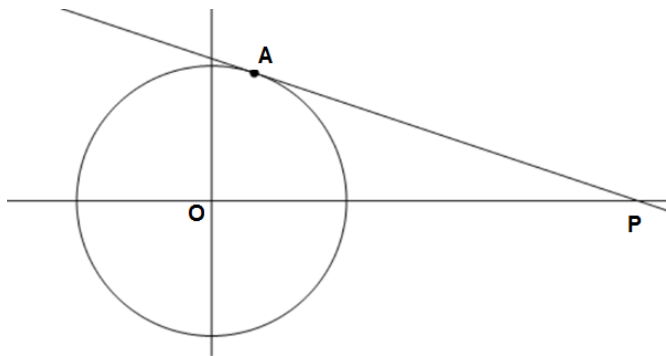


GCSE 9-1 maths question

The diagram below shows a circle with equation $x^2 + y^2 = 40$.

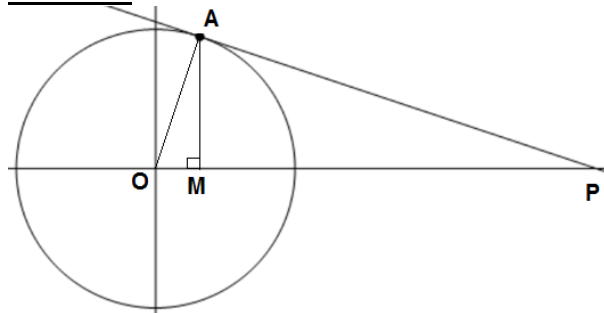
The straight line through A and P is a tangent to the circle at A .

A is the point $(2,6)$.



Find the area of triangle OAP .

Solution 1



Triangles OAP and OAM are similar.

The ratio $OM:OA$ is $2:\sqrt{40}$.

The area scale factor is $\left(\frac{\sqrt{40}}{2}\right)^2 = \frac{40}{4} = 10$.

The area of triangle OAM is $\frac{2 \times 6}{2} = 6$.

The area of triangle OAP is $6 \times 10 = 60$.

Solution 2

Gradient of $OA = \frac{6}{2} = 3$.

The product of the gradients of perpendicular lines is -1 therefore the gradient of $AP = -\frac{1}{3}$.

The equation of the line through A and P is $y = -\frac{1}{3}x + c$ so $c = y + \frac{1}{3}x$.

The line passes through the point $(2,6)$ therefore $c = 6 + \frac{2}{3} = \frac{20}{3}$ and the equation of the line is

$y = -\frac{1}{3}x + \frac{20}{3}$ or $3y = 20 - x$. $y = 0$ at P so $x = 20$ at P .

The length of OP is 20 and the area of the triangle is $\frac{20 \times 6}{2} = 60$.