**1.** The straight line $L$ passes through the points A(–1, 4) and B(5, 8).

(a) Calculate the gradient of $L$.

**(2)**

(b) Find the equation of $L$.

**(2)**

The line $L$ also passes through the point P(8, $y$).

(c) Find the value of $y$.

**(2)**

**(Total 6 marks)**

**2.** The straight line, $L_1$, has equation $y = -\frac{1}{2}x - 2$.

(a) Write down the $y$ intercept of $L_1$.

**(1)**

(b) Write down the gradient of $L_1$.

**(1)**

The line $L_2$ is perpendicular to $L_1$ and passes through the point (3, 7).

(c) Write down the gradient of the line $L_2$.

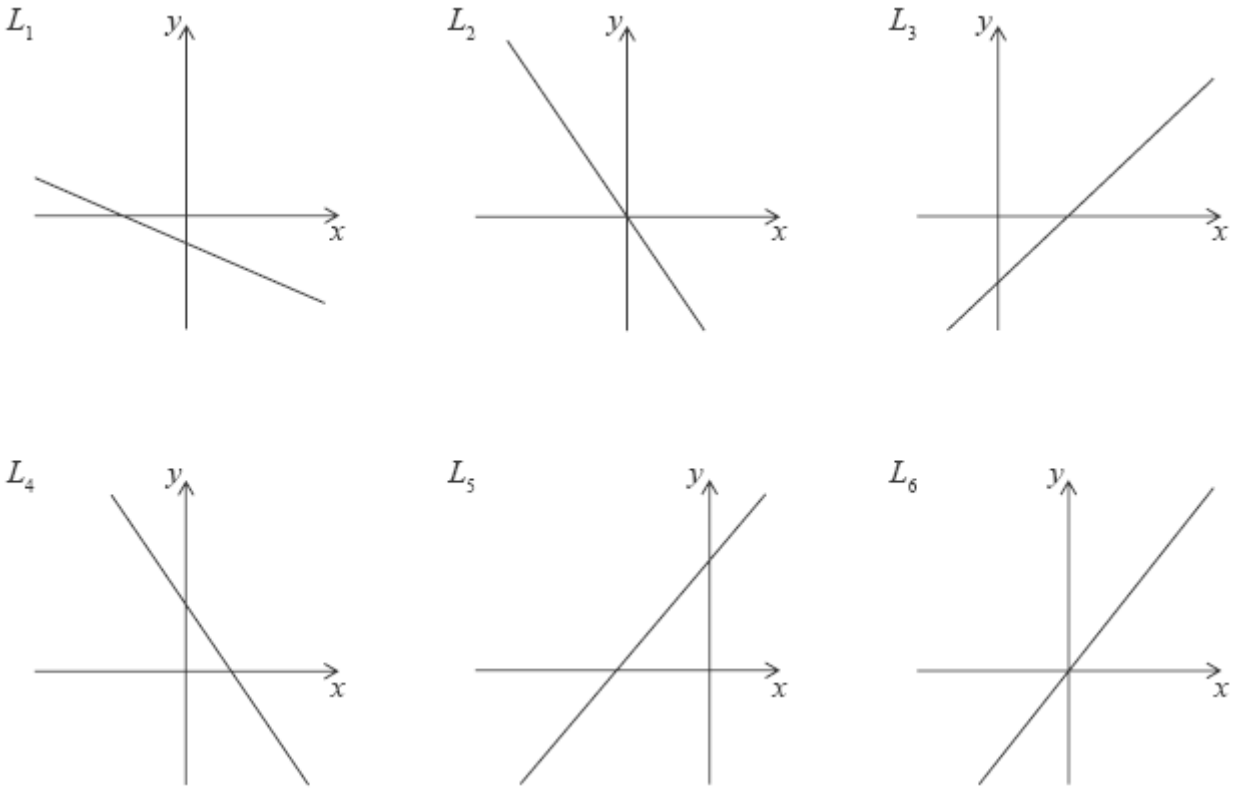
**(1)**

(d) Find the equation of $L_2$. Give your answer in the form $ax + by + d = 0$ where $a, b, d \in \mathbb{Z}$.

**(3)**

**(Total 6 marks)**

**3.** The following diagrams show six lines with equations of the form $y = mx + c$.




In the table below there are four possible conditions for the pair of values $m$ and $c$.
Match each of the given conditions with one of the lines drawn above.

| Condition | Line |
|---|---|
| $m > 0$ and $c > 0$ | |
| $m < 0$ and $c > 0$ | |
| $m < 0$ and $c < 0$ | |
| $m < 0$ and $c < 0$ | |

**(Total 6 marks)**

**4.** A line joins the points A(2, 1) and B(4, 5).

(a) Find the gradient of the line AB.

**(2)**

Let M be the midpoint of the line segment AB.

(b) Write down the coordinates of M.

**(1)**

(c) Find the equation of the line perpendicular to AB and passing through M.

**(3)**
**(Total 6 marks)**

**5.** $P$ (4, 1) and $Q$ (0, –5) are points on the coordinate plane.

(a) Determine the

(i) coordinates of $M$, the midpoint of $P$ and $Q$;

(ii) gradient of the line drawn through $P$ and $Q$;

(iii) gradient of the line drawn through $M$, perpendicular to $PQ$.

The perpendicular line drawn through $M$ meets the $y$-axis at $R$ (0, $k$).

(b) Find $k$.

**(Total 6 marks)**

**6.** The mid-point, M, of the line joining A($s$, 8) to B(−2, $t$) has coordinates M(2, 3).

(a) Calculate the values of $s$ and $t$.

**(2)**

(b) Find the equation of the straight line perpendicular to AB, passing through the point M.

**(4)**
**(Total 6 marks)**

**7.** Three points are given A(0, 4), B(6, 0) and C(8, 3).

(a) Calculate the gradient (slope) of line AB.

**(2)**

(b) Find the coordinates of the midpoint, M, of the line AC.

**(2)**

(c) Calculate the length of line AC.

**(2)**

(d) Find the equation of the line BM giving your answer in the form $ax + by + d = 0$ where $a$, $b$ and $d \in \mathbb{Z}$.

**(5)**

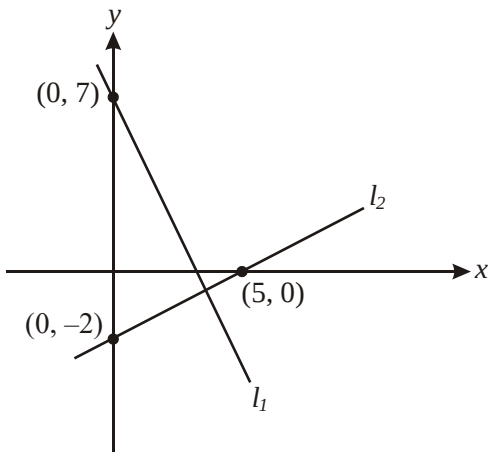
(e) State whether the line AB is perpendicular to the line BC showing clearly your working and reasoning.

**(3)**

**(Total 14 marks)**

**8.** The following diagram shows the lines $l_1$ and $l_2$, which are perpendicular to each other.

**Diagram not to scale**




(a) Calculate the gradient of line $l_1$.

(b) Write the equation of line $l_1$ in the form $ax + by + d = 0$ where $a$, $b$ and $d$ are integers, and $a > 0$.

**(Total 8 marks)**