"Equation of a straight line." (Standard)

Question 1

The line l_1 has equation $3x + 5y - 2 = 0$.

Find the gradient of l_1.

(2 marks)

Question 2

The line L_2 with equation $2x + 3y - 14 = 0$ crosses the x-axis at the point B.

Find the coordinates of B.

(2 marks)

Question 3

The line l_1 passes through the point $A(2,5)$ and has gradient $-\frac{1}{2}$.

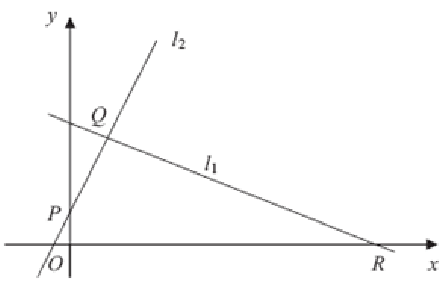
Find an equation of l_1, giving your answer in the form $y = mx + c$.

Question 4

Find an equation of the line joining $A(7,4)$ and $B(2,0)$, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(3 marks)

Question 5



The points $Q(1,3)$ and $R(7,0)$ lie on the line l_1, as shown in the figure.

The length of QR is $a\sqrt{5}$. Find the value of a.

Question 6

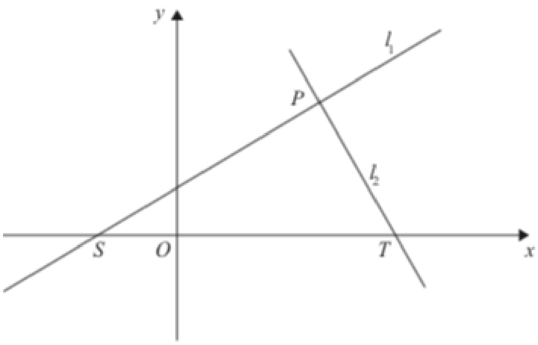
The line L_1 has equation $4y + 3 = 2x$.

The line L_2 passes through the point $C(2,4)$ and is perpendicular to L_1.

Find an equation for L_2, giving your answer in the form $ax + by + c = 0$, where a, b, c are integers.

(5 marks)

Question 7



Not to scale

Figure 1

The straight line l_1, shown in Figure 1, has equation $5y = 4x + 10$

The point P with x-coordinate 5 lies on l_1

The straight line l_2 is perpendicular to l_1 and passes through P.

Find an equation for l_2, writing your answer in the form $ax + by + c = 0$ where a, b and c are integers.

(4 marks)

Question 8

The points P and Q have coordinates $(-1,6)$ and $(9,0)$ respectively.
The line l is perpendicular to PQ and passes through the mid-point of PQ.

Find the equation for l, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(5 marks)

Mark scheme

Question 1

$-\frac{3}{5}$

(a) Putting the equation in the form $y = mx\ (+c)$ and attempting to extract the m or mx (not the c), or finding 2 points on the line and using the correct gradient formula.	M1	
Gradient $= -\frac{3}{5}$ (or equivalent)	A1	
		(2)

Question 2

$(7, 0)$

(d)	$y = 0, \Rightarrow B(7,0)$ or $\underline{x = 7}$	$x = 7$ or $-\frac{c}{a}$	M1A1ft

Question 3

$y = -\frac{1}{2}x + 6$

Question 4

$4x - 5y - 8 = 0$ or $-4x + 5y + 8 = 0$

$m_{AB} = \frac{4-0}{7-2} \left(= \frac{4}{5}\right)$	M1
Equation of AB is: $y - 0 = \frac{4}{5}(x-2)$ or $y - 4 = \frac{4}{5}(x-7)$ (o.e.)	M1
$\underline{4x - 5y - 8 = 0}$ (o.e.)	A1

Question 5

$a = 3$

Question 6

$2x + y - 8 = 0$

$\{4y + 3 = 2x\} \Rightarrow y = \frac{2x-3}{4} \Rightarrow m(L_1) = \frac{1}{2}$ or $\frac{2}{4}$	M1 A1
So $m(L_2) = -2$	B1ft
L_2: $y - 4 = -2(x - 2)$	M1
L_2: $2x + y - 8 = 0$ or L_2: $2x + 1y - 8 = 0$	A1

Question 7

$5x + 4y - 49 = 0$

Gradient of $l_1 = \frac{4}{5}$ oe	States or implies that the gradient of $l_1 = \frac{4}{5}$. E.g. may be implied by a perpendicular gradient of $-\frac{5}{4}$. Do not award this mark for just rearranging to $y = \frac{4}{5}x + ...$ unless they then state e.g. $\frac{dy}{dx} = \frac{4}{5}$	B1
Point $P = (5, 6)$	States or implies that P has coordinates (5, 6). $y = 6$ is sufficient. **May be seen on the diagram.**	B1
$-\frac{5}{4} = \frac{y - "6"}{x - 5}$ or $y - "6" = -\frac{5}{4}(x - 5)$ or $"6" = -\frac{5}{4}(5) + c \Rightarrow c = ...$	Correct straight line method using P(5, "6") and gradient of $-\frac{1}{\text{grad } l_1}$. Unless $-\frac{5}{4}$ or $-\frac{1}{4}$ is being used as the gradient here, the gradient of l_1 clearly needs to have been identified and its negative reciprocal attempted to score this mark.	M1
$5x + 4y - 49 = 0$	Accept any integer multiple of this equation including "= 0"	A1

Question 8

$5x - 3y - 11 = 0$

Mid-point of PQ is (4, 3)	B1
PQ: $m = \frac{0-6}{9-(-1)}, \left(= -\frac{3}{5}\right)$	B1
Gradient perpendicular to PQ $= -\frac{1}{m}$ $\left(= \frac{5}{3}\right)$	M1
$y - 3 = \frac{5}{3}(x - 4)$	M1
$5x - 3y - 11 = 0$ or $3y - 5x + 11 = 0$ or multiples e.g. $10x - 6y - 22 = 0$	A1