Question	Answer	Mark	Comments
1	$\frac{10-0}{6-4}$ or $(m=)\ \frac{10}{2}$ or $-3-(6-4)$ or $-3-2$ or $4-(6-(-3))$ or -5 or $(-5, 0)$ and $\frac{10-0}{-3-(-5)}$ or $(m=)\ \frac{10}{2}$ or $0 = 4m + k$ and $10 = 6m + k$ and $10 - 0 = 6m - 4m$ or $2m = 10$ or $(m=)\ 5$	M1	oe method to find the gradient of either line implied by $y = 5x \ldots$ any letters
	$10 =$ their $5 \times (-3) + c$ or $(c=)\ 5 \times (6-(-3)) - 20$ or $(c=)\ 25$ or $y - 10 =$ their $5(x-(-3))$ or $y = 5(x+9) - 20$ or $5x + 25$	M1dep	oe
	$y = 5x + 25$	A1	
	Additional Guidance		
	Do not allow further incorrect work, eg $y = 5x + 25$ and then $y = x + 5$		M1M1A0

2	$\frac{3}{2}$	B1	

Q	Answer	Mark	Comments
3	(Gradient of PQ =) $\frac{14-8}{2-6}$ or $\frac{8-14}{6-2}$ or -1.5 or $\frac{-3}{2}$ or (gradient of QR =) $\frac{8-5}{6-2}$ or $\frac{5-8}{2-6}$ or 0.75 or $\frac{3}{4}$ or $\frac{-3}{-4}$	M1	oe
	(Gradient of PQ =) -1.5 or $\frac{-3}{2}$ and (gradient of QR =) 0.75 or $\frac{3}{4}$ or $\frac{-3}{-4}$	M1dep	oe
	No and $-1.5 \times 0.75 \neq -1$ or No and $-1.5 \times 0.75 = -1.125$	A1ft	oe eg No and $\frac{-3}{2} \times \frac{3}{4} = -\frac{9}{8}$ ft their two gradients with M1 scored accept No and -1.5 is not the negative reciprocal of 0.75
	Additional Guidance		
	Accept $-\frac{3}{2}$ or $\frac{3}{-2}$ for $\frac{-3}{2}$		
	Gradient of $PQ = \frac{-3}{2}$, gradient of $QR = \frac{4}{3}$, No and $\frac{-3}{2} \times \frac{4}{3} = -2$		M1M0A1ft
	Answers involving Pythagoras' theorem or scale drawing		M0M0A0

Q	Answer	Mark	Comments
4	$\frac{15-8}{6-2}$ or $\frac{7}{4}$	M1	oe eg $\frac{8-15}{2-6}$ or 1.75 may be embedded in an attempt at equation of line eg $y=\frac{7}{4}x\ldots$ may be implied
	$-1 \div$ their $\frac{7}{4}$ or $-\frac{4}{7}$ or $\frac{17-9}{x-0} \times$ their $\frac{7}{4} = -1$	M1	oe allow [–0.57143, –0.57] may be embedded in an attempt at equation of a line eg $y =$ their $-\frac{4}{7}x\ldots$
	$17 - 9 =$ their $-\frac{4}{7}x$ or $-4x = 56$ or $56 \div -4$	M1dep	oe equation must be of the form $ax = b$ (b can be unprocessed) dep on 2nd M1
	–14	A1	

	Additional Guidance	
4 cont	The second mark is not dependent on the first – see examples below	
	(gradient of line through given points =) $\frac{6-2}{15-8}=\frac{4}{7}$ (gradient of perpendicular line =) $-\frac{7}{4}$ $17-9=-\frac{7}{4}x$	M0 M1 M1
	(gradient of line through given points =) $-\frac{7}{4}$ $\frac{17-9}{x}\times-\frac{7}{4}=-1$ $-56=-4x$	M0 M1 M1
	(gradient of line through given points =) $\frac{7}{4}$ (gradient of perpendicular line =) $\frac{4}{7}$	M1 M0M0
	Condone use of letters for gradients eg $x = 1.75$	M1
	For the first two marks, condone inclusion of x in their gradients	
	Answer –14 that comes from rounding or truncating cannot score A1 eg1 (perp grad =) –0.57 $8=-0.57x$ Answer –14 eg2 (perp grad =) –0.57 $8=-0.57x=-14.03$ Answer –14	M3A1 M3A0

