

Core 1 – Linear Graphs

Challenge 1

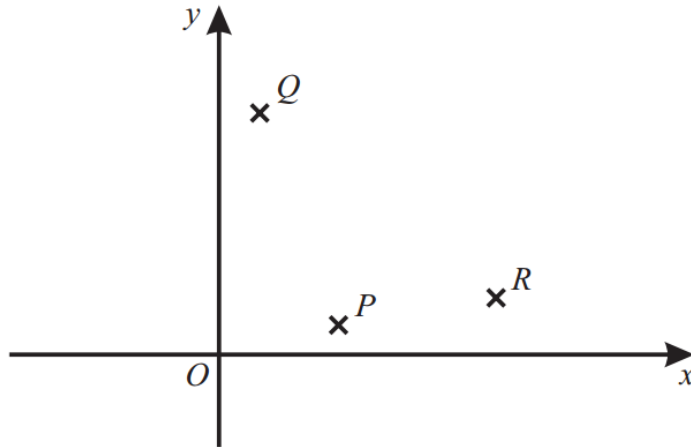
The points A and B have coordinates $(13, 5)$ and $(9, 2)$ respectively.

- (a) (i) Find the gradient of AB . *(1 mark)*
- (ii) Find an equation for the line AB . *(1 mark)*
- (b) The point C has coordinates $(2, 3)$ and the point X lies on AB so that XC is perpendicular to AB .
- (i) Show that the equation of the line XC can be written in the form $4x + 3y = 17$. *(4 marks)*
- (ii) Calculate the coordinates of X . *(3 marks)*



Challenge 2

The points P , Q and R have coordinates $(3,1)$, $(1,9)$ and $(7,2)$ respectively.



- Find an equation for the straight line QR in the form $ax + by = c$, where a , b and c are integers. (3 marks)
- Prove that the triangle PQR is right-angled and find its area. (4 marks)
- Determine an equation for the straight line which passes through P and which is perpendicular to QR . (2 marks)



Challenge 3

The points A , B and C have coordinates $(1,7)$, $(5,5)$ and $(7,9)$ respectively.

- (a) Show that AB and BC are perpendicular. (3 marks)
- (b) Find an equation of the line BC . (2 marks)
- (c) The equation of the line AC is $3y = x + 20$ and M is the midpoint of AB .
- (i) Find an equation of the line through M parallel to AC . (3 marks)
- (ii) This line intersects BC at the point T . Find the coordinates of T . (3 marks)



Final Challenge

The line AB has equation $3x - 4y = 4$, and the line BC has equation $4x + 3y = 22$.

- (a) (i) Find the gradient of AB . (2 marks)
- (ii) Prove that the lines AB and BC are perpendicular. (2 marks)
- (b) Find the coordinates of the point B . (3 marks)
- (c) The point A has coordinates $(4p, 3p - 1)$, where p is a constant, and the point C has coordinates $(1, 6)$.
- (i) Show that $AC^2 = 25p^2 - 50p + 50$. (2 marks)
- (ii) Given that AC has length $\sqrt{125}$, find the possible values of p . (3 marks)

