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11/644/2016

B

Second Terminal Evaluation - 2016
MATHEMATICS

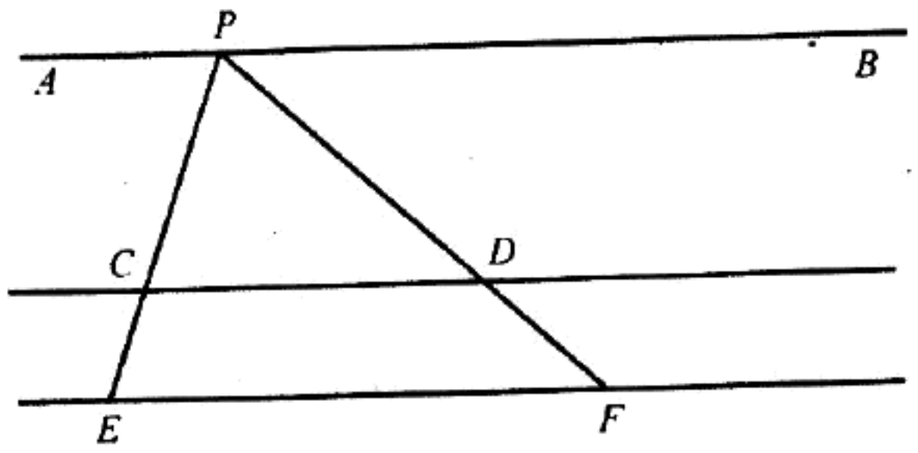
Class: IX

Time: 2½ hours
Score: 80

Instructions

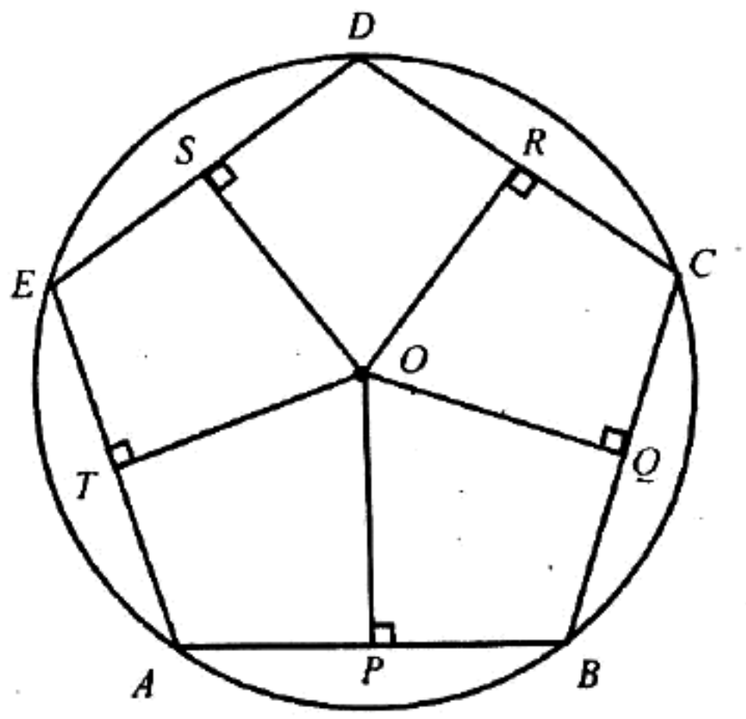
- The first 15 minutes is given as '**cool off time**'. You may read and understand the questions during this time.
- Answer all the questions.
- If there is an ***OR*** between any two questions, you may answer one among them.
- Simplification using irrationals like π, $\sqrt{2}$, $\sqrt{3}$ etc., with their approximate values is not required if not specified in the question.

1. In the figure, the lines AB, CD and EG are parallel. $PC = 4$ centimetre, $CE = 2$ centimetre, $PD = 6$ centimetre. Find DF and PF.



(2)

2. In the figure, O is the centre of the circle. The perpendiculars drawn to the sides of a pentagon OP, OQ, OR, OS and OT are equal. Prove that $ABCDE$ is a regular pentagon.

