1.(a)

$$m_{QR} = \frac{3-8}{13+2}$$

$$= \frac{-5}{15}$$

$$= -\frac{1}{3}$$

$$m_{alt} = 3$$

$$y + 1 = 3(x - 5)$$

$$y + 1 = 3x - 15$$

$$y = 3x - 16$$

1.(b)

$$m_{PR} = \frac{3+1}{13-5}$$

$$= \frac{4}{8}$$

$$= \frac{1}{2}$$

$$\tan \theta = \frac{1}{2}$$

$$\theta = 26 \cdot 6°$$

Question			Generic scheme	Illustrative scheme	Max mark
1.	(a)		$\bullet^1$ find gradient of QR	$\bullet^1$ $-\dfrac{1}{3}$ or $-\dfrac{5}{15}$	3
			$\bullet^2$ use property of perpendicular lines	$\bullet^2$ 3	
			$\bullet^3$ determine equation of altitude	$\bullet^3$ $y = 3x - 16$	

Notes:

1. $\bullet^3$ is only available to candidates who find and use a perpendicular gradient.
2. The gradient of the perpendicular bisector must appear in fully simplified form at $\bullet^2$ or $\bullet^3$ stage for $\bullet^3$ to be awarded - see Candidate B.
3. $\bullet^3$ is not available as a consequence of using the midpoint of QR and the point P.
4. At $\bullet^3$, accept any arrangement of a candidate's equation where constant terms have been simplified.

Commonly Observed Responses:

Candidate A – BEWARE	**Candidate B – unsimplified gradient**
Correct equation from incorrect substitution	$m = -\dfrac{5}{15}$ $\quad \bullet^1$ ✔
$m = \dfrac{13 - (-2)}{3 - (8)} = 3$ $\quad \bullet^1$ ✘ $\bullet^2$ ∧	$m_\perp = \dfrac{15}{5}$ $\quad \bullet^2$ ✔
$y = 3x - 16$ $\quad \bullet^3$ ✘	$15x - 5y - 80 = 0$ $\quad \bullet^3$ ∧

Question			Generic scheme	Illustrative scheme	Max mark
	(b)		$\bullet^4$ determine gradient of the line	$\bullet^4$ $m = \dfrac{1}{2}$ or $\tan\theta = \dfrac{1}{2}$	2
			$\bullet^5$ use $m = \tan\theta$ to find the angle	$\bullet^5$ $26\cdot6°$ or $0.4636...$ radians	

Notes:

5. Do not penalise the omission of units at $\bullet^5$.
6. Accept any answers which round to $27°$ or 0.46 radians.
7. For $27°$ or 0.46 radians without working award 2/2.
8. Where candidates find the angle of the altitude or other sides with the positive direction of the x-axis only $\bullet^5$ is available.

Commonly Observed Responses:

Candidate C – no reference to tan	**Candidate D - BEWARE**
$m = \dfrac{4}{8}$ $\quad \bullet^4$ ✔	$m = \dfrac{1}{2}$ $\quad \bullet^4$ ✔
$26.6°$ $\quad \bullet^5$ ✔	$\theta = \tan\dfrac{1}{2}$ $\quad \bullet^5$ ✘
	$\theta = 26.6°$
	Stating $\tan$ rather than $\tan^{-1}$
	See general marking principle (g)

Candidate E	
$\tan^{-1}(3) = 72°$ $\quad \bullet^4$ ✘ $\bullet^5$ ✔$_1$	