MATHEMATICS

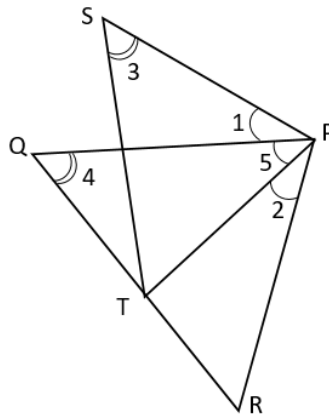**CLASS – X**

Section A

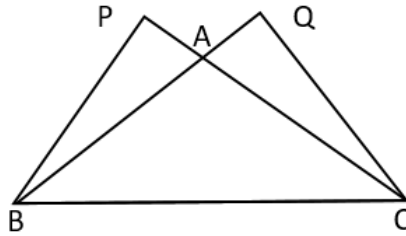**Answer ALL the following Questions. Each question carries 2 marks.**

1. Prove that the lengths of tangents drawn from an external point to a circle are equal.

2. In the figure, $\angle 1 = \angle 2$ and $\angle 3 = \angle 4$. Show that $PT \times QR = PR \times ST$

3. ABCD is a square. CD is a tangent to the circle with centre O as shown in the figure. If OD = CE, what is the ratio of the area of the circle and the area of the square? Give reasons for your answer.
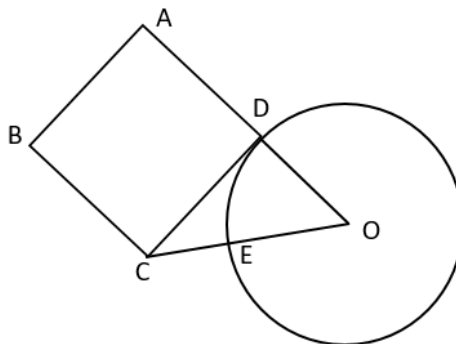
4. In $\triangle ABC$, $\angle A$ is obtuse, $PB \perp AC$ and $QC \perp AB$. Prove that $AB \times AQ = AC \times AP$
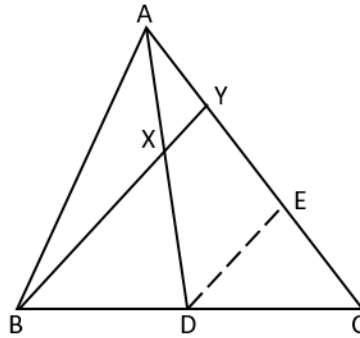
5. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, prove that $AQ = \frac{1}{2}(BC + CA + AB)$.
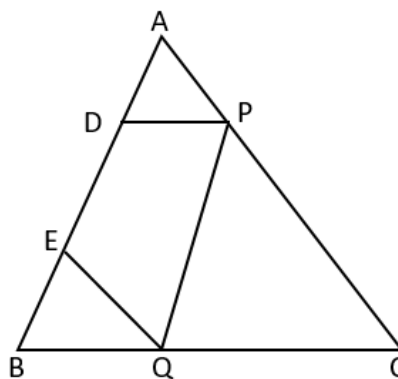
Section B

Answer ALL the following Questions. Each question carries 3 marks.

6. In a ΔABC, AD is a median. X is a point on AD such that $AX : AD = 2 : 3$. Ray BX intersects AC in Y. Prove that $BX = 4XY$.


7. In the figure, there are two points D and E on side AB of $\triangle ABC$ such that AD = BE. If DP || BC and EQ || AC, prove that PQ || AB.


8. In a right triangle ABC in which $\angle B = 90°$, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P. Prove that the tangent to the circle at P bisects BC.