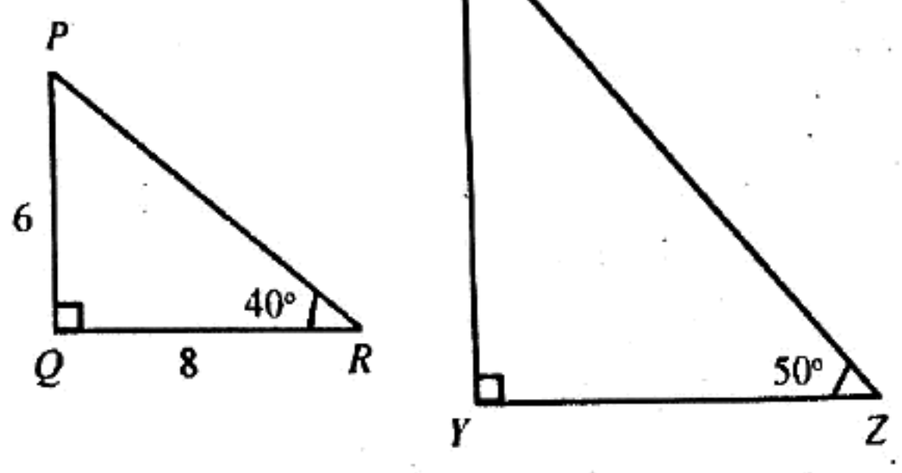


(3)

3. Triangles PQR and XYZ are right triangles $\angle R = 40°$, $\angle Z = 50°$. Also $PQ = 6$ centimetre and $QR = 8$ centimetre.

   i) Find $\angle P$ and $\angle X$

   ii) If YZ is $1\frac{1}{2}$ times of PQ, find all sides of triangle XYZ.



(3)

4. Arc length of a sector with central angle $60°$ is 10π centimetres.

   i) Find the perimeter of the circle.

   ii) What is the radius of the circle? (3)

5. $p(x) - q(x) = 2x^2 + 2x + 5$ and $p(x) = 4x^2 + 5x + 6$. Find $q(x)$. What is $q(1)$? (3)

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6. Prove that $(\sqrt{3}-1)(\sqrt{3}+1)=2$. Using this, compute $\frac{2}{\sqrt{3}-1}$ correct to two decimal places. ($\sqrt{3}$ = 1.732) (4)

OR

Look at this number pattern:

$$\sqrt{1-\frac{1}{2}} = 1\sqrt{\frac{1}{2}}$$

$$\sqrt{2-\frac{2}{3}} = 2\sqrt{\frac{1}{3}}$$

$$\sqrt{3-\frac{3}{4}} = 3\sqrt{\frac{1}{4}}$$

.....

.....

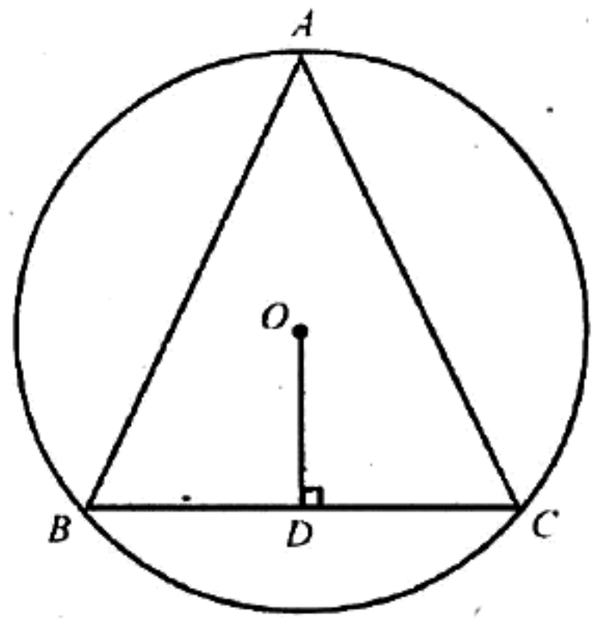
i) Write next two lines of this number pattern.

ii) Explain using algebra why this is correct always.

