

Date : 08 – 08 – 2010

STD. 10

Time : 10 . 00 To 12 : 30

- Note :
1. There are two sections in this question paper. In the beginning only Sec. 1 will be given.
 2. Sec. 1 is to be completed in at most 1 Hr. Write your answers in the [] given & return.
If you complete it earlier return it & get Sec. 2.
 3. Use separate sheet for rough work in Sec. 1. Write only answer in the [] given.
 4. Attempt Sec. 2 in Main Answer book.

Name of the Student :

Seat No. :

Name of the School

Centre

Section – 1

Q-1 In the following statement write "T" if the statement is true & "F" if the statement is false in the

[] given against each question.

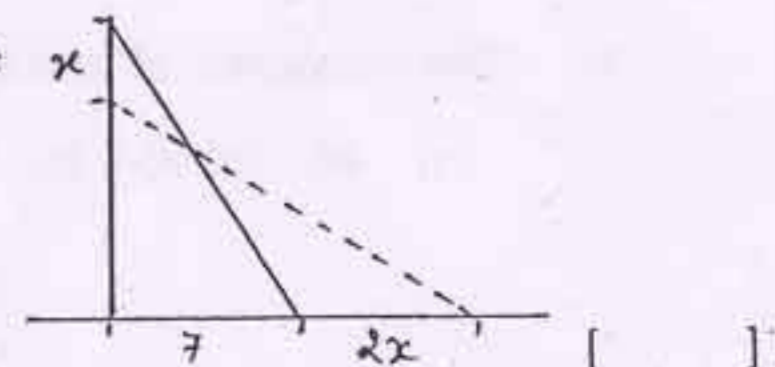
[15]

1. Angles of a triangle are not its subsets. []
2. $\overline{AB} \subset \overrightarrow{AB} \subset \overleftarrow{AB}$ []
3. $AB = PQ$ then $\overline{AB} = \overline{PQ}$ []
4. If two triangles are similar, they are congruent. []
5. Every square is a rectangle. []
6. A pentagonal prism has 5 surfaces. []
7. The total surface area of a solid hemisphere with radius r is $2\pi r^2$ []
8. If the circumcentre lies on a triangle, it is a right angled triangle. []
9. If the perimeter is same, a circle has more area than a square. []
10. An angle divides a plane in three subsets of points. []
11. A line divides a plane in two subsets of points. []
12. In a pair of complementary angles, both are always acute angles. []
13. In a pair of a supplementary angles, at least one is an obtuse angle. []
14. In circle, the bisector of a chord passes through the centre of the circle. []
15. If \overrightarrow{PQ} is the bisector of \overline{AB} , P is always the midpoint of \overline{AB} . []

Q-2 Write only answer in the [] given. Use answer sheet for rough work. [20]

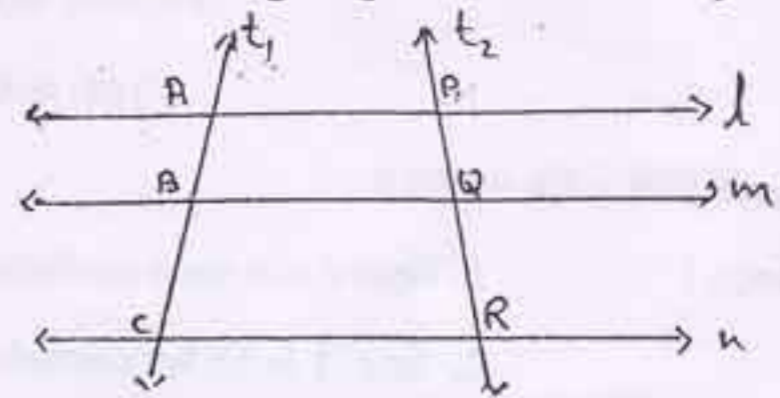
1. In a rectangle, the length is double than the breadth. How many times is its area than the square of the length of its diagonal? []

2. A 25 m. long ladder is placed against a wall. The foot of the ladder is 7 m. away from the wall. How many meters the ladder slips down, if the foot slides double the distance that it slips?



