Question	Scheme	Marks	AOs
4	States gradient of $4y-3x=10$ is $\frac{3}{4}$ oe or rewrites as $y=\frac{3}{4}x+\ldots$	B1	1.1b
	Attempts to find gradient of line joining $(5,-1)$ and $(-1,8)$	M1	1.1b
	$=\frac{-1-8}{5-(-1)}=-\frac{3}{2}$	A1	1.1b
	States neither with suitable reasons	A1	2.4
		(4)	
			(4 marks)

Notes

B1: States that the gradient of line l_1 is $\frac{3}{4}$ or writes l_1 in the form $y=\frac{3}{4}x+\ldots$

M1: Attempts to find the gradient of line l_2 using $\frac{\Delta y}{\Delta x}$ Condone one sign error Eg allow $\frac{9}{6}$

A1: For the gradient of l_2 $=\frac{-1-8}{5-(-1)}=-\frac{3}{2}$ or the equation of l_2 $y=-\frac{3}{2}x+\ldots$

Allow for any equivalent such as $-\frac{9}{6}$ or -1.5

A1: CSO (on gradients)

Explains that they are neither parallel as the gradients not equal nor perpendicular as $\frac{3}{4}\times-\frac{3}{2}\neq-1$ oe

Allow a statement in words "they are not negative reciprocals " for a reason for not perpendicular and "they are not equal" for a reason for not being parallel

3.4	Using a model
3.5	Evaluating the outcome/ refining a model

Question	Scheme	Marks	AOs
1(a)	$2x+4y-3=0 \Rightarrow y=\mp\frac{2}{4}x+...$ Gradient of perpendicular = $\pm\frac{4}{2}$	M1	1.1b
	Either $m=2$ or $y=2x+7$	A1	1.1b
		(2)	
(b)	Combines 'their' $y=2x+7$ with $2x+4y-3=0 \Rightarrow 2x+4(2x+7)-3=0 \Rightarrow x=...$	M1	1.1b
	$x=-2.5$ oe	A1	1.1b
		(2)	
			(4 marks)

Notes

(a)

M1: Attempts to set given equation in the form $y=ax+b$ with $a=\mp\frac{2}{4}$ oe such as $\mp\frac{1}{2}$ **AND** deduces that $m=-\frac{1}{a}$ Condone errors on the "$+b$"

An alternative method is to find both intercepts to get gradient $l_1=\pm\frac{0.75}{1.5}$ and use the perpendicular gradient rule.

A1: Correct answer. Accept **either** $m=2$ **or** $y=2x+7$

This must be simplified and not left as $m=\frac{4}{2}$ or $m=2x$ unless you see $y=2x+7$.

Watch: There may be candidates who look at $\underset{=}{\mathbf{2}}x+4y-3=0$ and incorrectly state that the gradient is 2 and use the perpendicular rule to get $m=-\frac{1}{2}$ They will score M0 A0 in (a) and also no marks in (b) as the lines would be parallel. In a case like this don't allow an equation to be "altered"

Candidates who state $m=2$ or $y=2x+7$ **with no incorrect working** can score both marks

(b)

M1: Substitutes their $y=mx+7$ into $2x+4y-3=0$, condoning slips, in an attempt to form and solve an equation in x. Alternatively equates their $y=-\frac{1}{2}x+\frac{3}{4}$ with their $y=mx+7$ in an attempt to form and solve, condoning slips, an equation in x. Don't be too concerned by the mechanics of the candidates attempt to solve. (E.g. allow solutions from their calculators).

You may see $2x+4y-3=2x-y+7$ with y being found before the value of x appears

It cannot be awarded from "unsolvable" equations (e.g. lines that are parallel).

A1: $x=-2.5$

The answer alone can score both marks as long as both equations are correct and no incorrect working is seen.

