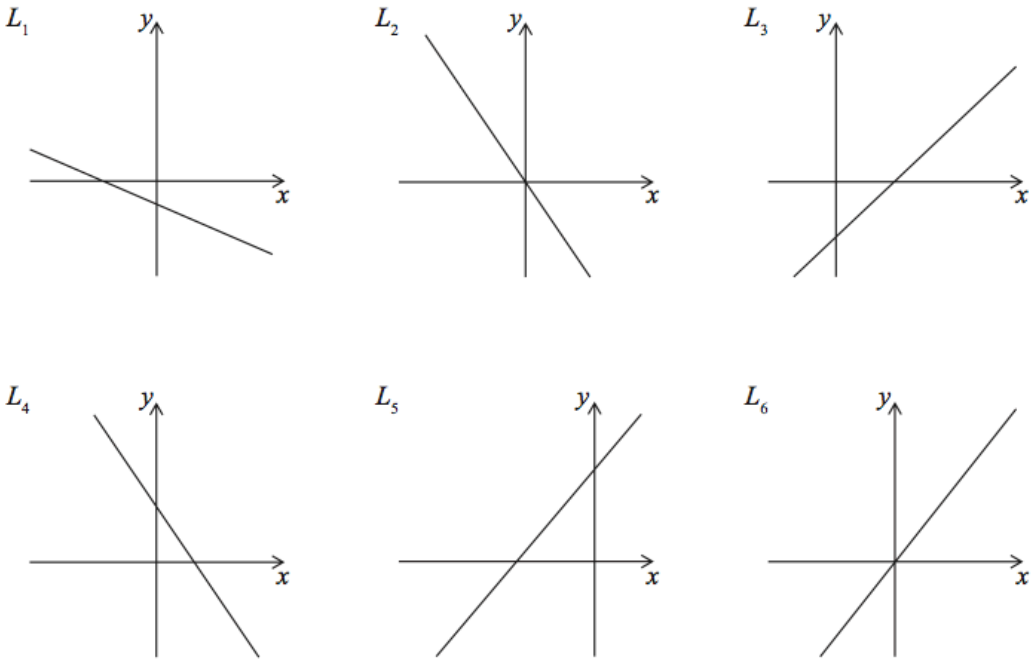
1) The following diagrams show six lines with equations of the form $y = mx + c$.




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 $c < 0$ | |

*[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 mark]*

(b) Write down the gradient of $L_1$. *[1 mark]*

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 mark]*

(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 marks]*

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

(a) Find the gradient of the line AB. *[2 marks]*

Let M be the midpoint of the line segment AB.

(b) Write down the coordinates of M. *[1 mark]*

(c) Find the equation of the line perpendicular to AB and passing through M. *[3 marks]*

4) The diagram below shows the line PQ, whose equation is $x+2y=12$. The line intercepts the axes at P and Q respectively.

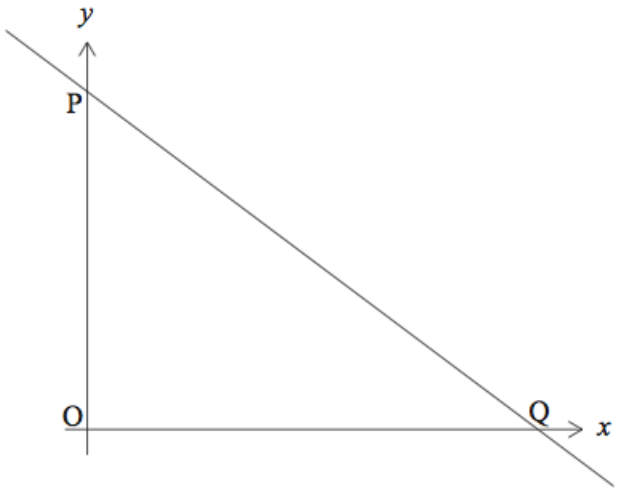



***diagram not to scale***

(a) Find the coordinates of P and of Q. *[3 marks]*

(b) A second line with equation $x-y=3$ intersects the line PQ at the point A. Find the coordinates of A. *[3 marks]*

5) A straight line, $L_1$, has equation $x+4y+34=0$.

