Question number	Scheme	Marks
9 (a)	$\frac{y-(-3)}{5-(-3)}=\frac{x-2}{-2-2}\Rightarrow(y=-2x+1)$ oe	M1A1 (2)
(b) (i)	$\left(\frac{3\times2+1\times-2}{3+1},\frac{5\times1+3\times-3}{3+1}\right)=(1,-1)$	M1A1
	Gradient of perpendicular $=\frac{1}{2}$	B1
(ii)	$y--1=\frac{1}{2}(x-1)\Rightarrow\left(y=\frac{x}{2}-\frac{3}{2}\right)$	M1A1 (5)
(c)	(i) $s=0$ (3, 0) (ii) $t=-1$ (−1, −2)	B1ft B1ft (2)
(d)	Length $PQ=\sqrt{(5--3)^2+(-2-2)^2}=4\sqrt{5}$	M1
	Length $SN=\sqrt{(3-1)^2+(0-1)^2}=\sqrt{5}$	
	Length $TN=\sqrt{(1--2)^2+(-1--2)^2}=\sqrt{5}$	A1
	Area $=\frac{1}{2}\left(4\sqrt{5}\times\sqrt{5}+4\sqrt{5}\times\sqrt{5}\right)=20$	dM1A1 (4) [13]
ALT 1	*PSQT* is a quad with perpendicular diagonals: Length $ST=\sqrt{(3--1)^2+(0--2)^2}=2\sqrt{5}$ Length $PQ=$ $\sqrt{(5--3)^2+(-2-2)^2}=4\sqrt{5}$ M1(either)A1(both or *SN* or *TN*) Area $=\frac{1}{2}\times4\sqrt{5}\times2\sqrt{5}=20$ (units^2) dM1A1	
ALT 2	By "determinant" method Eg Area $=\frac{1}{2}\begin{vmatrix}-2&-1&2&3&-2\\5&-2&-3&0&5\end{vmatrix}$ M1A1 $=\frac{1}{2}\left(-2\times-2+-1\times-3...-\left(-2\times0-3\times-3...\right)\right)=20$ dM1A1	

(a)

M1 Attempt an equation for PQ using any *complete* method

A1 Correct equation in any form, no simplification needed

(b)

M1 Attempt one of the coordinates of N either by using the formula for the coords of a point dividing a line in a given ratio or by diagram. If a diagram is used the method is complete if one of the coords is deduced (and correct).

A1 Both coords correct.

NB If coords are written down without any working shown award M1A1 if both correct or M1A0 if one is correct.

B1 Correct gradient of perp. May only be seen in the equation of l.

M1 Use their gradient of the perpendicular and their coordinates of N to obtain an equation for l. If the gradient used is the same as their gradient of PQ award M0. Must be a *complete* method.

A1 Correct equation any form, need not be simplified

(c)

(i)B1ft $s = 0$ No working needed ft their equation of l

(ii)B1ft $t = -1$ No working needed ft their equation of l

NB Award these marks if the coordinates of S and/or T are given rather than $s = 0$, $t = -1$

(d)

M1 Attempting one of the necessary lengths

A1 All three lengths correct

dM1 Attempting the areas of triangles PSQ and PTQ **and** adding their results

A1 Correct total area.

ALT1

M1 Attempt length of PQ or ST

A1 Correct lengths of PQ and one of SN, TN or ST

dM1 Using their lengths and the formula for the area the quad.

A1 Correct area obtained

ALT2

M1 Use the "determinant" formula with their coordinates for S and T. Can start at any point and proceed in order round the diagram (either direction). First and last coordinates must be the same and 1/2 must be included.

A1 All coordinates correct

M1 Attempt to evaluate

A1 Correct area obtained. Must be positive.