Remember to isw after the correct answer and ignore any y coordinate

Question	Scheme	Marks	AOs
4 (a)	Attempts $H = mt + c$ with both $(3, 2.35)$ and $(6, 3.28)$	M1	3.3
	Method to find both m and c	dM1	3.1a
	$H = 0.31t + 1.42$ oe	A1	1.1b
		(3)	
(b)	Uses the model and states that the initial height is their 'b'	B1ft	3.4
	Compares 140 cm with their 1.42 (m) and makes a valid comment. In the case where $H = 0.31t + 1.42$ it should be this fact supports the use of the linear model as the values are close.	B1ft	3.5a
		(2)	
		(5 marks)	

Notes

Mark parts (a) and (b) as one

(a)

M1: For creating a linear model with both pieces of information given.

Eg. Accept sight of $2.35 = 3m + c$ and $3.28 = 6m + c$ Condone slips on the 2.35 and 3.28.

Allow for an attempt at the "gradient" $m = \frac{3.28 - 2.35}{6 - 3} (= 0.31)$ or the intercept.

Allow for a pair of simultaneous in any variable even x and y

dM1: A full method to find both constants. For simultaneous equations award if they arrive at values for m and c.

If they attempted the gradient it would be for attempting to find "c" using $y = mx + c$ with their m and one of the points $(3, 2.35)$ or $(6, 3.28)$

A1: A correct model using allowable/correct variables. $H = 0.31t + 1.42$ Condone $h \leftrightarrow H, t \leftrightarrow T$

Allow equivalents such as $H = \frac{31}{100}t + \frac{142}{100}$, $t = \frac{H - 1.42}{0.31}$ but not $H = \frac{0.93}{3}t + 1.42$

Do not allow $H = 0.31t + 1.42$ m (with the units)

(b) To score any marks in (b) the model must be of the form $H = mt + b$ where $m > 0, b > 0$

B1ft: States or implies that 1.42 (with or without units) or 142 cm (including the units) is the original height or the height when $t = 0$

You should allow statements such as c = 1.42 or original height = 1.42 (m)

Follow through on their value of 'c', so for $H = 0.25t + 1.60$ it is scored for stating the initial height is 1.60 (m) or 160 cm. Do not follow through if $c \leqslant 0$

B1ft: Compares 140 cm with their 1.42 (m) **and** makes a valid comment.

In the case where $H = 0.31t + 1.42$ it should be this fact supports the use of the linear model as the values are close or approximately the same. Allow $1.42\text{m} \approx 1.4\text{m}$ or similar

In the case of $H = 0.25t + 1.60$ it would be for stating that the fact that it does not support the use of the model as the values are too different. If they state $1.60 > 1.40$ this is insufficient. They cannot just state that they are not the same. It must be implied that there is a significant difference.

As a rule of thumb use "good model" for between 135cm and 145 cm.

Question	Scheme	Marks	AOs
4 (a)	Attempts $A = mn + c$ with either $(0,190)$ or $(8,169)$ Or attempts gradient eg $m = \pm\frac{190-169}{8}(=-2.625)$	M1	3.3
	Full method to find a linear equation linking A with n E.g. Solves $190 = 0n + c$ and $169 = 8n + c$ simultaneously	dM1	3.1b
	$A = -2.625n + 190$	A1	1.1b
		(3)	
(b)	Attempts $A = -2.625\times 19 + 190 = ...$	M1	3.4
	$A = 140.125$ g km^{-1}	A1	1.1b
	It is predicting a much higher value and so is not suitable	B1ft	3.5a
		(3)	
			(6 marks)

Notes

(a)

M1: Attempts $A = mn + c$ with either $(0,190)$ or $(8,169)$ considered.
Eg Accept sight of $190 = 0n + c$ or $169 = 8m + c$ or $A - 169 = m(n-8)$ or $A = 190 + mn$ where m could be a value.
Also accept an attempt to find the gradient $\pm\frac{190-169}{8}$ or sight of ± 2.625 or $\pm\frac{21}{8}$ oe

dM1: A full method to find both constants of a linear equation
Method 1: Solves $190 = 0n + c$ and $169 = 8n + c$ simultaneously
Method 2: Uses gradient and a point Eg $m = \pm\frac{190-169}{8}(=-2.625)$ and $c = 190$
Condone different variables for this mark. Eg. y in terms of x.

A1: $A = -2.625n + 190$ or $A = -\frac{21}{8}n + 190$ oe

(b)

M1: Attempts to substitute $"n" = 19$ into their linear model to find A. They may call it x = 19
Alternatively substitutes $A = 120$ into their linear model to find n.