(a) Find the gradient of $L_1$. *[2 marks]*

The equation of line $L_2$ is $y=mx$. $L_2$ is perpendicular to $L_1$.

(b) Find the value of $m$. *[2 marks]*

(c) Find the coordinates of the point of intersection of the lines $L_1$ and $L_2$. *[2 marks]*

6) (a) Write down the gradient of the line $y=3x+4$. *[1 mark]*

(b) Find the gradient of the line which is perpendicular to the line $y=3x+4$. *[1 mark]*

(c) Find the equation of the line which is perpendicular to $y=3x+4$ and which passes through the point $(6,7)$. *[2 marks]*

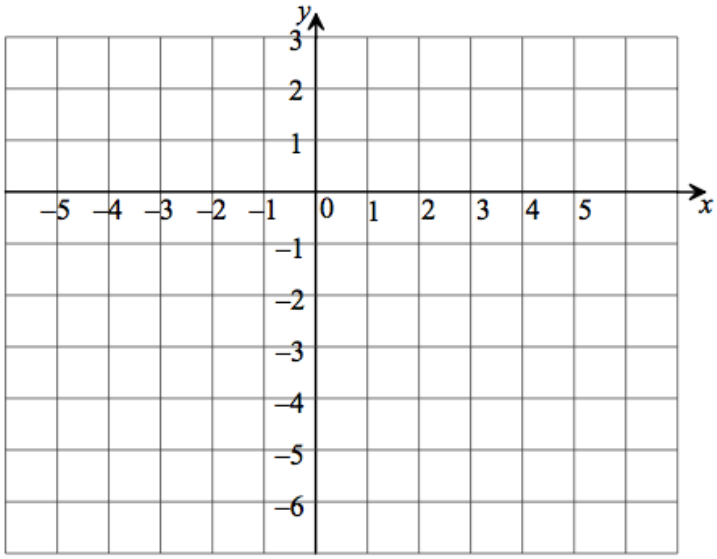
(d) Find the coordinates of the point of intersection of these two lines. *[2 marks]*

7) 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 marks]*

(b) Find the equation of the straight line perpendicular to AB, passing through the point M. *[4 marks]*

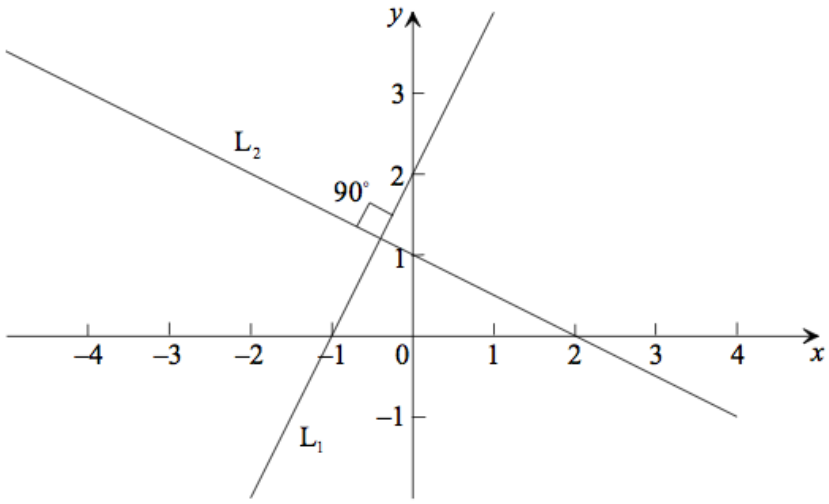
8)




(a) On the grid above, draw a straight line with a gradient of $-3$ that passes through the point $(-2,0)$.

(b) Find the equation of this line.

9) A student has drawn the two straight line graphs $L_1$ and $L_2$ and marked in the angle between them as a right angle, as shown below. The student has drawn one of the lines incorrectly.




Consider $L_1$ with equation $y = 2x + 2$ and $L_2$ with equation $y = -\frac{1}{4}x + 1$.

(a) Write down the gradients of $L_1$ and $L_2$ **using the given equations**.

(b) Which of the two lines has the student drawn incorrectly?

(c) How can you tell from the answer to part (a) that the angle between $L_1$ and $L_2$ should not be $90°$?

(d) Draw the correct version of the incorrectly drawn line on the diagram.