11 The straight line $\mathbf{L}_1$ has equation $x + 2y = 4$
The straight line $\mathbf{L}_2$ passes through the points $(-1, -7)$ and $(7, 9)$

Michael says that the lines $\mathbf{L}_1$ and $\mathbf{L}_2$ are perpendicular.

Is Michael correct?
You must show clearly how you get your answer.

(Total for Question 11 is 3 marks)

13 Point A has coordinates (5, 8)
Point B has coordinates (9, –4)

(a) Work out the gradient of AB.

.....

(2)

The straight line **L** has equation $y = -4x + 5$

(b) Write down the gradient of a straight line that is perpendicular to **L**.

.....

(1)

(Total for Question 13 is 3 marks)

13 The straight line $\mathbf{L}_1$ has equation $y = 6 - 2x$
The straight line $\mathbf{L}_2$ is perpendicular to $\mathbf{L}_1$ and passes through the point (4, 7)

Find the coordinates of the point where the line $\mathbf{L}_2$ crosses the x-axis.

(..... , ...)

(Total for Question 13 is 4 marks)

15 The straight line $\mathbf{L}_1$ has equation $2y = 6x - 5$

The straight line $\mathbf{L}_2$ is perpendicular to $\mathbf{L}_1$ and passes through the point $(9, -1)$

Find an equation for $\mathbf{L}_2$
Give your answer in the form $ay + bx = c$

.....

(Total for Question 15 is 4 marks)

17 The straight line **L** passes through the points (4, −1) and (6, 4)

The straight line **M** is perpendicular to **L** and intersects the *y*-axis at the point (0, 8)

Find the coordinates of the point where **M** intersects the *x*-axis.

(..... , ...)

(Total for Question 17 is 4 marks)

18 The straight line **L** is perpendicular to the straight line with equation $2x + y = 9$ and passes through the point with coordinates (8, 11)

Find an equation for **L**
Give your answer in the form $y = mx + c$

.....

(Total for Question 18 is 4 marks)

18 The straight line **P** has equation $5y + 2x = 7$

Find the gradient of a straight line that is perpendicular to **P**

.....

(Total for Question 18 is 2 marks)

DO NOT WRITE IN THIS AREA

19 (a) Write down an equation of a line that is parallel to the line with equation $y = 7 - 4x$

.....

(1)

The line **L** passes through the points with coordinates (–3, 1) and (2, –2)

(b) Find an equation of the line that is perpendicular to **L** and passes through the point with coordinates (–6, 4)
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

.....

(4)

(Total for Question 19 is 5 marks)

20 The centre O of a circle has coordinates (4, 7)

The point A, on the circle, has coordinates (6, 11) and AOP is a diameter of the circle.

Find an equation of the tangent to the circle at the point P

.....

(Total for Question 20 is 4 marks)

23 P and Q are two points.

The coordinates of P are $(-1, 6)$

The coordinates of Q are $(5, -4)$

Find an equation of the perpendicular bisector of PQ.
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

.....

(Total for Question 23 is 6 marks)

21 Line **L** has equation $4y - 6x = 33$
Line **M** goes through the point A (5, 6) and the point B (−4, k)

L is perpendicular to **M**.

Work out the value of k.

.....

(Total for Question 21 is 4 marks)

25 The straight line with equation $y - 2x = 7$ is the perpendicular bisector of the line AB where A is the point with coordinates $(j, 7)$ and B is the point with coordinates $(6, k)$

Find the coordinates of the midpoint of the line AB
Show clear algebraic working.

(..... , ...)

(Total for Question 25 is 6 marks)