A1: $A = 140.125$ from $n = 19$ Allow $A = 140$
or $n = 26/27$ following $A = 120$

B1ft: Requires a correct calculation for their model, a correct statement and a conclusion
E.g For correct (a) $A = 140$ is (much) higher than 120 so the model is not suitable/appropriate.
Follow through on a correct statement for their equation. As a guide allow anything within [114,126] to be regarded as suitable. Anything less than 108 or more than 132 should be justified as unsuitable.

Note B0 Recorded value is not the same as/does not equal/does not match the value predicted

Paper 1: Pure Mathematics Mark Scheme

Question	Scheme	Marks	AOs
1 **Way 1**	Uses $y = mx + c$ with both (3, 1) and (4, −2) and attempt to find m or c	M1	1.1b
	$m = -3$	A1	1.1b
	$c = 10$ so $y = -3x + 10$ o.e.	A1	1.1b
		(3)	
Or **Way 2**	Uses $\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$ with both (3, 1) and (4, −2)	M1	1.1b
	Gradient simplified to -3 (may be implied)	A1	1.1b
	$y = -3x + 10$ o.e.	A1	1.1b
		(3)	
Or **Way 3**	Uses $ax + by + k = 0$ and substitutes both $x = 3$ when $y = 1$ and $x = 4$ when $y = -2$ with attempt to solve to find a, b or k in terms of one of them	M1	1.1b
	Obtains $a = 3b$, $k = -10b$ or $3k = -10a$	A1	1.1b
	Obtains $a = 3$, $b = 1$, $k = -10$ Or writes $3x + y - 10 = 0$ o.e.	A1	1.1b
		(3)	
		(7 marks)	

Notes:

M1: Need correct use of the given coordinates
A1: Need fractions simplified to -3 (in ways 1 and 2)
A1: Need constants combined accurately

N.B. Answer left in the form $(y - 1) = -3(x - 3)$ or $(y - (-2)) = -3(x - 4)$ is awarded M1A1A0 as answers should be simplified by constants being collected

Note that a correct answer implies all three marks in this question

Question Number	Scheme	Marks
1.	The line l_1 has equation $8x+2y-15=0$	
(a)	Gradient is -4	B1 **[1]**
(b)	Gradient of parallel line is equal to their previous gradient	M1
	Equation is $y-16="-4"\left(x-\left(-\tfrac{3}{4}\right)\right)$	M1
	So $y=-4x+13$	A1
		[3] **(4 marks)**

(a)

B1 Gradient, m, $\frac{dy}{dx}$ given as -4 FINAL ANSWER

Do not allow $-\frac{8}{2}$ or $-\frac{4}{1}$ or $-4 \to \frac{1}{4}$ in part (a). Do not allow if left as $y=-4x+..$

(b)

M1 Gradient of lines are the same. This may be implied by sight of their $'-4'$ in a gradient equation. For example you may see candidates state $y='-4'x+..$ in (a) and then write $y='-4'x+c$ in (b)

M1 For an attempt to find an equation of a line using $\left(-\frac{3}{4},16\right)$ and a numerical gradient (which may be different to the gradient used in part (a)). For example they may try to find a normal! Condone a sign error on one of the brackets. If the form $y=mx+c$ is used they must proceed as far as finding c.

A1 cao $y=-4x+13$ Allow $m=-4, c=13$

Question Number	Scheme	Marks
2.(a)	$(0,3)$	B1
(b)	$(2,-3)$	B1
(c)	$(2,1.5)$ oe	B1
(d)	$(2,-1)$	B1
		[4] **(4 marks)**

Condone the omission of the brackets. Eg Condone $0,3$ for $(0,3)$

Allow $x=...y=...$

If options are given, Attempt one $=(0,3)$, Attempt two = $(2,5)$, Award B0.

If there is no labelling mark (a) as the first one seen, (b) as the second one seen etc unless it is obvious.

