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GREENLAWNS HIGH SCHOOL, MUMBAI - 400 026.
FIRST TERMINAL EXAMINATION 2017

SUBJECT : MATHEMATICS
TIME : 2 1/2 HOUR

CLASS : X
MARKS: 80

NOTE: Attempt all questions from Section A and any four questions from Section B. All working, including rough work must be clearly shown and must be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.

SECTION A (40 Marks)
Attempt all questions from this section.

Question 1.

a) Sonia has a 4 years recurring deposit account of Rs. 500 per month. If she gets Rs. 4900 as the interest at the time of maturity, find the rate of interest. [3]

b) Solve the following inequation and graph the solution set on the number line [3]

$$-2\frac{1}{2} + 2x \leq \frac{4x}{5} \leq \frac{4}{3} + 2x, \quad x \in W$$

c) Plot ΔABC whose vertices are the points A (1,2), B (4, 4) and C (3,7). Reflect ΔABC in the line $y = 0$ onto $\Delta A' B' C'$ and then $\Delta A' B' C'$ in the origin onto $\Delta A'' B'' C''$. Write down the coordinates of i) A', B' and C'
ii) A'', B'' and C''
Also give a special name to the quadrilateral $BCC''B''$

Question 2

a) Solve the following [3]

$$\begin{bmatrix} 3 & -4 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 17 \\ 2 \end{bmatrix}$$

b) Find the value of k if the point P(0,2) is equidistant from A(3,k) and B (k,5) [3]

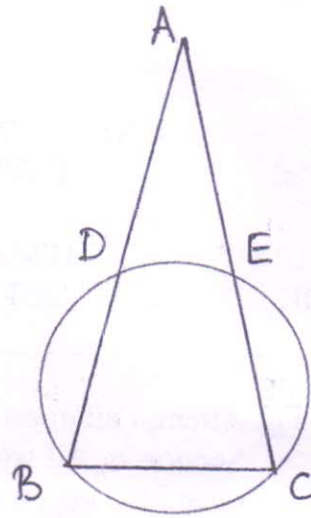
c) If $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$, prove that [4]

$$\left(\frac{a^2b^2 + c^2d^2 + e^2f^2}{ab^3 + cd^3 + ef^3} \right)^{3/2} = \sqrt{\frac{ace}{bdf}}$$

Question 3.

a) ABC is an isosceles triangle in which $AB = AC$. A circle passing through B and C intersects the sides AB and AC at D and E respectively.

Prove that $DE \parallel BC$.



[3]

b) Draw a circle of radius 4.2 cm. Draw two tangents to this circle so that the angle between the tangents is 60° . Record the length of the tangent segments.

[3]

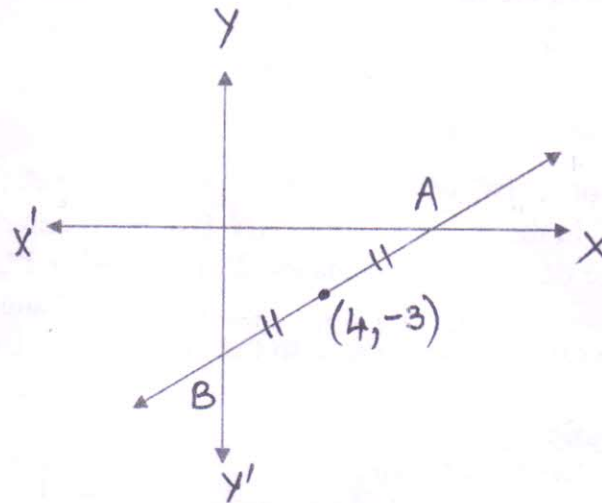
c) Prove the following identity.

