Circular measure – 2022 O Level Additional Math

1. June/2022/Paper_11/No.9

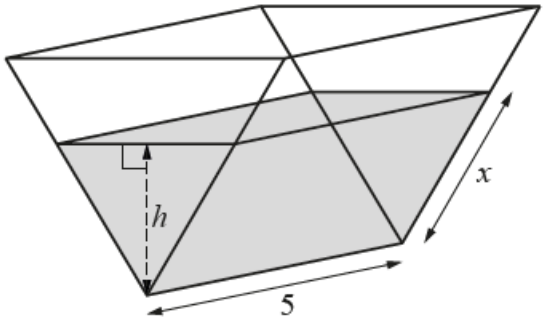
A circle, centre O and radius r cm, has a sector OAB of fixed area $10\,\text{cm}^2$. Angle AOB is θ radians and the perimeter of the sector is P cm.

(a) Find an expression for P in terms of r. [3]

(b) Find the value of r for which P has a stationary value. [3]

2. June/2022/Paper_21/No.9

In this question all lengths are in metres.



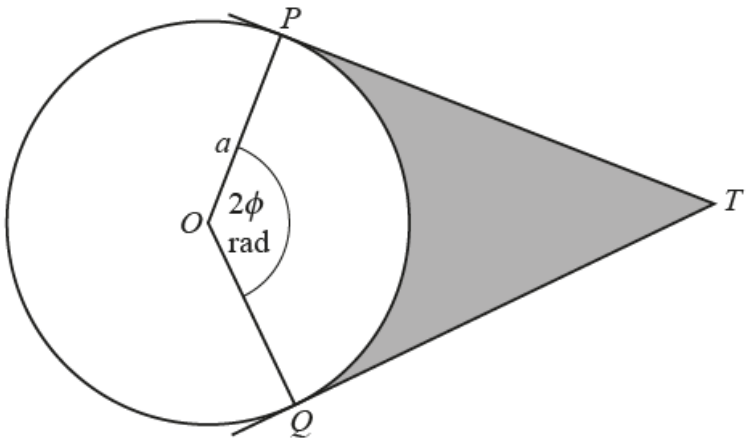
The diagram shows a water container in the shape of a triangular prism. The depth of water in the container is h. The container has length 5. The water in the container forms a prism with a uniform cross-section that is an equilateral triangle of side x.

(a) Show that the volume, V, of the water is given by $V = \frac{5\sqrt{3}h^2}{3}$. [4]

(b) Water is pumped into the container at a rate of $0.5\ \text{m}^3$ per minute. Find the rate at which the depth of the water is increasing when the depth of the water is 0.1 m. [4]

3. June/2022/Paper_22/No.9

In this question all lengths are in centimetres.



The diagram shows a circle, centre O, radius a. The lines PT and QT are tangents to the circle at P and Q respectively. Angle POQ is 2ϕ radians.

(a) In the case when the area of the sector OPQ is equal to the area of the shaded region, show that $\tan\phi = 2\phi$. [4]

(b) In the case when the perimeter of the sector OPQ is equal to half the perimeter of the shaded region, find an expression for $\tan\phi$ in terms of ϕ. [3]