Question Number	Scheme	Marks
6. (a)	Uses $1000 = 600 + 80(N-1) \Rightarrow N = 6$	M1,A1 **[2]**
(b)	Uses $\frac{15}{2}\left(2\times600+(15-1)\times80\right)=(£)17400$	M1 A1 **[2]**
(c)	Total for Saima = $\frac{15}{2}\left(2A+14A\right)=\left(120A\right)$	B1
	Sets $120A = 17400 \Rightarrow A = 145$	M1A1 **[3]**
		(7 marks)

(a)

M1 Attempts to use the formula $u_n = a + (n-1)d$ to find the value of 'n'.

Evidence would be $1000 = 600 + 80(N-1)$

Alternatively attempts $\dfrac{1000-600}{80}+1$ or repeated addition of £80 onto £600 until £1000 is reached

A1 $N = 6$ or accept the 6th year (or similar). The answer alone would score both marks.

(b)

M1 Uses a correct sum formula $S=\frac{n}{2}\left(2a+(n-1)d\right)$ with $n=15, a=600, d=80$

Alternatively uses $S=\frac{n}{2}\left(a+l\right)$ with $n=15$, $a=600$, $l=600+14\times80$ or 1720

Accept the sum of 15 terms starting 600 + 680+ 760+ 840+....

A1 cao (£)17400

(c)

B1 Finds the sum for Saima.

Accept unsimplified forms such as $\frac{15}{2}\left(2A+14A\right)$ or $\frac{15}{2}\left(A+15A\right)$ or the simplified answer of $120A$

Remember to isw following a correct answer

M1 Sets their $120A$ equal to their answer to (b) and proceeds to find a value for A.

They must be attempting to calculate sums rather than terms to score this mark.

Condone slips on the sum of an AP formula and award for a valid attempt from GP formula.

A1 cao $A = 145$

Question Number	Scheme	Marks
10.(a)	$p=13, q=13$	B1 B1 **[2]**
(b)	Gradient AD/ AC / DC= $\dfrac{5-(-3)}{10-7}=\left(\dfrac{8}{3}\right)$	M1
	Gradient $DE=-\dfrac{3}{8}$	M1, A1
	Equation of l is $(y-5)=\text{"}-\dfrac{3}{8}\text{"}(x-10)\Rightarrow 3x+8y=70$	M1A1 **[5]**
(c)	Sub $x=7$ into $3x+8y=70\Rightarrow y=\dfrac{49}{8}$. Hence $C=\left(7,\dfrac{49}{8}\right)$	M1A1 **[2]** **(9 marks)**

(a)

B1 For either $p=13$ or $q=13$. Score within a coordinate $(13,...)$ or $(...,13)$ Just 13 scores B1B0

B1 For both $p=13$ and $q=13$. Allow $(13,13)$ for both marks.

(b)

M1 For an attempt at the gradient of AD or AC using their coordinates for C

Look for an attempt at $\dfrac{\Delta y}{\Delta x}$ There must be an attempt to subtract on both the numerator and the denominator. It can be implied by their attempt to find the equation of line AC

M1 For an attempt at using $m_2=-\dfrac{1}{m_1}$ or equivalent to find the gradient of the perpendicular m_2

A1 Gradient of DE is $-\dfrac{3}{8}$ or equivalent

M1 It is for the method of finding a line passing though (10, 5) with a changed gradient. Eg $\dfrac{8}{3}\to\dfrac{3}{8}$

Look for $(y-5)=$ changed $m_1(x-10)$ Both brackets must be correct

Alternatively uses the form $y=mx+c$ AND proceeds as far as $c=$ ..

A1 $3x+8y=70$ or exact equivalent. Accept $\pm A(3x+8y=70)$ where $A\in\mathbb{N}$

(c)

M1 Substitutes $x=7$ in their $3x+8y=70\Rightarrow y=...$

A1 $C=\left(7,\dfrac{49}{8}\right)$ or exact equivalent. Allow this mark when x and y are written separately.