7. In the figure, O is the circumcentre of the triangle ABC, $AB = AC$ and the line OD is perpendicular to the side BC. If BC = 16 centimetre and OD = 6 centimetre.

i) What is the cirumradius?

ii) Calculate the length of the sides AB and AC.



(4)

8. Construct a triangle with perimeter 12 centimetres and ratio of their sides is 1 : 3 : 3. (4)

9. Breadth of a rectangular prism is 2 centimetre less than its length, height is 3 centimetre more than its length. Take the length as x, express the volume of the prism $v(x)$ using x. If the length is 5 centimetre find its volume? (4)

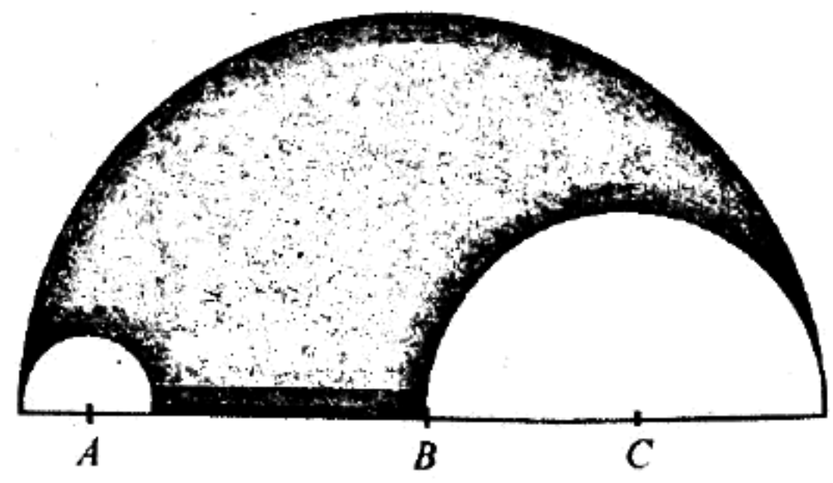
10. Two parallel chords 10 centimetre and 24 centimetre long are drawn on the same side of the centre of a circle of radius 13 centimetre. Find the distance between the chords. (4)

11. In the figure, the centres A, B, C of the semicircles are on a line. The radii of the unshaded semicircles are in the ratio 1 : 3. The radius of the smallest semicircle is 2 centimetre.

i) Find the area of the semicircle with centre at A.

ii) Find the area of the semicircle with centre at B.

iii) Find the area of the shaded region.



(4)

OR

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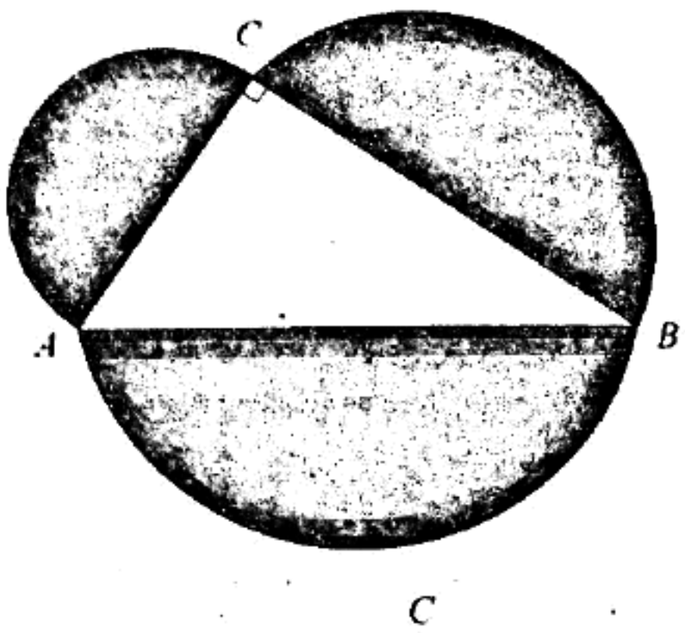
Sides of a right triangle ABC are $AB = 10$ centimetre, $BC = 8$ centimetre and $AC = 6$ centimetre. Semicircle are drawn with sides of the triangle as diameters.

i) Find the areas of semicircles.

