Past Paper Questions – Set 2

1.

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)

2.

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)

3.

The line l_1 has equation $y = 3x + 2$ and the line l_2 has equation $3x + 2y - 8 = 0$.

(a) Find the gradient of the line l_2.
(2)

The point of intersection of l_1 and l_2 is P.

(b) Find the coordinates of P.
(3)

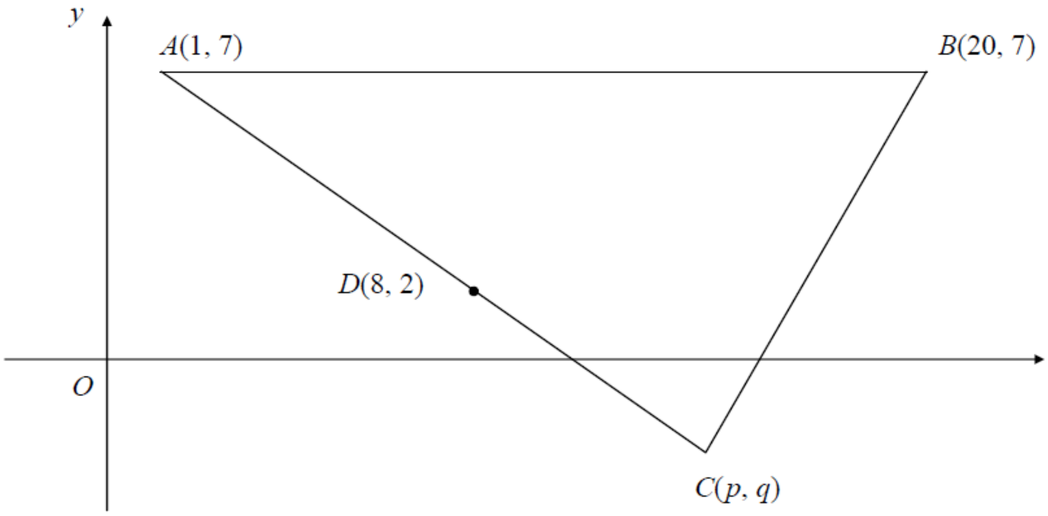
The lines l_1 and l_2 cross the line $y = 1$ at the points A and B respectively.

(c) Find the area of triangle ABP.

(4)

4.

Figure 2



The points $A(1, 7)$, $B(20, 7)$ and $C(p, q)$ form the vertices of a triangle ABC, as shown in Figure 2. The point $D(8, 2)$ is the mid-point of AC.

(*a*) Find the value of p and the value of q.

(2)

The line l, which passes through D and is perpendicular to AC, intersects AB at E.

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

(5)

(*c*) Find the exact x-coordinate of E.

(2)

5.

(i) Find the gradient of the line l_1 which has equation $4x - 3y + 5 = 0$. [1]

(ii) Find an equation of the line l_2, which passes through the point $(1, 2)$ and which is perpendicular to the line l_1, giving your answer in the form $ax + by + c = 0$. [4]

The line l_1 crosses the x-axis at P and the line l_2 crosses the y-axis at Q.

(iii) Find the coordinates of the mid-point of PQ. [3]

(iv) Calculate the length of PQ, giving your answer in the form $\frac{\sqrt{a}}{b}$, where a and b are integers. [3]

6.

The points A and B have coordinates $(5, -1)$ and $(13, 11)$ respectively.

(a) Find the coordinates of the mid-point of AB.

(2)

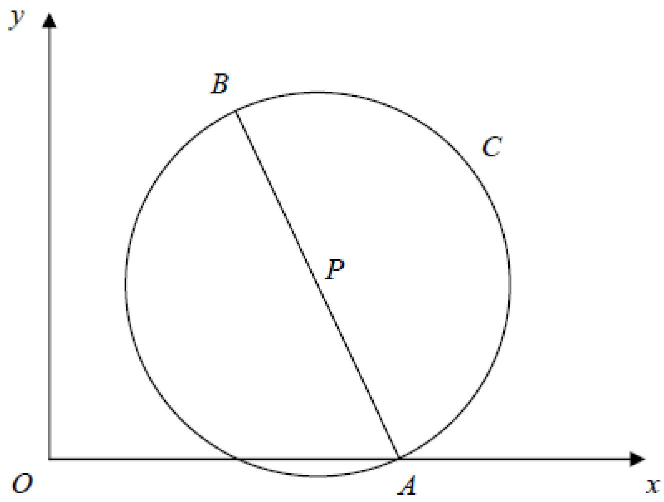
Given that AB is a diameter of the circle C,

(b) find an equation for C.

(4)

7.

Figure 1



In Figure 1, $A(4, 0)$ and $B(3, 5)$ are the end points of a diameter of the circle C.

Find

(a) the exact length of AB,

(2)

(b) the coordinates of the midpoint P of AB,

(2)

(c) an equation for the circle C.

(3)

8.

The line joining the points $(-1, 4)$ and $(3, 6)$ is a diameter of the circle C.

Find an equation for C.

(6)

9.

A circle with centre C has equation $x^2 + y^2 - 10x + 12y + 41 = 0$. The point $A(3, -2)$ lies on the circle.

(a) Express the equation of the circle in the form

$$(x-a)^2 + (y-b)^2 = k$$

[3 marks]

(b) (i) Write down the coordinates of C.

[1 mark]

(ii) Show that the circle has radius $n\sqrt{5}$, where n is an integer.

[2 marks]

(c) Find the equation of the tangent to the circle at the point A, giving your answer in the form $x + py = q$, where p and q are integers.

[5 marks]

(d) The point B lies on the tangent to the circle at A and the length of BC is 6. Find the length of AB.

[3 marks]

10.

The circle C has centre (3, 1) and passes through the point $P(8, 3)$.

(a) Find an equation for C.

(4)

(b) Find an equation for the tangent to C at P, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5)

11.

The circle C has centre $A(2, 1)$ and passes through the point $B(10, 7)$.

(a) Find an equation for C.

(4)

The line l_1 is the tangent to C at the point B.

(b) Find an equation for l_1.

(4)

The line l_2 is parallel to l_1 and passes through the mid-point of AB.

Given that l_2 intersects C at the points P and Q,

(c) find the length of PQ, giving your answer in its simplest surd form.

(3)