



In the diagram, AB is an arc of a circle, centre O and radius 6 cm, and angle $AOB = \frac{1}{3}\pi$ radians. The line AX is a tangent to the circle at A , and OBX is a straight line.

- (i) Show that the exact length of AX is $6\sqrt{3}$ cm. [1]

Find, in terms of π and $\sqrt{3}$,

- (ii) the area of the shaded region, [3]
 (iii) the perimeter of the shaded region. [4]