Q	Answer	Mark	Comments
5	**Alternative method 1 – using the equations of the lines**		
	$\frac{22-y}{8-0}=2$ or $22=2\times 8+c$ or $(c=)\ 22-2\times 8$ or $c=6$ or P is at (0, 6) or $(PR=)\ y=2x+6$ or y-coordinate of P is 6 or y-coordinate of Q is 6	M1	oe equation using any letter y is the y-coordinate of P ignore missing brackets may be seen on diagram may be seen on diagram
	$2m=-1$ or $(m=)\ -\frac{1}{2}$	M1	oe gradient of RQ
	$22=$ their $-\frac{1}{2}\times 8+c$ or $22=-4+c$ or $c=26$ or $(RQ=)\ y=-\frac{1}{2}x+26$	M1dep	oe equation in c dep on previous mark oe equation of RQ
	their $(-\frac{1}{2}x+26)=$ their 6 or x-coordinate of Q is 40	M1dep	oe equation in x where x is the x-coordinate of Q dep on M3 $-\frac{1}{2}=\frac{22-\text{their } 6}{8-x}$ implies M4 if their 6 is correct or from correct working
	(40, 6)	A1	

5 cont	**Alternative method 2 – using similar triangles**		
	Drops a perpendicular from R to point S on PQ and uses $RS = 2PS = 16$ to work out that P is at (0, 6)	M1	any or no letter eg $22 - 2 \times 8$
	$2m = -1$ or $(m =) -\frac{1}{2}$ or $\frac{RS}{SQ} = \frac{1}{2}$	M1	oe gradient of RQ
	16×2 or 32	M1dep	length of SQ may be seen on diagram dep on previous mark
	8 + their 32 or x-coordinate of Q is 40	M1dep	
	(40, 6)	A1	
	Additional Guidance		
	Note that 40 (for the x-coordinate of Q) implies M3 (on alt 2) and implies M4 if 6 is also seen (on alt 1)		

	$13 = 7a - 1$ or $(a =)\ 2$	M1	oe eg $\frac{13 - -1}{7 - 0}$ may be implied eg $(y =)\ 2x - 1$
	$(y =)\ \frac{3}{5}x \ldots$ or (gradient B =) $\frac{3}{5}$	M1	oe eg (gradient B =) 0.6 allow $(y =)\ \frac{3x + 4}{5}$
	gradient A = 2 and gradient B = $\frac{3}{5}$	A1	oe eg $2 > \frac{3}{5}$ condone $2x > \frac{3}{5}x$
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
6	Condone incorrect y-intercept eg $a = 2$ $\quad y = \frac{3}{5}x + 4$ gradient A = 2 $\quad$ gradient B = $\frac{3}{5}$		M1M1 A1
	It must be clear that the values 2 and $\frac{3}{5}$ are being used to answer the question to award A1 eg1 gradient A = 2 and gradient B = $\frac{3}{5}$ (no statement needed) eg2 $a = 2$ $\quad y = \frac{3}{5}x + \frac{4}{5}$ eg3 $y = 2x - 1$ and $y = \frac{3}{5}x + \frac{4}{5}$ $\quad$ 2 is greater than $\frac{3}{5}$ eg4 $y = 2x - 1$ and $y = \frac{3}{5}x + \frac{4}{5}$ $\quad$ gradient of A > gradient of B		M2A1 M2A0 M2A1 M2A0
	$13 = 7x - 1$ or $x = 2$ must be recovered to award 1st M1		

