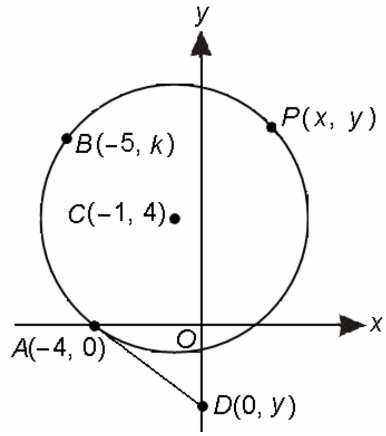
CHAPTER 6: COORDINATE GEOMETRY

Paper 2

Solution to Question 9



(a) (i) Let the coordinates of P be (x, y).

$$PC = AC$$
$$\sqrt{(x+1)^2+(y-4)^2}=\sqrt{(-1+4)^2+(4-0)^2}$$
$$(x+1)^2+(y-4)^2=(-1+4)^2+(4-0)^2$$
$$x^2+2x+1+y^2-8y+16=25$$
$$x^2+y^2+2x-8y-8=0$$

Thus, the equation of the locus of point P is $x^2+y^2+2x-8y-8=0$.

(ii) The locus of point P passes through $B(-5, k)$.
Substitute $x = -5$ and $y = k$ into the equation.

$$(-5)^2+k^2+2(-5)-8k-8=0$$
$$25+k^2-10-8k-8=0$$
$$k^2-8k+7=0$$
$$(k-1)(k-7)=0$$
$$k=1 \quad \text{or} \quad k=7$$

(b) Since AD is a tangent to the circle, then AD is perpendicular to radius AC.

Gradient of $AC = \dfrac{4-0}{-1+4} = \dfrac{4}{3}$

So, gradient of $AD = -\dfrac{3}{4}$

Equation of AD: $y - 0 = -\dfrac{3}{4}(x+4)$

$4y + 3x + 12 = 0$

At point D, $x = 0$.

$4y + 3(0) + 12 = 0$

$y = -3$

So, the coordinates of point D are $(0, -3)$.

ΔOAD is a right-angled triangle.

Area of $\Delta OAD = \dfrac{1}{2}(4)(3)$

$= 6 \text{ unit}^2$