

## Section 1: Points and straight lines

### Exercise level 2

- Given the points  $A(3, 1)$ ,  $B(6, y)$  and  $C(12, -2)$  find the value(s) of  $y$  for which
  - the line  $AB$  has gradient 2
  - the distance  $AB$  is 5
  - $A$ ,  $B$  and  $C$  are collinear
  - $AB$  is perpendicular to  $BC$
  - the lengths  $AB$  and  $BC$  are equal
- Find the equations of the following lines.
  - parallel to  $y = 4x - 1$  and passing through  $(2, 3)$
  - perpendicular to  $y = 2x + 7$  and passing through  $(1, 2)$
  - parallel to  $3y + x = 10$  and passing through  $(4, -1)$
  - perpendicular to  $3x + 4y = 12$  and passing through  $(-3, 0)$
  - parallel to  $x + 5y + 8 = 0$  and passing through  $(-1, -6)$
- Find the equation of the line  $AB$  in each of the following cases.
  - $A(1, 6)$ ,  $B(3, 2)$
  - $A(8, -1)$ ,  $B(-2, 3)$
  - $A(-5, 2)$ ,  $B(7, -4)$
  - $A(-3, -5)$ ,  $B(5, 1)$
-  The point  $E$  is  $(2, -1)$ ,  $F$  is  $(1, 3)$ ,  $G$  is  $(3, 5)$  and  $H$  is  $(4, 1)$ . Show, by calculation that  $EFGH$  is a parallelogram. Is  $EFGH$  also a rhombus? Explain your answer.
-   $P$  is the point  $(2, 1)$ ,  $Q$  is  $(6, 9)$  and  $R$  is  $(10, 2)$ .
  - Sketch the triangle  $PQR$ .
  - Prove that triangle  $PQR$  is isosceles.
  - Work out the area of triangle  $PQR$ .
- Three points are  $A(-1, 5)$ ,  $B(1, 0)$ , and  $C(11, 4)$ .
  - Find the gradient of  $BA$ .
  - Find the gradient of  $BC$ , and show that  $BA$  is perpendicular to  $BC$ .
  - Find the equation of the line through  $C$ , parallel to  $BA$ .
  - Find the equation of the line through  $A$ , parallel to  $BC$ .
  - Find the coordinates of point  $D$ , the remaining vertex of the rectangle  $ABCD$ .