Question Number	Scheme	Marks
8.	(a) Gradient of l_1 is $-\frac{2}{3}$	B1
	(b) Gradient of l_2 is $-\dfrac{1}{-\frac{2}{3}}=\dfrac{3}{2}$	M1
	Equation of l_2 is $y-2=\frac{3}{2}(x-7)$ $\quad[2y=3x-17]$	M1 A1
	(c) $2x+3y=-6 \Rightarrow 6x+9y=-18$ $3x-2y=17 \Rightarrow 6x-4y=34$	
	$13y=-52$	M1
	$y=-4$	A1
	$2x-12=-6 \Rightarrow x=3$ $\quad[Q(3,-4)]$	A1
	(d) Equation of l_3 is $y-2=-\frac{2}{3}(x-7)$ $\quad[3y+2x=20]$	M1 A1
	or $2x+3y+k=0$ so at $P(7,2)$, $14+6+k=0$ M1	
	$k=-20 \Rightarrow 2x+3y-20=0$ A1	
	(e) at R, $y=0$ so $2x+6=0 \Rightarrow x=-3$	B1
	$QR^2=(3+3)^2+(-4-0)^2$ and $PQ^2=(7-3)^2+(2+4)^2$	M1
	$\Rightarrow QR=\sqrt{36+16}=\sqrt{52}$ and $PQ=\sqrt{4^2+6^2}=\sqrt{52}$ *or* $QR^2=PQ^2=52$	A1
	(f) $PQRS$ is a square	B1
	so area = $PQ \times QR = \;=\sqrt{52}\times\sqrt{52}$	M1
	$=52$	A1 (15)

Notes for Question 8

(a)

B1 for $-\frac{2}{3}$ (or - 0.6 rec. or - 0.667, seen occasionally). Must be shown explicitly (re-arranging the equation to $y=-\frac{2}{3}x-2$ is not sufficient).

(b)

M1 for finding the gradient of l_2 as $-\frac{1}{\text{their gradient of } l_1}$

M1 for any complete method for finding the equation of l_2. Award M0 if gradient of l_1 is used. Use of $y=mx+c$ needs a value for c to be found.

A1cso for $y-2=\frac{3}{2}(x-7)$ oe. No need to simplify so ignore any simplification shown.

(c)

M1 for attempting the solution of the pair of simultaneous equations

A1 for $x=3$ or $y=-4$

A1 for the second value correct. No need to write in coordinate brackets

(d)

M1 for attempting the equation of l_3 - any complete valid method.

A1 for $y-2=-\frac{2}{3}(x-7)$ oe (Ignore any simplification shown)

(e)

B1 for $x=-3$ No working need be shown.

M1 for attempting to obtain the length of either PQ or QR or PQ^2 or QR^2 using **their** coordinates of Q.

A1cao for both lengths or squares of lengths correct.

(f)

B1 state that or use the fact that $PQRS$ is a square

M1 for Area $=PQ\times QR=....$ using their values

A1cso for 52

Notes for Question 8 Continued

Alternatives:

1. "Determinant" method:

B1 for S is (1, 6) seen explicitly or used

M1 for using **their** coordinates for P, Q, R and S in the "determinant"

- must have the points in order, clockwise or anticlockwise
- must have a closed shape, ie first and last in the determinant are the same
- must use $\frac{1}{2}$, either now or to complete the work

Example "determinant" $\frac{1}{2}\begin{vmatrix} 7 & 3 & -3 & 1 & 7 \\ 2 & -4 & 0 & 6 & 2 \end{vmatrix}$

A1 for 52 (must be positive)

2. Drawing a square around $PQRS$, finding area of this square and subtracting the triangular corners.

B1 for S is (1, 6) seen explicitly or used

M1 for a complete method, ie find **all** required areas and attempt the subtractions needed

A1 for 52