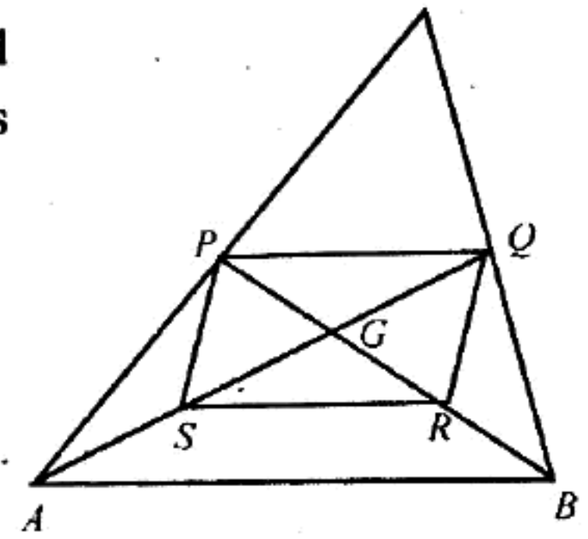
ii) Prove that sum of areas of two small semicircles is equal to the area of the largest semicircle.



12. In the figure, P and Q are mid points of sides AC and BC of the triangle ABC. R and S are mid points of lines BG and AG respectively.

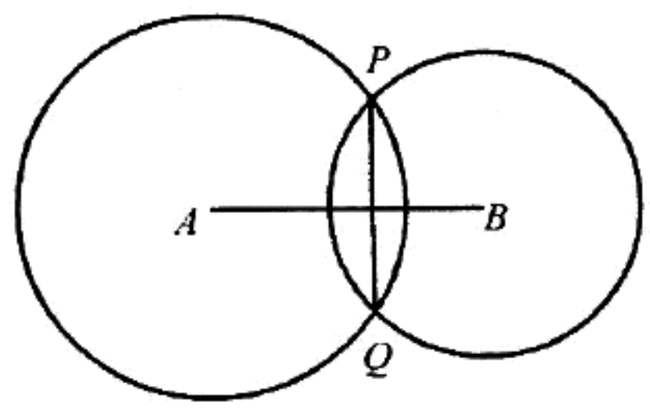
i) Find $AG : GQ$

ii) Prove that $PQRS$ is a parallelogram.



(4)

13. In the figure, two circles are drawn with centres A and B respectively. They intersect at P and Q. Prove that AB is the perpendicular bisector of PQ.

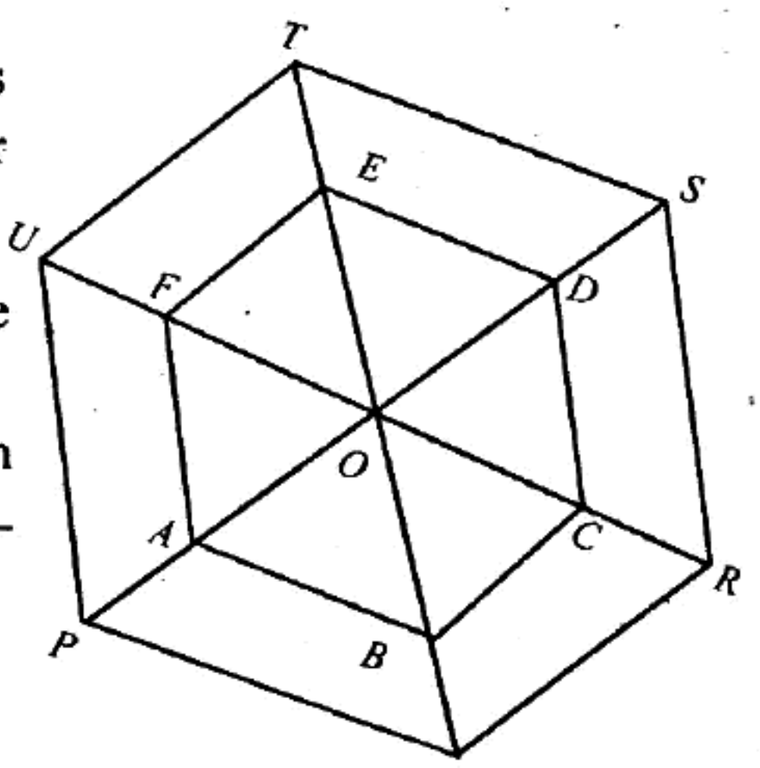


(4)

14. A point O inside the hexagon $ABCDEF$ is joined to its vertices and those lines are extended $1\frac{1}{2}$ times. Their ends are joined to make another hexagon $PQRSTU$.

i) Prove that the angles of the two hexagons are the same.

ii) Prove that the length of sides of the bigger hexagon is $1\frac{1}{2}$ times the length of sides of the smaller hexagon.

