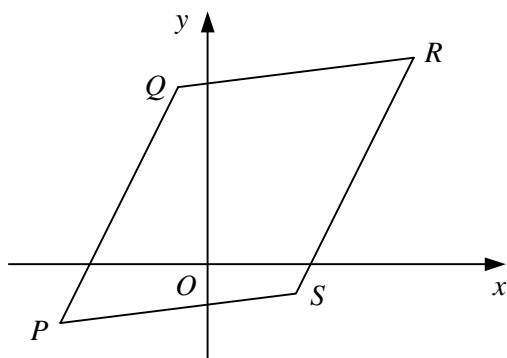# COORDINATE GEOMETRY

**1**   The straight line $l$ has the equation $y = 1 - 2x$.

The straight line $m$ is perpendicular to $l$ and passes through the point with coordinates $(6, -1)$.

**a**   Find the equation of $m$ in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.   **(4)**

**b**   Find the coordinates of the point where $l$ and $m$ intersect.   **(3)**

**2**   The straight line $l$ passes through the point $A$ $(1, -3)$ and the point $B$ $(7, 5)$.

**a**   Find an equation of line $l$.   **(3)**

The line $m$ has the equation $4x + y - 17 = 0$ and intersects $l$ at the point $C$.

**b**   Show that $C$ is the mid-point of $AB$.   **(4)**

**c**   Show that the straight line perpendicular to $m$ which passes through the point $C$ also passes through the origin.   **(4)**

**3**   The point $A$ has coordinates $(-2, 7)$ and the point $B$ has coordinates $(4, p)$.

The point $M$ is the mid-point of $AB$ and has coordinates $(q, \frac{9}{2})$.

**a**   Find the values of the constants $p$ and $q$.   **(3)**

**b**   Find the equation of the straight line perpendicular to $AB$ which passes through the point $A$. Give your answer in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.   **(5)**

**4**



The points $P$ $(-5, -2)$, $Q$ $(-1, 6)$, $R$ $(7, 7)$ and $S$ $(3, -1)$ are the vertices of a parallelogram as shown in the diagram above.

**a**   Find the length of $PQ$ in the form $k\sqrt{5}$, where $k$ is an integer to be found.   **(3)**

**b**   Find the coordinates of the point $M$, the mid-point of $PQ$.   **(2)**

**c**   Show that $MS$ is perpendicular to $PQ$.   **(4)**

**d**   Find the area of parallelogram $PQRS$.   **(4)**

**5**   The straight line $l$ is parallel to the line $2x - y + 4 = 0$ and passes through the point with coordinates $(-1, -3)$.

**a**   Find an equation of line $l$.   **(3)**

The straight line $m$ is perpendicular to the line $6x + 5y - 2 = 0$ and passes through the point with coordinates $(4, 4)$.

**b**   Find the equation of line $m$ in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers.   **(5)**

**c**   Find, as exact fractions, the coordinates of the point where lines $l$ and $m$ intersect.   **(3)**

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**6** The straight line $l$ has gradient $\frac{1}{2}$ and passes through the point with coordinates (2, 4).

   **a** Find the equation of $l$ in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers. **(3)**

   The straight line $m$ has the equation $y = 2x - 6$.

   **b** Find the coordinates of the point where line $m$ intersects line $l$. **(3)**

   **c** Show that the quadrilateral enclosed by line $l$, line $m$ and the positive coordinate axes is a kite. **(4)**

**7**
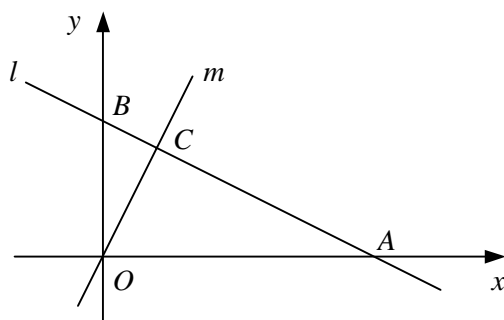


The diagram shows the straight line $l$ with equation $x + 2y - 20 = 0$ and the straight line $m$ which is perpendicular to $l$ and passes through the origin $O$.

   **a** Find the coordinates of the points $A$ and $B$ where $l$ meets the $x$-axis and $y$-axis respectively. **(2)**

   Given that $l$ and $m$ intersect at the point $C$,

   **b** find the ratio of the area of triangle $OAC$ to the area of triangle $OBC$. **(5)**

**8** The straight line $p$ has the equation $6x + 8y + 3 = 0$.

   The straight line $q$ is parallel to $p$ and crosses the $y$-axis at the point with coordinates (0, 7).

   **a** Find the equation of $q$ in the form $y = mx + c$. **(2)**

   The straight line $r$ is perpendicular to $p$ and crosses the $x$-axis at the point with coordinates (1, 0).

   **b** Find the equation of $r$ in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers. **(4)**

   **c** Show that the point where lines $q$ and $r$ intersect lies on the line $y = x$. **(4)**

**9** The vertices of a triangle are the points $P$ (3, $c$), $Q$ (9, 2) and $R$ (3$c$, 11) where $c$ is a constant.

   Given that $\angle PQR = 90°$,

   **a** find the value of $c$, **(5)**

   **b** show that the length of $PQ$ is $k\sqrt{10}$, where $k$ is an integer to be found, **(3)**

   **c** find the area of triangle $PQR$. **(4)**

**10** The straight line $l_1$ passes through the point $P$ (1, 3) and the point $Q$ (13, 12).

   **a** Find the length of $PQ$. **(2)**

   **b** Find the equation of $l_1$ in the form $ax + by + c = 0$, where $a$, $b$ and $c$ are integers. **(4)**

   The straight line $l_2$ is perpendicular to $l_1$ and passes through the point $R$ (2, 10).

   **c** Find an equation of line $l_2$. **(3)**

   **d** Find the coordinates of the point where lines $l_1$ and $l_2$ intersect. **(3)**

   **e** Find the area of triangle $PQR$. **(3)**