Examination Style Questions: Coordinate Geometry

Question 1

The points A and B have coordinates (2, 3) and (6,-5) respectively.

a) Find the distance between the points A and B giving your answer in the form $p\sqrt{q}$ where *p* and *q* are integers. (3 *marks*)

b) Find the gradient of the line AB (2 *marks*)

c) M is the midpoint of the line segment AB. Line l_1 is a line that goes through M and is perpendicular to the line segment AB.

(i) State the gradient of line l_1. (1 *mark*)

(ii) Find an equation of l_1 giving your answer in the form $ax+by+c=0$, where *a, b* and *c* are integers. (2 *marks*)

Question 2

The points P, Q and R have coordinates (1, -5), (6, 7) and (18, 2) respectively.

a) Verify that both P and Q lie on the line $12x-5y-37=0$. (2 *marks*)

b) The line QR is perpendicular to the line PQ. (2 *marks*)

(i) Show that the gradient of QR is $\frac{-5}{12}$. (2 *marks*)

(ii) Find an equation of the line QR giving your answer in the form $y=mx+c$. (2 *marks*)

(iii) Show that triangle PQR has area 84.5 units^2. (3 *marks*)

Question 3

The points A, B and C have coordinates (1, 6), (4, 15) and (-2, 7) respectively. Line l_1 joins the points A and B. The line l_2 is parallel to l_1 and goes through C.

a) Find the gradient of the line l_1. (2 *marks*)

b) Find an equation of the line l_2 giving your answer in the form $y=mx+c$. (2 *marks*)

c) Show that triangle CAB is a right angled triangle and find its area. (4 *marks*)

Examination Style Questions: Coordinate Geometry

Question 1

The points A and B have coordinates (2, 3) and (6,-5) respectively.

d) Find the distance between the points A and B giving your answer in the form $p\sqrt{q}$ where *p* and *q* are integers. (3 *marks*)

e) Find the gradient of the line AB (2 *marks*)

f) M is the midpoint of the line segment AB. Line l_1 is a line that goes through M and is perpendicular to the line segment AB.

(iii) State the gradient of line l_1. (1 *mark*)

(iv) Find an equation of l_1 giving your answer in the form $ax + by + c = 0$, where *a, b* and *c* are integers. (2 *marks*)

Solution

a) $\sqrt{(6-2)^2 + (-5-3)^2} = 4\sqrt{5}$

b) $\dfrac{-5-3}{6-2} = -2$

c) $l_1$has gradient $\dfrac{1}{2}$, and so equation of line is: $y - 3 = \dfrac{1}{2}(x-2)$ or $x - 2y + 4 = 0$

Question 2

The points P, Q and R have coordinates (1, -5), (6, 7) and (18, 2) respectively.

c) Verify that both P and Q lie on the line $12x - 5y - 37 = 0$. (2 *marks*)

d) The line QR is perpendicular to the line PQ. (2 *marks*)

(iv) Show that the gradient of QR is $\dfrac{-5}{12}$. (2 *marks*)

(v) Find an equation of the line QR giving your answer in the form $y = mx + c$.

(2 *marks*)

(vi) Show that triangle PQR has area 84.5 units^2. (3 *marks*)

Solution

a) For P $12(1) - 5(-5) - 37 = 0$ and so P lies on the line.

For Q $12(6) - 5(7) - 37 = 0$ and so Q lines on the line.

b)

(i) $\dfrac{2-7}{18-6} = -\dfrac{5}{12}$

(ii) $y-7=\frac{-5}{12}(x-6)$ or $y=\frac{-5}{12}x+\frac{19}{2}$

(iii) PQ has length $\sqrt{(7--5)^2+(6-1)^2}=13$ and QR has length $\sqrt{(12-7)^2+(18-6)^2}=13$ and since PQ and QR are perpendicular then the triangle is right angled, hence area is $\frac{1}{2}\times13\times13=84.5$

Question 3

The points A, B and C have coordinates (1, 6), (4, 15) and (-2, 7) respectively. Line l_1 joins the points A and B. The line l_2 is parallel to l_1 and goes through C.

d) Find the gradient of the line l_1. (2 *marks*)

e) Find an equation of the line l_2 giving your answer in the form $y=mx+c$. (2 *marks*)

f) Show that triangle CAB is a right angled triangle and find its area. (4 *marks*)

Solution

a) $\frac{15-6}{4-1}=3$

b) $y-7=3(x--2)$ or $y=3x+13$

c) AC has gradient $\frac{7-6}{-2-1}=-\frac{1}{3}$ and therefore since the product of the gradients of AB and AC is -1 the lines must be perpendicular and the triangle CAB is right angled.

AC has length $\sqrt{(-2-1)^2+(7-6)^2}=\sqrt{10}$ and AB has length $\sqrt{(4-1)^2+(15-6)^2}=3\sqrt{10}$ and the area of triangle CAB is $\frac{1}{2}\times\sqrt{10}\times3\sqrt{10}=15$ units^2.