3. In a right angled triangle, the square of the hypotenuse is the double of the product of the other two sides. Find the measures of remaining angles. []

4. In the figure $l \parallel m \parallel n$. t_1 & t_2 are transversals. If $AB = \frac{2}{3} BC$ & $PR=25$, Find PQ.



(B) Answer the following questions selecting the proper choice from those given below each question. Write only the letter (a,b,c, or d) in the [] given. [10]

1. If the radius of a circle is a rational number, how is the number showing the area?
 (a) Rational (b) perfect square (c) irrational (d) integer []

2. $\triangle ABC$ and $\triangle ABD$ are right angled triangles with AB as hypotenuse. If $BC = 1, AC=P, AD=2$
 $BD = \underline{\hspace{2cm}}$
 (a) $\sqrt{P^2+1}$ (b) $\sqrt{P^2-3}$ (c) $\sqrt{P^2-3}+2$ (d) $\sqrt{P^2+3}$ []

3. If the length of the diagonal of a square is p , the area = $\underline{\hspace{2cm}}$
 (a) $\frac{p}{\sqrt{2}}$ (b) $\frac{p^2}{2}$ (c) p^2 (d) $\frac{p}{2}$ []

4. In $\triangle ABC$, $AB=12, AC=7, BC=10$. If AB and AC are doubled and BC remains same, how many times is the area of the new \triangle ? []
 (a) 2 (b) 4 (c) does not change (d) 0

5. What is the measure of the angle between the minute hand and the hour hand of a clock at 15 minutes past 2 O'clock?
 (a) $22\frac{1}{2}$ (b) $7\frac{1}{2}$ (c) 30 (d) 20 []

6. In a right angled triangle, the length of two equal sides is 2. What is its perimeter?
 (a) $6\sqrt{2}$ (b) $4 + 2\sqrt{2}$ (c) $2\sqrt{2}$ (d) 12 []

7. \widehat{AB} is a minor arc of a circle with centre P . R is a point on major arc AB , other than A and B . If $m\angle ARB = 40, m\angle APB = \underline{\hspace{2cm}}$
 (a) 80 (b) 20 (c) 90 (d) 60 []

8. The volume of a cone is 9π units. If the radius and height are equal, how much it is?
 (a) 27π (b) π (c) 3 (d) 9 []

9. If $\sin \theta = \frac{p}{q}$, $\tan \theta = \underline{\hspace{2cm}}$
 (a) $\frac{q}{\sqrt{p^2-q^2}}$ (b) $\frac{p}{\sqrt{p^2-q^2}}$ (c) $\frac{q}{\sqrt{q^2-p^2}}$ (d) $\frac{p}{\sqrt{q^2-p^2}}$ []

10. The measures of two supplementary angles are $(\theta - 10)$ and $(\theta + 20)$ then $\theta = \underline{\hspace{2cm}}$
 (a) 40 (b) 95 (c) 85 (d) 50 []

SECTION - 2

Q-3 Find the answer showing calculations Draw the required rough figure. (16)

1. In ΔABC $m\angle B = 90$. Length of the the medians drawn from A and C are 5 & $\sqrt{40}$ resp. Find AC.
2. In right angled ΔPQR , PQ is hypotenuse & $PR > RQ$. M is the mid point of PQ. The perpendicular bisector of \overline{PQ} intersects \overline{PR} in N. If $PQ = 20$ & $QR = 12$ units, find the area of $\square MNRQ$.
3. In ΔABC $A-P-R-B$ and $A-Q-S-C$ are given so that $\overline{PQ} \parallel \overline{RS} \parallel \overline{BC}$. \overline{PQ} & \overline{RS} trisects the area of the triangle. Find the $PQ : RS$.
4. The perimeter of a right angled triangle is 14 units & the length of the hypotenuse is 6 units. How much is the area of the triangle ?

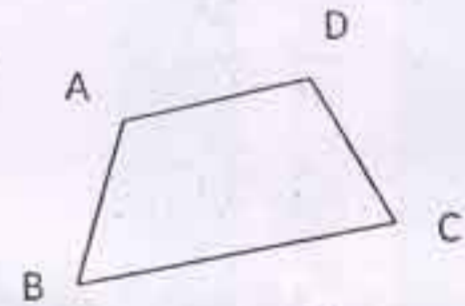
Q-4 Carry out the following constructions showing all steps with explanation.

Proof is more important than accurate figures. If you do not have the compass box draw the rough figures. (14)

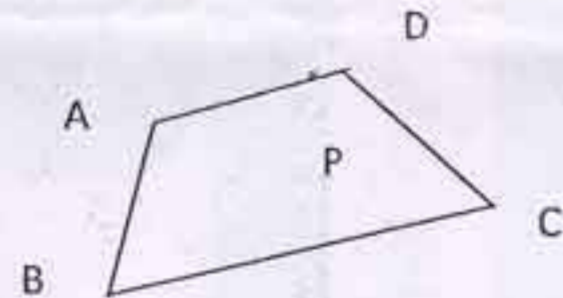
1. Construct an equilateral triangle with suitable measure of the side. Then construct a regular hexagon circumscribing this triangle such that The three vertices of this triangle are alternate vertices of the hexagon
(Hint : Construct the circumcircle of the Δ . Then proceed)
2. Construct a ΔABC with $BC = 5$ cm, $\overline{BQ} \perp \overline{AC}$, $Q \in \overline{AC}$ & $BQ = 3$ cm & $m\angle A = 30$.
(Hint : Construct \overline{BQ} . Then construct perpendicular line to \overline{BQ} at Q. Then proceed)