Q	Answer	Mark	Comment
7	**Alternative method 1**		
	$\frac{8-0}{4-0}$ or 2	M1	oe gradient from origin to point
	$-\frac{1}{2}$ or $y=-\frac{1}{2}x\ldots$	M1	oe gradient of tangent negative inverse of their gradient
	$8 = \text{their } -\frac{1}{2} \times 4 + c$ or $c = 10$	M1dep	oe equation in c (any letter) dep on previous mark
	$0 = \text{their } -\frac{1}{2}x + \text{their } 10$	M1	oe equation in x ft their equation of the form $y = mx + c$ where m and c are numbers $\neq 0$
	20	A1	condone (20, 0)
	Alternative method 2		
	$\frac{8-0}{4-0}$ or 2	M1	oe gradient from origin to point
	$-\frac{1}{2}$ or $y=-\frac{1}{2}x\ldots$	M1	oe gradient of tangent negative inverse of their gradient
	$\frac{8-0}{4-x} = \text{their } -\frac{1}{2}$	M1dep	oe equation in x dep on previous mark
	their $2 \times (8-0) = \text{their } -1 \times (4-x)$ or $16 = -4 + x$	M1dep	oe linear equation in x
	20	A1	condone (20, 0)

7 (cont)	**Alternative method 3**		
	$\frac{8-0}{4-0}$ or 2	M1	oe gradient from origin to point
	$-\frac{1}{2}$ or $y=-\frac{1}{2}x\ldots$	M1	oe gradient of tangent negative inverse of their gradient
	$y-8=$ their $-\frac{1}{2}\times(x-4)$	M1dep	oe equation eg $x+2y=20$ dep on previous mark
	$0-8=$ their $-\frac{1}{2}\times(x-4)$	M1	oe linear equation in x ft their equation in y and x
	20	A1	condone (20, 0)
	Alternative method 4		
	4^2+8^2 and $(x-4)^2+8^2$	M1	
	$x^2=4^2+8^2+(x-4)^2+8^2$	M1dep	oe equation in x
	$x^2=16+64+x^2-8x+16+64$	M1dep	oe equation in x with brackets expanded and squares evaluated
	$8x=16+64+16+64$ or $8x=160$	M1dep	oe linear equation in x
	20	A1	condone (20, 0)

Q	Answer	Mark	Comments
8	$-\frac{5}{4}$ or $-1\frac{1}{4}$ or -1.25	B2	B1 $\frac{5}{4}$ or $1\frac{1}{4}$ or 1.25 or $x+4$ and $y-5$ or possible coordinates for P and Q stated or shown on a diagram eg $P(0, 5)$ and $Q(4, 0)$ or right-angled triangle shown with 4 as horizontal length and 5 as vertical length

Additional Guidance	
B1 may be awarded for correct work, with no or incorrect answer, even if this is seen amongst multiple attempts	
Ignore attempts at rounding after correct answer seen	
Accept $\frac{-5}{4}$	B2
Condone $\frac{5}{-4}$	B2
$(x+4)$ $(y-5)$	B1
$x+4$ and $y-5$ may be seen embedded in a fraction eg $\frac{y-(y-5)}{x-(x+4)}$ or $\frac{y-(y-5)}{x+(x+4)}$	B1
$-\frac{4}{5}$	B0
$\frac{4}{5}$	B0

Q	Answer	Mark	Comments
9(a)	$(m_1=)\frac{-7-9}{3--5}$ or $(m_1=)\frac{9--7}{-5-3}$ or -2	M1	gradient of AC
	$-1 \div$ their -2 or $\frac{1}{2}$	M1	gradient of line perpendicular to AC their -2 must be identified as a gradient $\frac{1}{2}$ implies M1M1
	$-7 =$ their $\frac{1}{2} \times 3 + c$ or $(c=)-8.5$ or $y--7 =$ their $\frac{1}{2}(x-3)$	M1dep	oe condone any letter for c dep on 2nd M1
	$y=\frac{1}{2}x-8.5$	A1	oe eg $2y=x-17$
	Additional Guidance		
	Check part (a) for working for part (b)		