[4]

$$\frac{\sin^3 \theta + \cos^3 \theta}{1 - 2 \cos^2 \theta} = \frac{\sec \theta - \sin \theta}{\tan \theta - 1}$$

Question 4

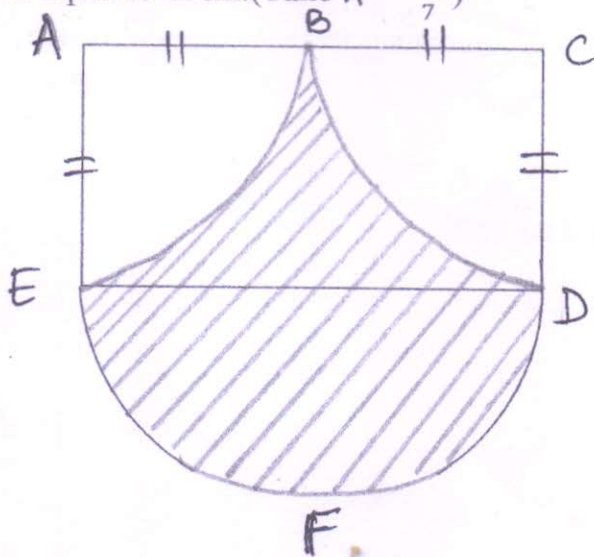
a) The midpoint of the line segment AB Shown in the given figure is $(4, -3)$. Write down the co-ordinates of A and B.



[3]

b) Calculate the area of the shaded region, if the diameter of the semi-circle is equal to 28cm. (Take $\pi = \frac{22}{7}$)

[3]



- 2) $(2x + 3)$ is a factor of $4x^3 + 20x^2 + 33x + 18$. Hence, factorise the given expression completely. [4]

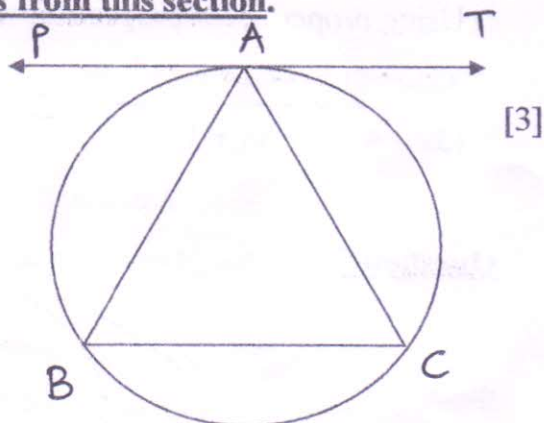
SECTION B (40 Marks)

Attempt any four questions from this section.

Question 5.

- a) In the figure given alongside, PAT is a tangent at A to the circumcircle of ΔABC such that $PAT \parallel BC$.

Prove that : ΔABC is an isosceles triangle.



- b) The following table show marks secured by 140 students in an examination. [3]

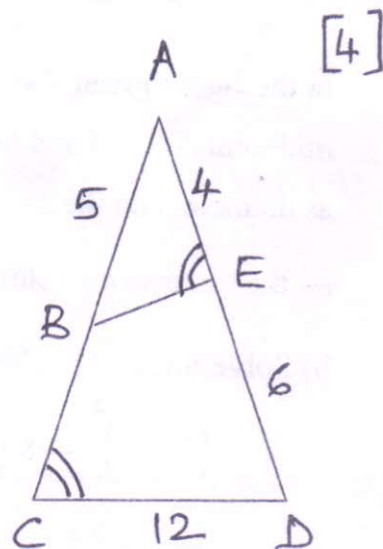
Marks	0-10	10-20	20-30	30-40	40-50
Number of students	20	24	40	36	20

Calculate the mean marks using the short cut method

- c) In ΔACD drawn alongside, B and E are points on AC and AD respectively such that $\angle AEB = \angle ACD$. $AB = 5$ cm, $AE = 4$ cm, $ED = 6$ cm and $CD = 12$ cm. State and prove the similarity relation between the triangles.

Hence calculate i) BE and BC

- ii) $\frac{AE}{BC}$ ii) $\frac{\text{Area}(\Delta ABE)}{\text{Area}(\text{Quadrilateral BEDC})}$



Question 6.

a) The difference between a natural number and twice its reciprocal is $\frac{47}{7}$. [3]
Find the number .

