Revision Exercise 1

(Coordinate Geometry – Straight Lines)

1.

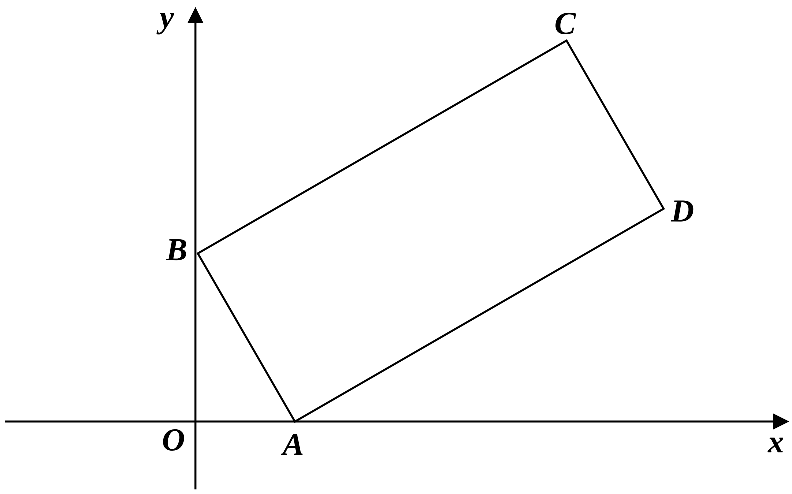


Fig. 2

The points A (3, 0) and B (0, 4) are two vertices of the rectangle $ABCD$, as shown in Fig. 2.

(a) Write down the gradient of AB and hence the gradient of BC.

The point C has coordinates (8, k), where k is a positive constant.

(b) Find the length of BC in terms of k.

Given that the length of BC is 10 and using your answer to part (b),

(c) find the value of k,

(d) find the coordinates of D.

2

The points $A(-1, -2)$, B (7, 2) and $C(k, 4)$, where k is a constant, are the vertices of triangle ABC. Angle ABC is a right angle.

(a) Find the gradient of AB.

(2)

(b) Calculate the value of k.

(2)

(c) Show that the length of AB may be written in the form $p\sqrt{5}$, where p is an integer to be found.

(3)

(d) Find the exact value of the area of $\triangle ABC$.

(3)

(e) Find an equation for the straight line l passing through B and C. Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(2)

The line l crosses the x-axis at D and the y-axis at E.

(f) Calculate the coordinates of the mid-point of DE.

(3)

3

The straight line l_1 has equation $4y + x = 0$.

The straight line l_2 has equation $y = 2x - 3$.

(a) On the same axes, sketch the graphs of l_1 and l_2. Show clearly the coordinates of all points at which the graphs meet the coordinate axes.

(3)

The lines l_1 and l_2 intersect at the point A.

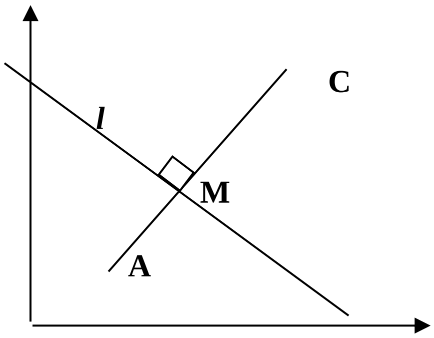
(b) Calculate, as exact fractions, the coordinates of A.

(3)

(c) Find an equation of the line through A which is perpendicular to l_1. Give your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(3)

4.



Not to scale

Fig. 10

In Fig.10, A has coordinates (1, 1) and C has coordinates (3, 5). M is the mid-point of AC.

The line l is perpendicular to AC.

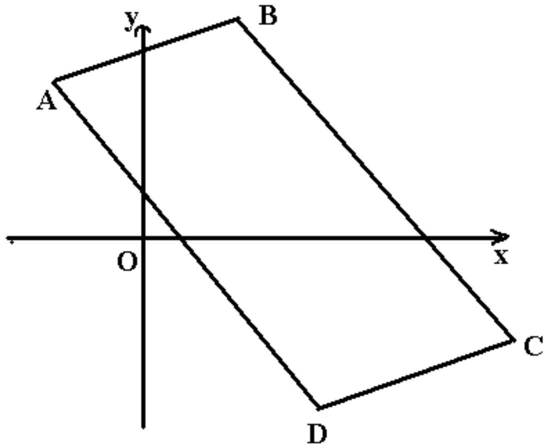
(i) Find the coordinates of M.
Hence find the equation of l.

(ii) The point B has coordinates (-2, 5).
Show that B lies on the line *l*.
Find the coordinates of the point D such that ABCD is a rhombus.

(iii) Find the lengths MC and MB.
Hence calculate the area of the rhombus ABCD.

5

ABCD is a parallelogram. The coordinates of A, B, C and D are (-2, 3), (2, 4), (8, -3) and (4, -4) respectively.



(i) Prove that AB and BD are perpendicular.

(ii) Find the lengths of AB and BD and hence find the area of the parallelogram ABCD.

(iii) Find the equation of the line CD and show that it meets the *y*-axis at X (0, -5).

(iv) Show that the lines BX and AD bisect each other.

(v) Explain why the area of the parallelogram ABCD is equal to the area of the triangle BXC.
Find the length of BX and hence calculate exactly the perpendicular distance of C from BX.

6

The line l_1 passes through the point (9, –4) and has gradient $\frac{1}{3}$.

(a) Find an equation for l_1 in the form $ax + by + c = 0$, where a, b and c are integers.

(3)

The line l_2 passes through the origin O and has gradient –2. The lines l_1 and l_2 intersect at the point P.

(b) Calculate the coordinates of P.

(4)

Given that l_1 crosses the y-axis at the point C,

(c) calculate the exact area of $\triangle OCP$.

(3)

7

The line l_1 passes through the points $P(-1, 2)$ and $Q(11, 8)$.

(a) Find an equation for l_1 in the form $y = mx + c$, where m and c are constants.

(4)

The line l_2 passes through the point $R(10, 0)$ and is perpendicular to l_1. The lines l_1 and l_2 intersect at the point S.

(b) Calculate the coordinates of S.

(5)

(c) Show that the length of RS is $3\sqrt{5}$.

(2)

(d) Hence, or otherwise, find the exact area of triangle PQR.

(4)

8

The straight line l_1 with equation $y = \frac{3}{2}x - 2$ crosses the y-axis at the point P. The point Q has coordinates (5, –3).

(a) Calculate the coordinates of the mid-point of PQ.

(3)

The straight line l_2 is perpendicular to l_1 and passes through Q.

(b) Find an equation for l_2 in the form $ax + by = c$, where a, b and c are integer constants.

(4)

The lines l_1 and l_2 intersect at the point R.

(c) Calculate the exact coordinates of R.

(4)