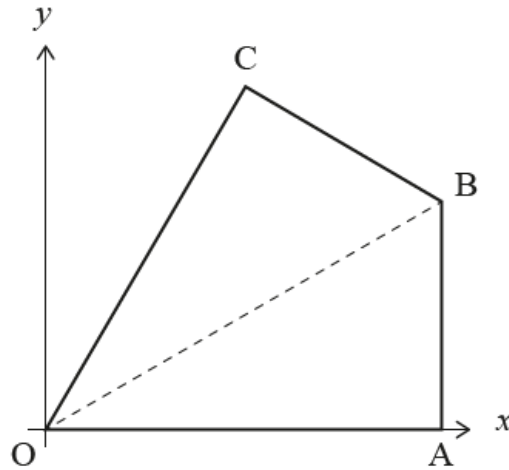


Linear [31 marks]

1. [Maximum mark: 7]

Quadrilateral $OABC$ is shown on the following set of axes.



$OABC$ is symmetrical about $[OB]$.

A has coordinates $(6, 0)$ and C has coordinates $(3, 3\sqrt{3})$.

(a.i) Write down the coordinates of the midpoint of $[AC]$. [1]

(a.ii) Hence or otherwise, find the equation of the line passing through the points O and B . [3]

(b) Given that $[OA]$ is perpendicular to $[AB]$, find the area of the quadrilateral $OABC$. [3]

2. [Maximum mark: 5]

Point P has coordinates $(-3, 2)$, and point Q has coordinates $(15, -8)$.

Point M is the midpoint of $[PQ]$.

(a) Find the coordinates of M . [2]

Line L is perpendicular to $[PQ]$ and passes through M .

(b) Find the gradient of L . [2]

(c) Hence, write down the equation of L . [1]

3. [Maximum mark: 7]

Let $f(x) = -2x + 3$, for $x \in \mathbb{R}$.

(a) The graph of a linear function g is parallel to the graph of f and passes through the origin. Find an expression for $g(x)$. [2]

(b) The graph of a linear function h is perpendicular to the graph of f and passes through the point $(-1, 2)$. Find an expression for $h(x)$. [3]

(c) Find $(g \circ h)(0)$. [2]

4. [Maximum mark: 5]

Consider the points $A(-2, 20)$, $B(4, 6)$ and $C(-14, 12)$. The line L passes through the point A and is perpendicular to $[BC]$.

(a) Find the equation of L . [3]

(b) The line L passes through the point $(k, 2)$.

Find the value of k . [2]

5. [Maximum mark: 7]

The function f is defined for all $x \in \mathbb{R}$. The line with equation $y = 6x - 1$ is the tangent to the graph of f at $x = 4$.

(a) Write down the value of $f'(4)$. [1]

(b) Find $f(4)$. [1]

The function g is defined for all $x \in \mathbb{R}$ where $g(x) = x^2 - 3x$ and $h(x) = f(g(x))$.

(c) Find $h(4)$. [2]

(d) Hence find the equation of the tangent to the graph of h at $x = 4$. [3]