# C1/A
# Coordinate Geometry.

(1) The points $A$, $B$, $C$ have coordinates $(-3, 1)$, $(7, 6)$, $(4, 2)$, respectively.

*(a)* Show that the line $AB$ has equation

$$x - 2y + 5 = 0.$$ [4]

*(b)* The line through $C$ perpendicular to $AB$ meets $AB$ at the point $D$.

(i) Find the equation of $CD$.

(ii) Show that the coordinates of $D$ are $(3, 4)$.

(iii) The point $E$ is the mid-point of $BD$. Find the length of $CE$. [8]

(2) The points $A$, $B$, $C$, $D$ have coordinates $(-2, 2)$, $(13, -3)$, $(7, 14)$, $(-3, 9)$ respectively.

*(a)* Show that $AC$ has equation

$$4x - 3y + 14 = 0.$$ [4]

*(b)* Show that $BD$ is perpendicular to $AC$ and find the equation of $BD$. [4]

*(c)* The lines $AC$ and $BD$ intersect at the point $E$. Find the coordinates of $E$. [2]

*(d)* The point $F$ is the mid-point of $BD$. Calculate the length of $EF$. [4]

(3) The points $A$, $B$, $C$ have coordinates $(4, -2)$, $(-12, 10)$, $(10, 6)$, respectively.

*(a)* Find the gradients of the lines

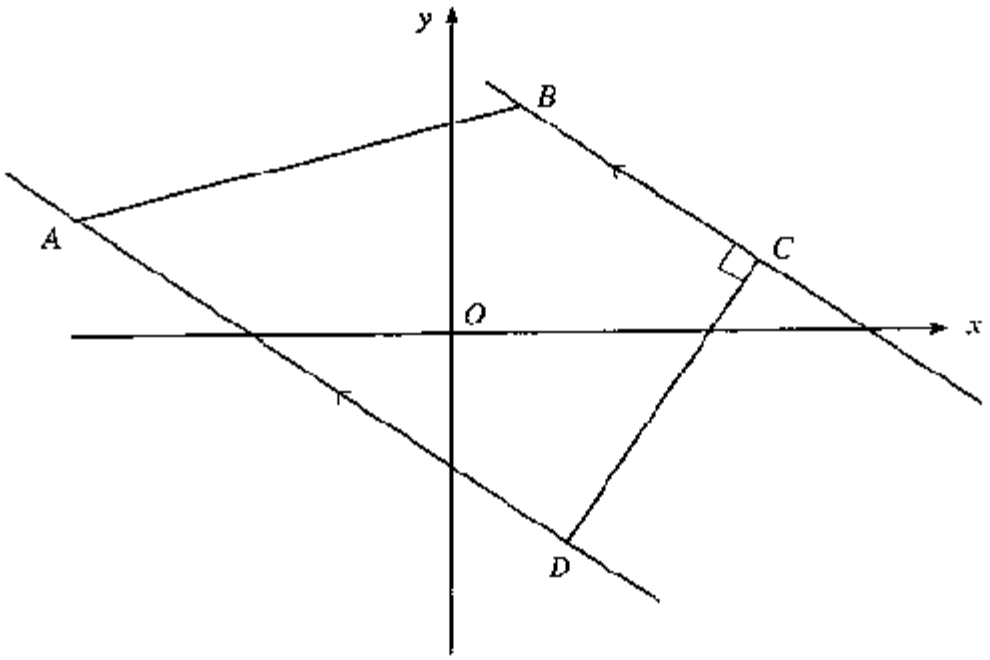
$AB$, $BC$, $CA$. [3]

*(b)* Show that one of the angles of triangle $ABC$ is a right-angle. [2]

*(c)* Show that the equation of the line $AB$ is $3x + 4y - 4 = 0$. [2]

*(d)* The mid-point of $BC$ is $D$. Find the length of $AD$. [4]

④




In the diagram, the points $A$, $B$, $C$ have coordinates $(-10, 5)$, $(4, 7)$, $(8, 4)$ respectively.

