CHAPTER 6: COORDINATE GEOMETRY

Paper 1

Solution to Question 15

(a) Let the coordinates of P be (x, y).
Given $A(1, 6)$ and $B(3, -2)$.
If $\angle APB = 90^o$, then $m_{AP} \times m_{BP} = -1$.

$$\frac{y-6}{x-1} \times \frac{y+2}{x-3} = -1$$
$$(y-6)(y+2) = -(x-1)(x-3)$$
$$y^2 - 4y - 12 = -(x^2 - 4x + 3)$$
$$x^2 + y^2 - 4x - 4y - 9 = 0$$

Thus, the equation of the locus of P is $x^2 + y^2 - 4x - 4y - 9 = 0$.

(b) Substitute $x = 1$ into the equation of the locus of P.

$$1^2 + y^2 - 4(1) - 4y - 9 = 0$$
$$1 + y^2 - 4 - 4y - 9 = 0$$
$$y^2 - 4y - 12 = 0$$
$$(y+2)(y-6) = 0$$
$$y = -2 \quad \text{or} \quad y = 6$$

The coordinates of points of intersection are $(1, -2)$ and $(1, 6)$.

Paper 2

Solution to Question 1

(a) $A(0, -3)$: y-intercept $= -3$
$B(9, 0)$: x-intercept $= 9$

The equation of AB in the intercept form is $\frac{x}{9} - \frac{y}{3} = 1$.

(b) Given $2AC = CB$

$$\frac{AC}{CB} = \frac{1}{2}$$

$$AC : CB = 1 : 2$$

Coordinates of point $C = \left(\frac{2(0)+1(9)}{1+2}, \frac{2(-3)+1(0)}{1+2}\right)$

$= (3, -2)$

(c) Gradient of $AB = -\left(\frac{-3}{9}\right)$

$= \frac{1}{3}$

Since CD is perpendicular to AB, then the gradient of PQ is -3.
Equation of CD: $y + 2 = -3(x - 3)$

$y = -3x + 7$

Thus, the y-intercept of CD is 7.