**1** Use coordinate geometry to answer this question. Answers obtained from accurate drawing will receive no marks.

A and B are points with coordinates $(-1, 4)$ and $(7, 8)$ respectively.

  (i) Find the coordinates of the midpoint, M, of AB.

     Show also that the equation of the perpendicular bisector of AB is $y + 2x = 12$.   [6]

  (ii) Find the area of the triangle bounded by the perpendicular bisector, the *y*-axis and the line AM, as sketched in Fig. 12.   [6]
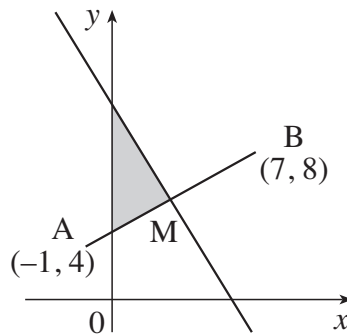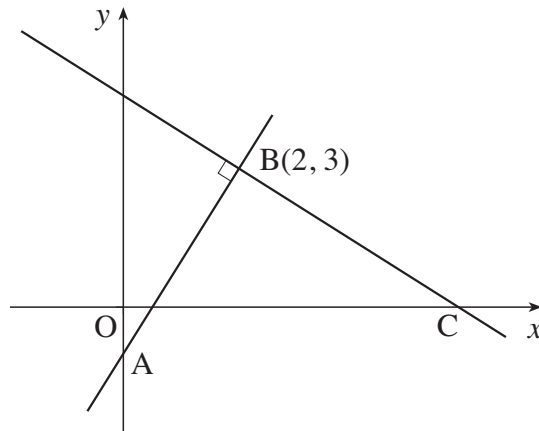

Fig. 12

2 A line has equation $3x + 2y = 6$. Find the equation of the line parallel to this which passes through the point $(2, 10)$.   [3]

3 Find the coordinates of the point of intersection of the lines $y = 3x + 1$ and $x + 3y = 6$.   [3]

4

Fig. 7

The line AB has equation $y = 4x - 5$ and passes through the point $B(2, 3)$, as shown in Fig. 7. The line BC is perpendicular to AB and cuts the x-axis at C. Find the equation of the line BC and the x-coordinate of C. [5]

5 $A(9, 8), B(5, 0)$ an $C(3, 1)$ are three points.

  (i) Show that AB and BC are perpendicular. [3]

 (ii) Find the equation of the circle with AC as diameter. You need not simplify your answer.

  Show that B lies on this circle. [6]

(iii) BD is a diameter of the circle. Find the coordinates of D. [3]