9. The side BC of a ΔABC is bisected at D; O is any point in AD. BO and CO produced meet AC and AB in E and F respectively and AD is produced to X so that D is the midpoint of OX. Prove that   (a) $AO: AX = AF: AB$ (b) FE ∥ BC
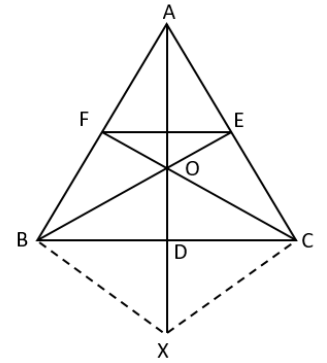
10. In the given figure, ΔABC~ΔDEF and their sides are of lengths(in cm) as marked along their sides, find the lengths of the sides of each triangle.
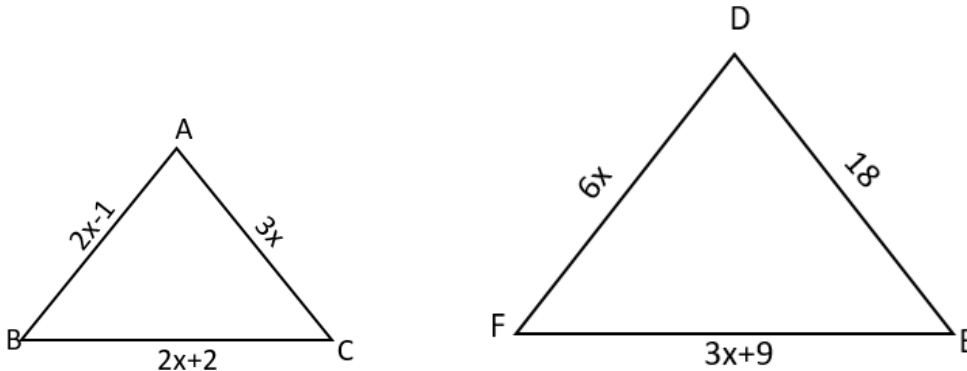

Section C

Answer ALL the following Questions. Each question carries 5 marks.

11. If an isosceles ΔABC in which $AB = AC = 6$ cm, is inscribed in a circle of radius 9 cm, find the area of the triangle.

12. Two circles with centres A and B of radii 6 cm and 8 cm respectively intersect at two points C and D such that AC and BC are tangents to the two circles. Find the length of the common chord CD.

13. OB is perpendicular bisector of the line segment DE, FA ⊥ OB and FE intersects OB at the point C. Prove that   (a) $\dfrac{OA}{OB} = \dfrac{AC}{BC}$ (b) $\dfrac{1}{OA} + \dfrac{1}{OB} = \dfrac{2}{OC}$
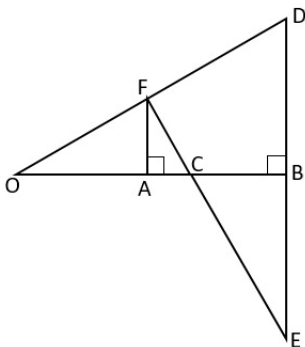
Section – D : Case Study

14. A circle can have at most two parallel tangents, one at a point on it and the other at a point diametrically opposite to it. Here AB is diameter of a circle and tangent n and tangent m drawn at the points A and B respectively are parallel to each other. Answer the questions based on above.
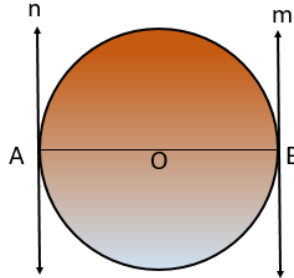
a) What is the distance between two parallel tangents of a circle if radius 6 cm?

b) What is the maximum number of tangents parallel to a secant a circle?

c) Two parallel tangents touch the circle A and B. Find the distance between parallel tangents if the area of circle is 25π cm^2.

OR

CD is tangent to circle at P. If $\angle PAB = 25°$, determine $\angle CPA$ given O is the centre of the circle.
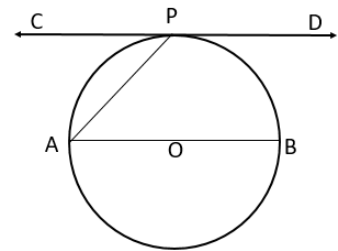
15. **ASSERTION REASON BASED QUESTIONS**

A statement of assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(a) Both (A) and (R) are true and (R) is the correct explanation of (A).

(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

Assertion(A): In $\triangle ABC$, D and E are points on sides AB and AC respectively such that BD = CE. If $\angle B = \angle C$, then DE is not parallel to BC.

Reason(R): If a line divides any two sides of a triangle in the same ratio, then line must be parallel to the third side.