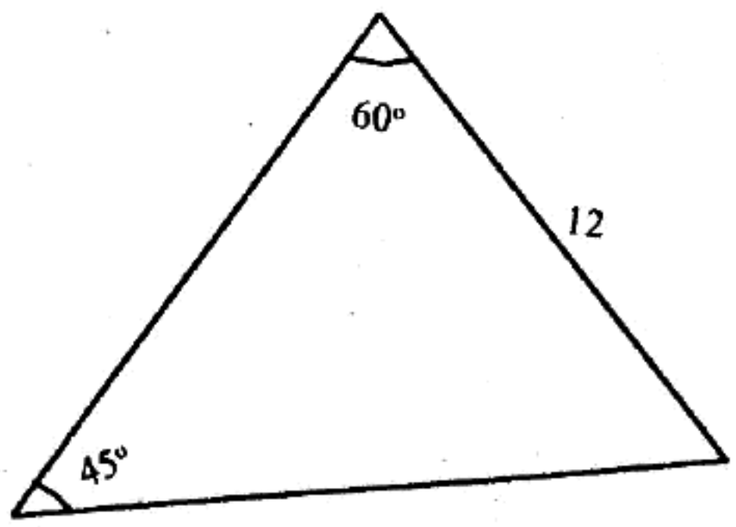


(4)

15. In the figure, one side of the triangle is 12 centimetres and two angles are 45° and 60°

a) Find the length of the other two sides of the triangle.

b) Find the perimeter of the triangle.
$[\sqrt{3} \approx 1.73, \sqrt{6} \approx 2.44]$



(5)

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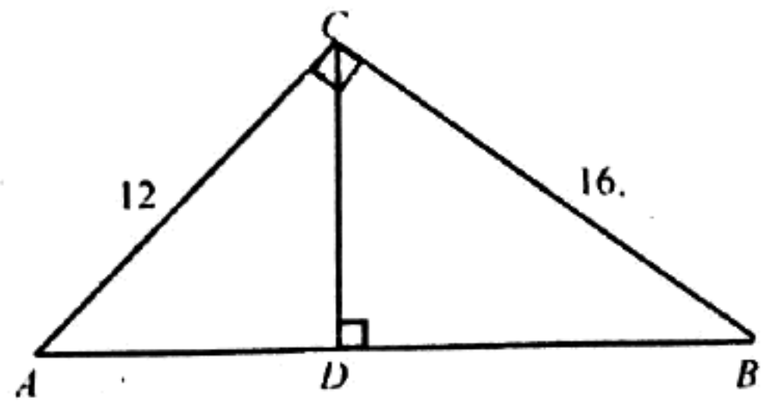
16. Draw a triangle of sides 6 centimetre, 5 centimetre and 5.5 centimetre and construct its circumcircle. Measure its circumradius. (5)

17. Draw a rectangle of sides 7 centimetre and 5 centimetre. Construct another rectangle of length 8 centimetre without changing the ratio of their sides. (5)

18. In triangle ABC, $\angle C = 90^{\circ}$, $AC = 12$ centimetres, $BC = 16$ centimetres and CD is perpendicular to AB.



