Question	Scheme	Marks	AOs
7	$3\sin\theta - 4\cos\theta \equiv R\sin(\theta - \alpha);\ R > 0,\ 0 < \alpha < 90°$		
(a)	$\tan\alpha = \frac{4}{3}$ o.e.	M1	1.1b
	Either $R = 5$ or $\alpha =$ awrt 53.13	B1	1.1b
	$5\sin(\theta - 53.13°)$	A1	1.1b
		(3)	
(b)(i)	$G_{max} = 17 + "5" = 22\ (°C)$	B1ft	3.4
		(1)	
(b)(ii)	$G = 17 + 3\sin(15t)° - 4\cos(15t)°;\ 0 \leqslant t \leqslant 17$		
	$20 = 17 + "5"\sin(15t - "53.13")$	M1	3.4
	$\sin(15t - "53.13") = \frac{3}{"5"}$ or $\sin(\theta - "53.13") = \frac{3}{"5"}$	M1	1.1b
	After midday solution $\Rightarrow 15t - "53.13" = 180 - 36.86989...$ $\Rightarrow t = \frac{143.1301... + "53.13"}{15}$	M1	3.1b
	$\Rightarrow t = 13.0840... \Rightarrow$ Time $= 6:05$ p.m. or $18:05$	A1	3.2a
		(4)	
			(8 marks)

Question 7 Notes:	
(a)	
M1:	For either $\tan\alpha = \frac{4}{3}$ or $\tan\alpha = \frac{3}{4}$ or $\tan\alpha = -\frac{4}{3}$ or $\tan\alpha = -\frac{3}{4}$
B1:	At least one of either $R = 5$ (condone $R = \sqrt{25}$) or $\alpha =$ awrt 53.13
A1:	$5\sin(\theta - 53.13°)$
(b)(i)	
B1ft:	Either 22 or follow through "17 + their R from part (a)"
(b)(ii)	
M1:	Realisation that the model $G = 17 + 3\sin(15t)° - 4\cos(15t)°$ can be rewritten as $G = 17 + "5"\sin(15t - "53.13")$ and applies $G = 20$
M1:	Rearranges their equation to give either $\sin(15t - "53.13") = \frac{3}{"5"}$ or $\sin(\theta - "53.13") = \frac{3}{"5"}$ **Note:** This mark can be implied by either • $15t - "53.13" = 36.86989...$ or $143.1301...$ • $\theta - "53.13" = 36.86989...$ or $143.1301...$
M1:	Uses the model in a complete strategy to find a value for t which is greater than 7 e.g. p.m. solution occurs when $15t - "53.13" = 180 - 36.86989...$ and so rearranges to give $t = ...$, where t is greater than 7
A1:	Finds the p.m. solution of either $6:05$ p.m. or $18:05$ when the greenhouse temperature is predicted by the model to be $20°C$