Do not allow this A1 if other answers follow $x=7$ $y=\dfrac{49}{8}$

Question Number	Scheme	Marks
3	$2x+3y=6 \Rightarrow y=-\frac{2}{3}x+...$	B1
	Equation of l_2 is $y=-\frac{2}{3}x+c$	M1
	Substitutes $3,-5$ into $y=-\frac{2}{3}x+c \Rightarrow -5=-\frac{2}{3}\times 3+c$	M1
	$y=-\frac{2}{3}x-3$	A1
		(4 marks)
Alt	Equation of l_2 is $2x+3y=c$	B1 M1
	Substitutes $3,-5$ into $2x+3y=c \Rightarrow 6-15=c$	M1
	$2x+3y=-9$	
	$y=-\frac{2}{3}x-3$	A1
		(4 marks)

B1 States or implies the gradient of l_1 is $-\frac{2}{3}$ Alternatively accept l_1 written in the form $y=-\frac{2}{3}x+...$

M1 States or implies the gradient of l_2 **is the same** as l_1 Eg. $y='-\frac{2}{3}'x+c$.

If the gradient of l_2 is incorrect then you must see

- Evidence that the gradient used for l_2 has been linked with the gradient of l_1
  For example $2x+3y=6$ Gradient of $\boldsymbol{l_1}$ is 2 so equation of $\boldsymbol{l_2}$ is $y=2x+c$
- Or a statement that the gradients are the same. $2x+3y=6$ The gradient of $\boldsymbol{l_1}$ is 6 so gradient of $\boldsymbol{l_2}$ is 6.

You must see some evidence of the candidate using equal gradients. They cannot just write down a gradient for this mark. So for example, given $2x+3y=6$ gradient of $\boldsymbol{l_2}$ is 2 or equation of $\boldsymbol{l_2}$ is $y=2x+c$ scores M0, as there is insufficient evidence of the candidate using equal gradients.
In the alternative scheme the first two marks can be implied by stating that the new equation is of the form $2x+3y=c$

M1 Substitutes $3,-5$ into their $y='-\frac{2}{3}'x+c \Rightarrow c=...$ Also score for $'-\frac{2}{3}'=\frac{y--5}{x-3}$ oe

It is for knowing how to find an equation of a line knowing the gradient with the point $3,-5$

Hence follow through on an incorrect gradient, even a perpendicular one.

A1 $y=-\frac{2}{3}x-3$ Accept forms like this $y=\left(-\frac{2}{3}\right)x+(-3)$

$y='-\frac{2}{3}'x+.... \Rightarrow y=\frac{3}{2}x+c \Rightarrow -5=\frac{3}{2}\times 3+c \Rightarrow c=..$

Question Number	Scheme		Marks
6(a)(i)	$\frac{3}{2}$	Accept exact equivalents	B1
(ii)	$y=0,\quad 3x+5=0 \Rightarrow x=-\frac{5}{3}$	M1: Sets $y=0$ and attempts to find x. Accept as evidence $3x+5=0 \Rightarrow x=..$ or awrt -1.7	M1A1
		A1: $x=-\frac{5}{3}$ or exact equivalent including 1.6 **recurring (i.e. a clear dot over the 6)**	
			(3)
(b)	Gradient $l_2=-\frac{1}{"\frac{3}{2}"}=-\frac{2}{3}$	Uses $m_2=-\frac{1}{m_1}$ to find the gradient of l_2 (may be implied by their line equation). Allow an attempt to find m_2 from $m_1 \times m_2=-1$.	M1
	Point B has y coordinate of 4	This may be embedded within the equation of the line but must be seen in part (b).	B1
	e.g. $y-'4'='-\frac{2}{3}'(x-1)$ or $\frac{y-'4'}{x-1}='-\frac{2}{3}'$	A correct straight line method with a changed gradient and their point $(1,'4')$. There must have been attempt to find the y coordinate of B. If using $y=mx+c$, must reach as far as finding a value for c.	M1
	e.g. $y-4=-\frac{2}{3}(x-1)$ or $\frac{y-4}{x-1}=-\frac{2}{3}$	A correct un-simplified equation	A1
	$2x+3y-14=0$	Accept $A(2x+3y-14)=0$ where A is an integer. Terms can be in any order but must have '= 0'.	A1
			(5)
Alt (b)	Gradient $l_2=-\frac{1}{"\frac{3}{2}"}=-\frac{2}{3}$	Uses $m_2=-\frac{1}{m_1}$ to find the gradient of l_2 as before	M1
	$\frac{3}{2}x+\frac{5}{2}=-\frac{2}{3}x+c$	A correct statement for $l_1=l_2$	B1
	$x=1 \Rightarrow c=\frac{14}{3}$	Substitutes $x = 1$ to find a value for c	M1
	$y=-\frac{2}{3}x+\frac{14}{3}$	Correct equation	A1
	$2x+3y-14=0$	Accept $A(2x+3y-14)=0$ where A is an integer.	A1

