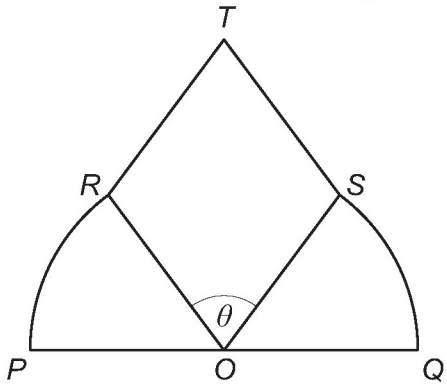
7 A new design for a company logo is to be made from two sectors of a circle, *ORP* and *OQS*, and a rhombus *OSTR*, as shown in the diagram below.



The points *P*, *O* and *Q* lie on a straight line and the angle *ROS* is θ radians.

A large copy of the logo, with $PQ = 5$ metres, is to be put on a wall.

7 (a) Show that the area of the logo, A square metres, is given by

$$A = \frac{25}{8}(\pi - \theta + 2\sin\theta)$$

[4 marks]

7 (b) (i) Show that the maximum value of A occurs when $\theta = \frac{\pi}{3}$

Fully justify your answer.

[6 marks]

7 (b) (ii) Find the exact maximum value of A

[2 marks]

7 (c) Without further calculation, state how your answers to parts **(b)(i)** and **(b)(ii)** would change if *PQ* were increased to 10 metres.

[2 marks]