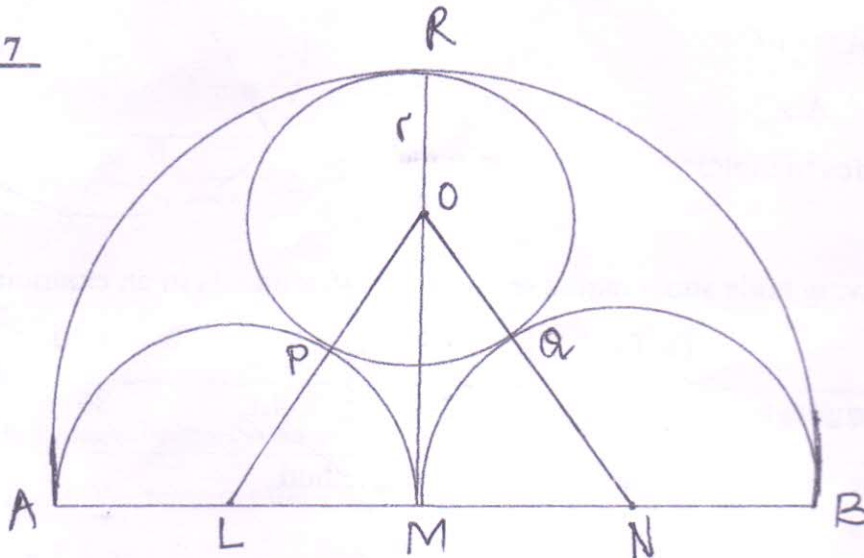
b) Find the value of $\frac{1}{2} \sin^2 90 + \frac{1}{4} \cos^2 60 + \cot 90 - \frac{3}{4} \sec^2 30$ [3]

c) Using properties of proportion, solve for x [4]

$$\frac{(3x-4)^3 - (x+1)^3}{(3x-4)^3 + (x+1)^3} = \frac{61}{189}$$

Question 7

a)



[5]

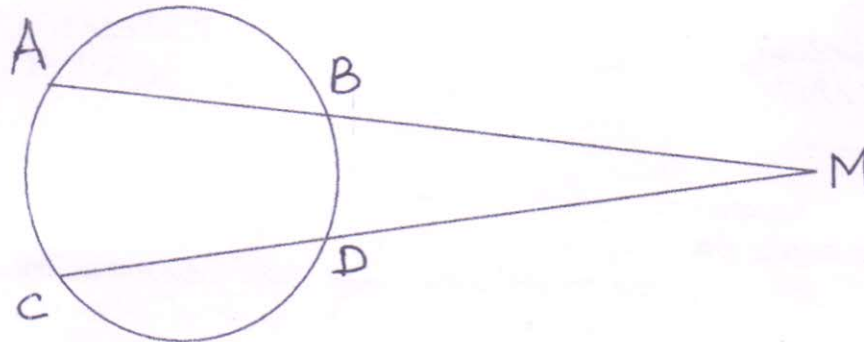
In the figure given above AB is a line segment and M is its midpoint. L and N are midpoints of AM and MB respectively. Semicircles are drawn with AM, MB and AB as diameters on the same side of the line AB. A circle with centre O is drawn to touch all the three semicircles. Prove that its radius r is given by $r = \frac{1}{6} AB$.

b) Solve for x [3]

$$4 \left(\frac{7x-1}{x} \right)^2 - 8 \left(\frac{7x-1}{x} \right) + 3 = 0$$

c)

[2]



In the figure drawn above, chords AB and CD when extended meet at M.

Given $AB = 4$ cm, $BM = 6$ cm, $MD = 5$ cm. Calculate the length of CD.

Question 8.

a) Find the area of the canvas required to make a conical tent 15 m high and 72m in diameter given that 20% of the canvas is used in folds and stitching. [4]

b) In what ratio does the point M (p, -1) divide the line segment joining the points A (1, -3) and B (6,2) ? Hence, find the value of p. [3]

c) Construct a regular hexagon of side 4cm. circumscribe a circle to it. [3]

Question 9

a) The heights of 100 pupils in a school are given below. [5]

Height in cm	121-130	131-140	141-150	151-160	161-170	171-180
No. of pupils	12	17	26	22	14	9

Draw an ogive for the above data and find the median height.

b) Two poles of equal heights are standing opposite to each other on either side of a road which is 100 m wide. From a point between them on the road, angles of elevation of their tops are 30° and 60° . Find the position of the point and also the heights of the poles. [5]