(c)	$y=0 \Rightarrow 2x-14=0 \Rightarrow x=7$	Attempts to find C using $y=0$ in the equation obtained in part (b)	M1
	Attempts Area of triangle using $\frac{1}{2}\times AC\times(y \text{ coord of } B)$ $=\frac{1}{2}\times\left('7'+'\frac{5}{3}'\right)\times'4'$ or Attempts Area of triangle using 2 triangles $\frac{1}{2}\times\left(1+'\left(\frac{5}{3}\right)'\right)\times(y \text{ coord of } B)+\frac{1}{2}\times('7'-1)\times(y \text{ coord of } B)$ If they make a second/different attempt to find the y coordinate of B then still allow this mark.		M1
	$=\frac{52}{3}$	Area $=\frac{52}{3}$ or exact equivalent e.g $17\frac{1}{3}$ or 17.3 **recurring (i.e. a clear dot over the 3)**	A1
			(3)
			(11 marks)
Way 2 6(c)	$y=0 \Rightarrow 2x-14=0 \Rightarrow x=7$	Attempts to find C using $y=0$ in the equation obtained in part (b)	M1
	Attempts area of triangle using $\frac{1}{2}AB\times BC=\frac{1}{2}\times\sqrt{\frac{208}{9}}\times\sqrt{52}$ A complete method for the area including correct attempts at finding AB and BC using their values.		M1
	$=\frac{52}{3}$	Area $=\frac{52}{3}$ or exact equivalent e.g. $17\frac{1}{3}$ or 17.3 **recurring (i.e. a clear dot over the 3)**	A1
			(3)
Way 3 6(c)	$y=0 \Rightarrow 2x-14=0 \Rightarrow x=7$	Attempts to find C using $y=0$ in the equation obtained in part (b)	M1
	$\frac{1}{2}\begin{vmatrix}1 & 7 & -\frac{5}{3} & 1\\ 4 & 0 & 0 & 4\end{vmatrix}=\frac{1}{2}\left\|-\frac{20}{3}-28\right\|$	Uses shoelace method. Must see a correct method including ½.	M1
	$=\frac{52}{3}$	Area $=\frac{52}{3}$ or exact equivalent e.g $17\frac{1}{3}$ or 17.3 **recurring (i.e. a clear dot over the 3)**	A1
			(3)

Question Number	Scheme	Marks
1.	The line l_1 has equation $10x - 2y + 7 = 0$	
(a)	Gradient is 5	B1
		[1]
(b)	Gradient of parallel line is equal to their previous gradient	M1
	Equation is $y - \frac{4}{3} = "5"\left(x - \left(-\frac{1}{3}\right)\right)$	M1
	So $y = 5x + 3$	A1
		[3]
		(4 marks)

(a)

B1 Gradient given as 5 or 10/2 or exact equivalent. Do not accept if embedded within an equation. You must see 5 (or equivalent)

(b)

M1 Gradient of lines are the same. This may be implied by sight of their '5' in a gradient equation. For example you may see $y = '5'x + c$ or equivalent as the equation of their ''parallel'' line .

M1 For an attempt to find an equation of a line using $\left(-\frac{1}{3}, \frac{4}{3}\right)$ and a numerical gradient (which may be different to the gradient used in part (a). For example they may try to find a normal!)
It must be a full attempt to find an equation.
Accept $y - \frac{4}{3} = "\text{numerical } m"\left(x - -\frac{1}{3}\right)$ or equivalent. Allow one sign slip for the coordinate.
If $y = mx + c$ is used it must proceed as far as finding the value of $"c"$

A1 Correct answer only (no equivalents) $y = 5x + 3$, but do allow $y = 5x + c$ followed by $c = 3$.

