ ,  $\angle A = 40^\circ$ . Find  $\angle B$  and  $\angle C$ . (2)

(ii) Find the value of  $x$  in the adjoining figure. (2)



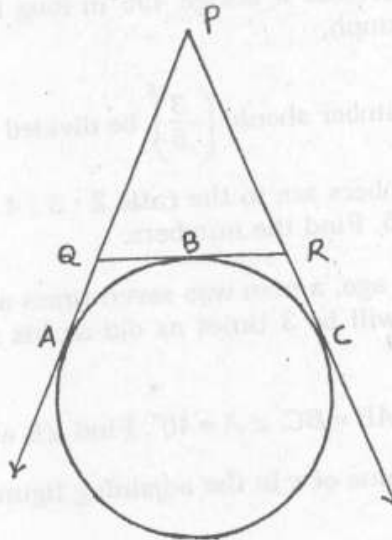
(iii) In Figure,  $ABC$  is a triangle, in which  $AB = AC$ ,  $BE$  and  $CF$  are the bisectors of  $\angle B$  and  $\angle C$ . Prove that  $BE = CF$ . (3)



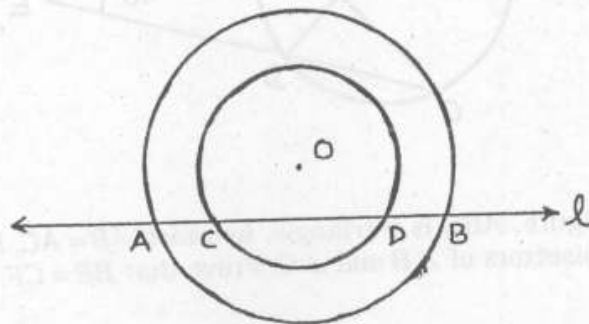
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- (iv)  $A, B$  and  $C$  can do a work in 6, 8 and 12 days respectively, each working alone.  $B$  and  $C$  work together for 2 days and then  $A$  replaces  $C$ . In how much time will the total work finish? (3)

8. (i) In Figure,  $PA, PC$  and  $QR$  are tangents to the circle. If  $PA = 5$  cm. Find the perimeter of  $\Delta PQR$ . (2)

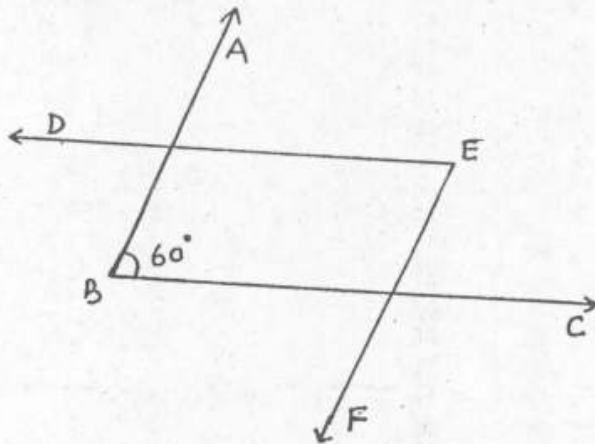


- (ii) A line  $l$  intersects two concentric circles at points  $A, C, D$  and  $B$ . Prove that  $AC = DB$ . (2)



- (iii) A radioactive substance decays at a constant rate in such a way that it reduces to 50% in 16000 years. In how many years, will it reduce to 12.5%? (3)
- (iv)  $OABC$  is a rhombus whose three vertices  $A, B$  and  $C$  lie on a circle with centre  $O$ . If the radius of the circle is 20 cm, find the area of the rhombus. (3)

9. (i) In Figure,  $AB \parallel EF$ ,  $DE \parallel BC$ , and  $\angle ABC = 60^\circ$ , find  $\angle DEF$  (2)



(ii) Simplify: 
$$\frac{2\sqrt{2} a^3 + 3\sqrt{3} b^3 - c^3 + 3\sqrt{6} abc}{(\sqrt{2} a + \sqrt{3} b - c)}$$
 (3)

- (iii) Three horses were purchased for Rs. 9000 each. One horse was sold at a loss of 10% and the other at a profit of 5%. At what price should the third horse be sold so as to get 20% profit on the whole transaction. Find also the gain % on the third horse. (5)

10. (i) A solid is in the form of a right circular cone mounted on a hemisphere. The radius of the hemisphere is 3.5 cm and the height of the cone is 4 cm. The solid is placed in a cylindrical tub, full of water, in such a way that the whole solid is submerged in water. If the radius of the cylinder is 5 cm and its height is 10.5 cm, find the volume of water left in the cylindrical tub. (5)

- (ii) The marks of 10 students in a test are 40, 35, 42, 36, 18, 32, 28, 48, 30, 24.

- Find the range of the data.
- Find the mean of the data.
- Find the correct mean if the marks of a student whose actual marks were 38, were taken as 36, by mistake.
- If each of the marks are increased by 2, find the new mean. (5)