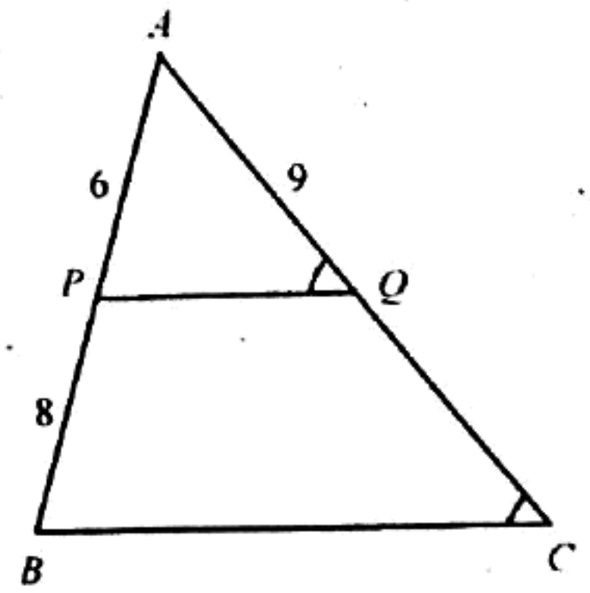
a) Find the length of AB

b) Find the length of AD and BD

c) Find the length of CD (5)

OR

In triangle ABC, $AP = PQ$ $\angle C = \angle Q$, $AP = 6$ centimetre, $PB = 8$ centimetre, $AQ = 9$ centimetre.



a) Write three pairs of equal angles from the figure.

b) Prove that triangle ABC isosceles.

c) Find the perimeter of the trapezium $PBCQ$.

19. Consider the polynomial $p(x) = 4x^2 - 5x + 5$

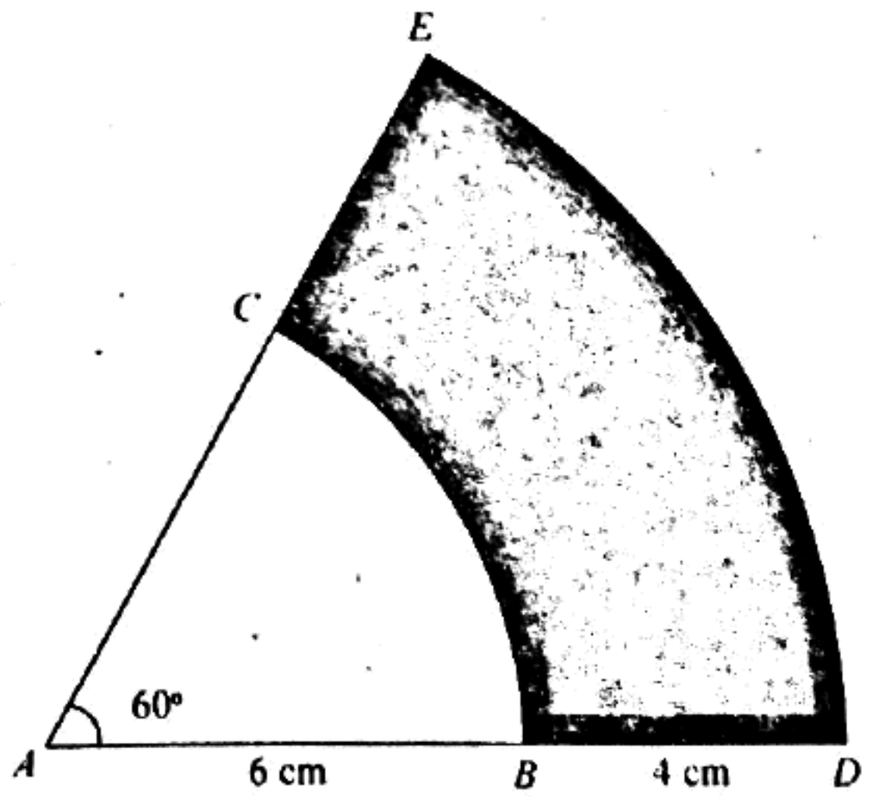
a) Find $(x - 2)\, p(x)$

b) Find $(x + 2)\, p(x)$

c) Find $2x\, p(x)$

d) Check whether $(x - 2)\, p(x) + (x + 2)\, p(x)$ and $2x\, p(x)$ are equal. (5)

20. The two sectors with centre at A have central angle 60°. If $AB = 6$ centimetre, and $BD = 4$ centimetre.



a) Find the radius of the bigger sector.

b) Find the area of the shaded region. (5)