Q-5 Complete the proof of the following riders using the given hints. It is not necessary to write "Data" & "To Prove". (15)

1. For a convex $\square ABCD$, prove that $AB + CD < AC + BD$
(Hint : Use the intersection point of the diagonals)



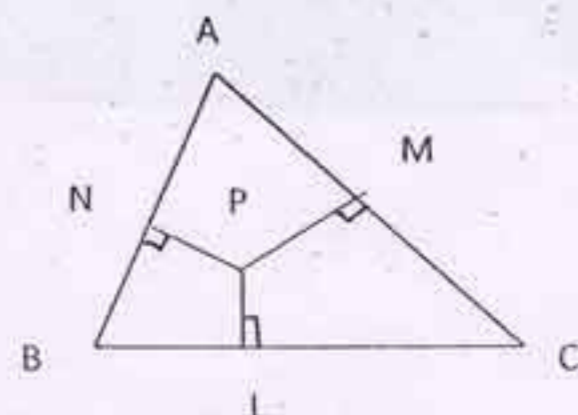
2. P is a point in the interior of a convex $\square ABCD$.
Prove that $AP + BP + CP + DP \geq AC + BD$



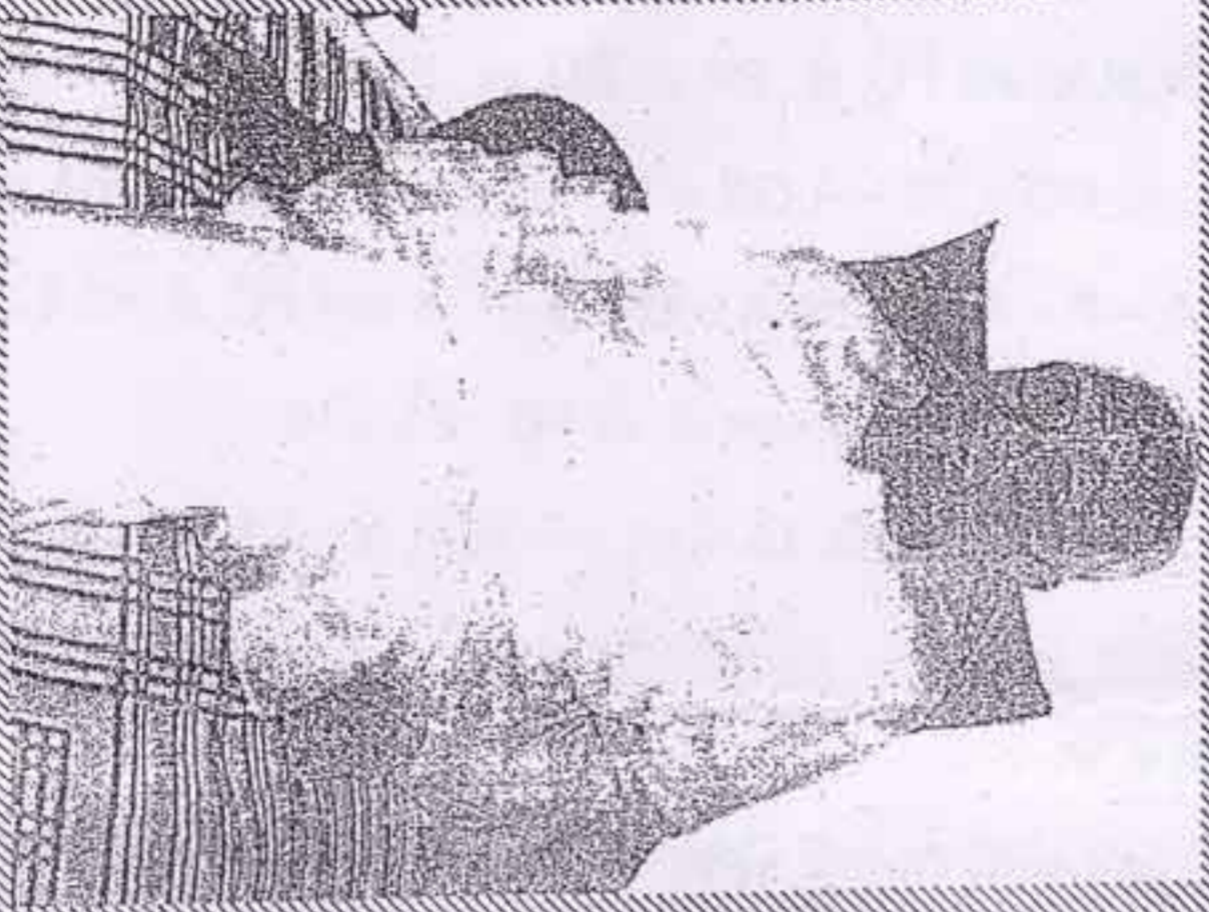
(Hint: Join P with each vertex. Use triangular inequality choosing proper Δ s)

