Problem 1

The diagram below shows a circle, centre O, with a radius 12 cm. The chord AB subtends at an angle of 75° at the centre. The tangents to the circle at A and at B meet at P.

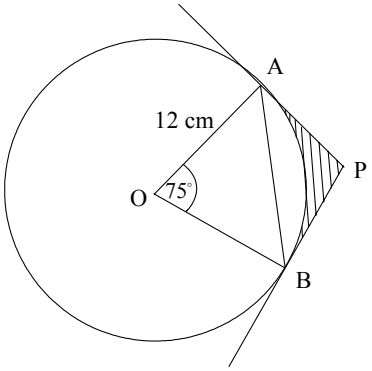

diagram not to scale

(a) Using the cosine rule, show that the length of AB is $12\sqrt{2(1-\cos 75^\circ)}$.

(b) Find the length of BP.

(c) Hence find

(i) the area of triangle OBP;

(ii) the area of triangle ABP.

(d) Find the area of **sector** OAB.

(e) Find the area of the shaded region.

Problem 2

In the following diagram, O is the centre of the circle and (AT) is the tangent to the circle at T.

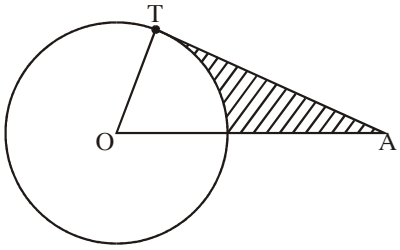

Diagram not to scale

If OA = 12 cm, and the circle has a radius of 6 cm, find the area of the shaded region.

Problem 3 *[6 marks]*

In the figure below,

the length of segment BC is 21 cm

the *length* of the *semi-circle* of radius O_1P is 22 cm

the *surface area* of the *semi-circle* of radius O_2Q is 39.3 cm^2

Find

i) Angle $\widehat{\text{BAC}}$

ii) The surface area of the triangle ABC.