① The points A, B, C, D have coordinates $(3, 2)$, $(-4, 3)$, $(5, 6)$, $(4, -1)$, respectively.

    (a)   Show that the lines AC and BD are perpendicular.   [5]

    (b)   Show that the line AC has equation

$$2x - y - 4 = 0$$

       and find the equation of the line BD.   [4]

    (c)   Find the coordinates of E, the point of intersection of AC and BD.   [2]

    (d)   Find the length of AE.   [2]

<div align="right">June 06</div>

② The points A, B, C, D have coordinates $(-5, 0)$, $(0, 5)$, $(3, 4)$ $(4, -3)$, respectively.

    (a)   Show that AC is perpendicular to BD.   [4]

    (b)   Show that AD is parallel to BC.   [3]

    (c)   Show that the equation of AC is

$$x - 2y + 5 = 0$$

       and find the equation of BD.   [3]

    (d)   The lines AC and BD intersect at E.

        (i)   Show that the coordinates of E are $(1, 3)$.   [2]

        (ii)   Find the length of AE.   [2]

<div align="right">Jan 07</div>

③ The points A, B, C, D have coordinates $(-1, 3)$, $(1, 7)$, $(2, -1)$, $(5, k)$, respectively. The line AB is parallel to the line CD.

    (a)   Find the gradient of AB.   [2]

    (b)   Show that $k = 5$.   [3]

    (c)   The line L is perpendicular to CD and passes through the point A. Show that the equation of L is $x + 2y - 5 = 0$.   [3]

    (d)   The line L intersects the line CD at the point E. Find the coordinates of E.   [4]

<div align="right">June 07</div>

④ The points A, B, C have coordinates $(-2, 3)$, $(10, -1)$, $(3, 8)$ respectively. The line through C perpendicular to AB intersects AB at the point D.

    (a)   Find the gradient of AB.   [2]

    (b)   Show that AB has equation

$$x + 3y - 7 = 0$$

       and find the equation of CD.   [5]

    (c)   Show that D has coordinates $(1, 2)$.   [2]

    (d)   The mid-point of AB is denoted by E. Find the length of ED.   [4]

<div align="right">Jan 08</div>