Q-6. P is a point in the interior of a ΔABC . The foot of the perpendicular from P, on \overline{BC} , \overline{CA} & \overline{AB} are resp. L, M & N. Prove that $BL^2 + CM^2 + AN^2 = BN^2 + CL^2 + AM^2$

[10]



પ્રોફેસર એ. આર. રાવ



Professor A. R. Rao

રાવ સાહેબના હુલામણા નામથી જાણીતા પ્રો. એ. આર. રાવ 23મી સપ્ટેમ્બર 2009ના રોજ તેમના કર્મસભ્ય ઇવનના એક સો વર્ષ પૂરાં કરશે. ભારતના મુખ્ય ગણિતજ્ઞ એવા રાવસાહેબ યા સદીથી વયુ સમય માટે જુનાગઢની બહાઉદીન કોલેજમાં અને ત્યારબાદ ગુજરાતની અન્ય કોલેજોમાં અધ્યાપક તરીકે કાર્યરત રહ્યા. અધ્યાપન ક્ષેત્રથી નિવૃત્ત થયા બાદ રાવ સાહેબ અમદાવાદના વિક્રમ એ. સારાભાઈ કોમ્યુનિટી સાયન્સ સેન્ટરમાં ગણિત તજ્જસ તરીકે જોડાયા. આજ દિન પર્યંત રાવસાહેબની સેવાઓ આ સેન્ટરને મળતી રહી છે. દેશવ્યવસ્થામાં અજાડ એવી ગણિતની પ્રયોગશાળા રાવસાહેબે અહીં વિકસાવી છે. વિદ્યાર્થીઓનો ગણિતમાં રસ જાગૃત કરે અને જનસમાજની ગણિતમાં રુચિ ઉત્પન્ન કરે એવા અનેક ગણિતિક નમૂનાઓ (models), ક્રીયાઓ અને રમતો રાવસાહેબે બનાવેલા છે. ગણિતને લોકલોચ બનાવવા માટે રાવસાહેબ રાજ્ય અને રાષ્ટ્ર કક્ષાની અનેક સંસ્થાઓ દ્વારા સન્માનિત થયા છે. ગણિતમાં ભૂમિતિ અને સંખ્યાશાસ્ત્ર રાવસાહેબના પ્રિય વિષયો છે. કોઈને પણ જરૂરી રાખે તેવા ગણિતના ક્રીયાઓના બજાના સમૂહ રાવસાહેબનું Brain Sharpeners નામનું પુસ્તક સૌ કોઈએ જોવા-માણવા જેવું છે.

સપ્ટેમ્બર 2007માં પ્રકાશિત સુગણિતમૂની પ્રો. એ. આર. રાવ વિશેષક તમે જરૂર વાંચશો. ગણિત વિશે અને રાવસાહેબ વિશે તમને તેમણી ઘણું જાણવાનું મળશે.

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Popularly known as Raosaheb, Prof. A. R. Rao will be completing a hundred and ~~one~~ ^{two} years of his active and fruitful life on September 23, 2009. One of the leading mathematicians of the country, Raosaheb worked as a Professor of Mathematics, first in Bahauddin College, Junagadh - where he spent more than a quarter of a century - and then in various other colleges of Gujarat. After his retirement from active teaching in 1976, Raosaheb joined the Vikram A. Sarabhai Community Science Centre (VASCSC) at Ahmedabad, as a Professor Emeritus, where he continues to offer his services till today. Considered to be the father of nonformal mathematics in Gujarat, Raosaheb has established a Mathematics Laboratory at VASCSC, which is unique of its kind in the whole country. The laboratory is replete with fascinating mathematical models, games and puzzles, which not only help the students understand mathematics better but also help kindle interest for masses in the subject. Considered dry and dull otherwise, it is this innovative concept of Mathematical Laboratory that von Raosaheb a number of awards for popularizing mathematics from state and national level organizations. While Geometry is his first love, Raosaheb is also interested in Number theory and Combinatorics. His book titled Brain Sharpeners is a treasure of mathematical puzzles which are both challenging and captivating.

The September-October, 2007 issue of Sugantam has been entirely devoted to Raosaheb to celebrate his entering the hundredth year. It provides an enjoyable reading with glimpses of the life and work of the great mathematician.