4.

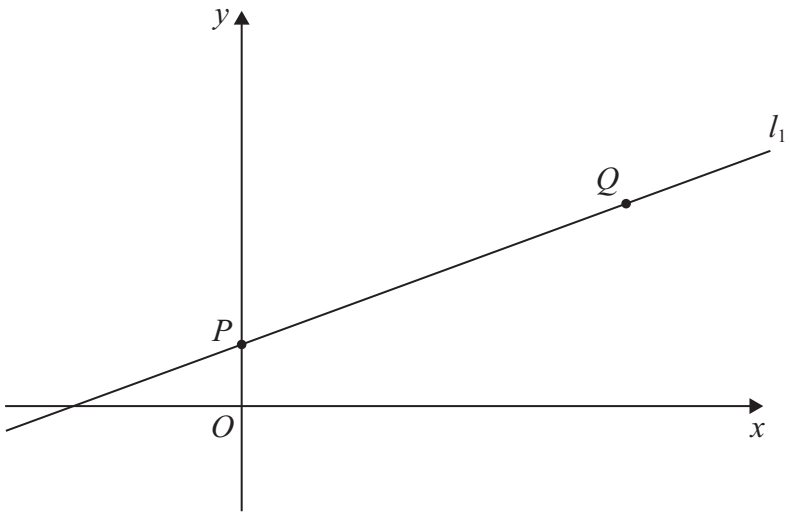

Figure 1

The line l_1, shown in Figure 1, has equation $2y = 3x + 8$
The line l_1 intersects the y-axis at the point P and passes through the point Q with x coordinate 6

(a) Find

(i) the coordinates of P,

(ii) the coordinates of Q.

(2)

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

(b) Find an equation for l_2, writing the answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

The line l_2 cuts the x-axis at the point R.

(c) Find the area of quadrilateral $OPQR$, making the method clear.

(3)

(Total for Question 4 is 9 marks)

5.

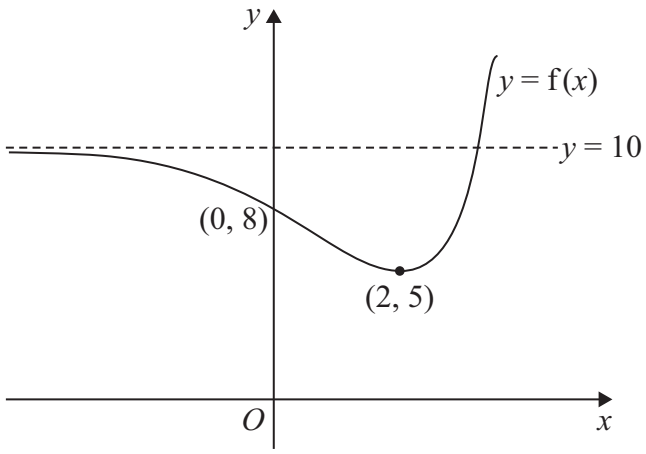

Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = f(x)$.

The curve crosses the y-axis at the point (0, 8).

The line with equation $y = 10$ is the only asymptote to the curve.

The curve has a single turning point, a minimum point at (2, 5), as shown in Figure 2.

(a) State the coordinates of the minimum point of the curve with equation $y = f\left(\frac{1}{4}x\right)$

(1)

(b) State the equation of the asymptote to the curve with equation $y = f(x) - 3$

(1)

The curve with equation $y = f(x)$ meets the line with equation $y = k$, where k is a constant, at two distinct points.

(c) State the set of possible values for k.

(2)

(d) Sketch the curve with equation $y = -f(x)$. On your sketch, show clearly the coordinates of the turning point, the coordinates of the intersection with the y-axis and the equation of the asymptote.

(3)

(Total for Question 5 is 7 marks)