Question Number	Scheme	Marks
5(a)	Gradient $PQ = \dfrac{y_1 - y_2}{x_1 - x_2} = \dfrac{7-4}{4-(-1)} = \dfrac{3}{5}$	M1A1
	Equation of line PQ $\quad \dfrac{3}{5} = \dfrac{y-7}{x-4}, \quad \dfrac{3}{5} = \dfrac{y-4}{x--1}$ oe	M1
	$\pm k(3x - 5y + 23 = 0)$ $\quad k$ an integer	A1
		(4)
(b)	Uses gradient PR= $-\dfrac{5}{3} \Rightarrow \dfrac{-7}{p+1} = -\dfrac{5}{3}$	M1
	$5p + 5 = 21 \Rightarrow p = \dfrac{16}{5}$ oe.	dM1, A1
		(3) **(7 marks)**
Alt 5(a)	Sub (-1,4) and (4,7) into $y = mx + c \Rightarrow 7 = 4m + c$ and $4 = -1m + c$	
	Solve simultaneously to get $m = \dfrac{3}{5}$	M1, A1
	Sub in either to get $c = ...\left(\dfrac{23}{5}\right)$	M1
	Rearranges to $\pm k(3x - 5y + 23 = 0)$	A1 (4)

Question Number	Scheme		Marks
8.(a)	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
			(4)

8(b)	$y=0 \Rightarrow 5x+4(0)-49=0 \Rightarrow x=...$ **or** $y=0 \Rightarrow 5(0)=4x+10 \Rightarrow x=...$	Substitutes $y = 0$ into their l_2 to find a value for x **or** substitutes $y = 0$ into l_1 or their rearrangement of l_1 to find a value for x. **This may be implied by a correct value on the diagram.**	M1
	$y=0 \Rightarrow 5x+4(0)-49=0 \Rightarrow x=...$ **and** $y=0 \Rightarrow 5(0)=4x+10 \Rightarrow x=...$	Substitutes $y = 0$ into their l_2 to find a value for x **and** substitutes $y = 0$ into l_1 or their rearrangement of l_1 to find a value for x. **This may be implied by correct values on the diagram.**	M1
	(Note that at T, $x = 9.8$ and at S, $x = -2.5$)		
	Fully correct method using their values to find the area of triangle SPT with vertices at points of the form (5, "6"), (p, 0) and (q, 0) where $p \neq q$ **Attempts to use integration should be sent to your team leader** **<u>Method 1:</u>** $\frac{1}{2}ST \times "6"$ $\frac{1}{2}\times('9.8'-'-2.5')\times'6'=...$ **<u>Method 2:</u>** $\frac{1}{2}SP \times PT$ $\frac{1}{2}\times\sqrt{(5-'-2.5')^2+('6')^2}\times\sqrt{('9.8'-5)^2+('6')^2}=...$ $\left(=\frac{1}{2}\times\frac{3\sqrt{41}}{2}\times\frac{6\sqrt{41}}{5}\right)$ **Note that if the method is correct but slips are made when simplifying any of the calculations, the method mark can still be awarded** **<u>Method 3:</u>** 2 Triangles $\frac{1}{2}\times(5+'2.5')\times'6'+\frac{1}{2}\times('9.8'-5)\times'6'=...$ **<u>Method 4:</u>** Shoelace method $\frac{1}{2}\begin{vmatrix}5 & 9.8 & -2.5 & 5\\ 6 & 0 & 0 & 6\end{vmatrix}=\frac{1}{2}\left\|(0+0-15)-(58.8+0+0)\right\|=\frac{1}{2}\left\|-73.8\right\|=...$ **(must see a correct calculation i.e. the middle expression for this determinant method)** **<u>Method 5:</u>** Trapezium + 2 triangles $\frac{1}{2}\times('2.5')\times'2'+\frac{1}{2}("2"+"6")\times5+\frac{1}{2}\times("9.8"-5')\times'6'=...$		**dd**M1
	$=36.9$	36.9 cso oe e.g $\frac{369}{10}$, $36\frac{9}{10}$, $\frac{738}{20}$ but not e.g. $\frac{73.8}{2}$	A1
	Note that the final mark is cso so beware of any errors that have fortuitously resulted in a correct area.		
			(4)
			(8 marks)