*(a)* Find the gradient of $BC$. [2]

*(b)* Show that the line through $A$ parallel to $BC$ has equation

$$4y + 3x + 10 = 0.$$ [3]

*(c)* The line through $C$ perpendicular to $BC$ meets the line $4y + 3x + 10 = 0$ at $D$.

(i) Find the equation of $CD$.

(ii) Show that the coordinates of $D$ are $(2, -4)$.

(iii) Find the area of the trapezium $ABCD$. [8]

⑤ The points $A$ and $B$ have coordinates $(1, -2)$, $(5, 10)$, respectively. The mid-point of $AB$ is $C$.

*(a)* Find

(i) the coordinates of $C$,

(ii) the gradient of $AB$. [3]

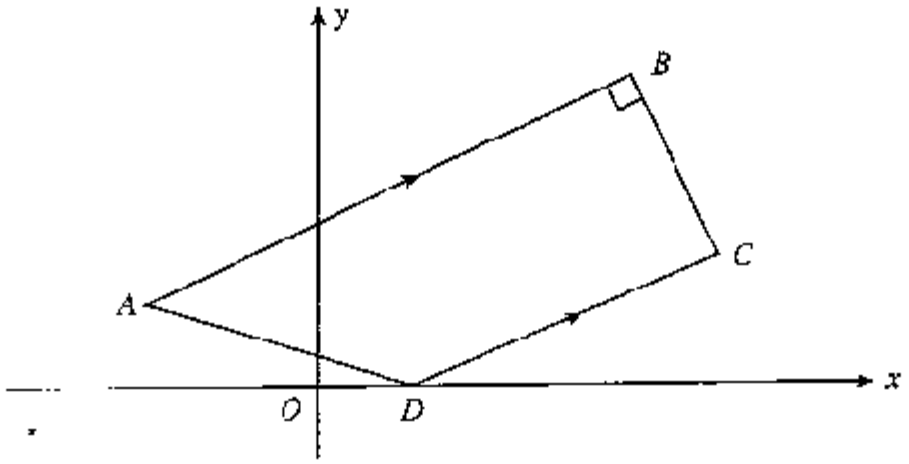
*(b)* The line $L$ passes through the point $C$ and is perpendicular to $AB$. Show that $L$ has equation

$$x + 3y - 15 = 0.$$ [4]

*(c)* The line $L$ intersects the $x$-axis at the point $D$.

(i) Find the coordinates of $D$. [1]

(ii) Calculate the size of $\hat{CAD}$. [4]




The diagram shows a trapezium $ABCD$ with $AB$ parallel to $DC$ and $AB$ perpendicular to $BC$. The point $C$ has coordinates (7,3) and $D$ lies on the $x$-axis. The line $AB$ has equation

$$x - 2y + 9 = 0.$$

*(a)* Find the gradient of the line $AB$. [1]

*(b)* Show that the equation of the line $BC$ is

$$2x + y - 17 = 0,$$

and find the equation of $CD$. [6]

*(c)* Find the coordinates of $B$ and $D$. [3]

*(d)* Show that the length of $BC$ is two thirds the length of $CD$. [2]

⑦ **The points $A$, $B$, $C$ have coordinates (–5, 5), (2, –1), (4, 3), respectively. The point $D$ is such that $AD$ is parallel to $BC$ and $CD$ is perpendicular to $BC$.**

***(a)* Show that the equation of $AD$ is**

$$y - 2x - 15 = 0.$$ **[2]**

***(b)* Find the equation of $CD$.** **[2]**

***(c)* Show that the coordinates of $D$ are (–4, 7).** **[2]**

***(d)* Find the area of the trapezium $ABCD$.** **[3]**

⑧ $A$, $B$, $C$ are the points (0, 4), (–2, –5) and (6, 11) respectively. The point $D$ is the mid-point of $BC$.

*(a)* Show that the equation of $BC$ is $2x - y - 1 = 0$. [2]

*(b)* Show that $AD$ is perpendicular to $BC$. [4]

*(c)* The line $L$ passes through the point $E(3, 0)$ and is parallel to $AD$, and intersects $BC$ at $F$. Show that $AD = EF$. [8]

(9) The points $A$, $B$, $C$ have coordinates $(2, 0)$, $(1, 5)$ and $(-3, -1)$, respectively. The mid-point of $BC$ is $D$.

*(a)* Show that the equation of $AD$ is

$$3y + 2x - 4 = 0.$$ [5]

*(b)* The line $L$ passes through $B$ and is perpendicular to $AB$. Find the equation of $L$. [3]

*(c)* The line $L$ intersects $AD$ at the point $E$. Show that $E$ has coordinates $(-4, 4)$. [2]

*(d)* Find the area of triangle $ABE$. [3]

(10) The points $A$, $B$, $C$, $D$ have coordinates $(1, 7)$, $(5, -1)$, $(8, 3)$, $(6, 7)$ respectively.

*(a)* Show that $AB$ and $CD$ are parallel. [3]

*(b)* Find the equation of $AB$. [2]

*(c)* The line $L$ passes through the point $D$ and is perpendicular to $AB$. Show that $L$ has equation

$$x - 2y + 8 = 0.$$ [3]

*(d)* The lines $L$ and $AB$ intersect at the point $E$. Find the coordinates of $E$. [2]

*(e)* Calculate the length of $EF$, where $F$ is the mid-point of $AB$. [4]

(11) The points $A$ and $B$ have coordinates $(-2, 2)$ and $(6, 18)$, respectively. The mid-point of $AB$ is $C$. The line through $C$ perpendicular to $AB$ intersects the $x$-axis at the point $D$.

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

*(b)* Show that $C$ has coordinates $(2, 10)$ and hence find the equation of $CD$. [4]

*(c)* Given that the point $E$ has coordinates $(-10, 11)$, show that

(i) $EC$ is parallel to $AD$,

(ii) $EC = \frac{1}{2} AD$. [7]

(12) The points $A$, $B$, $C$ have coordinates $(-1, 3)$, $(1, 7)$, $(2, 4)$ respectively.

*(a)* The line $L_1$ is the perpendicular bisector of the line $AB$. Show that $L_1$ has equation

$$x + 2y - 10 = 0.$$ [6]

*(b)* The line $L_2$ passes through $A$ and is parallel to $BC$. Find the equation of $L_2$. [3]

*(c)* Find the coordinates of $D$, the point of intersection of $L_1$ and $L_2$. [2]

*(d)* Show that $BC = AD$. [2]

The points $A$, $B$ and $C$ have coordinates (1, 3), (−2, −2), (−4, 6) respectively. The line through $A$ perpendicular to $BC$ meets $BC$ at $D$.

*(a)* Show that the equation of $BC$ is

$$4x + y + 10 = 0$$

and find the equation of $AD$. [7]

*(b)* Show that the coordinates of $D$ are (−3, 2). [2]

*(c)* The line $AD$ is extended to $E$ so that $D$ is the mid-point of $AE$. Find the coordinates of $E$ and the length $AE$. [4]

(14) The points $A$, $B$, $C$, $D$ have coordinates (2, 0), (5, 1), (7, 10), (−3, 5) respectively.

*(a)* Show that the lines $AC$ and $BD$ are perpendicular. [4]

*(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 the lines $AC$ and $BD$. [2]

*(d)* Show that $AC = 5AE$. [3]

(15) The points $A$ and $B$ have coordinates (2, 3) and (5, 9) respectively. The line through $B$ perpendicular to $AB$ meets the $x$-axis at the point $C$.

*(a)* Show that the equation of the line $BC$ is

$$x + 2y - 23 = 0.$$ [6]

*(b)* Find the coordinates of $C$. [1]

The point $D$ has coordinates (24, 1). The line through $A$ parallel to the line $CD$ intersects the line $BC$ in the point $E$.

*(c)* Show that the coordinates of $E$ are (7, 8). [5]

*(d)* Find the length of $CE$. [2]

(16) The points $A$, $B$, $C$ have coordinates (−2, −3), (6, 1) and $(k, 3)$ respectively. The line $AB$ is perpendicular to $BC$.

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

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

*(c)* The line $L$ is parallel to $BC$ and passes through $A$. Find the equation of $L$. [2]

*(d)* The line $L$ intersects the $y$-axis at $D$. Calculate the length of $CD$. [3]