

Q	Marking instructions	AO	Marks	Typical solution
10(a)	Obtains $R = \sqrt{29}$ AWFW [5.38, 5.4]	1.1b	B1	$R = \sqrt{29}$ $\tan \alpha = \frac{5}{2}$ $\alpha = 68.2$ Hence $\sqrt{29} \sin(x + 68.2)$
	Uses compound angle identity to obtain $R \sin \alpha = 5$ or $R \cos \alpha = 2$ or obtains $\tan \alpha = \frac{5}{2}$ or $\alpha = \mathbf{AWFW}$ [68, 68.2] Allow angle in radians	1.1a	M1	
	Obtains $\sqrt{29} \sin(x + 68.2)$ For $\sqrt{29}$, AWFW [5.38, 5.4] and for 68.2, AWFW [68, 68.2]	2.1	R1	
	Subtotal		3	

Q	Marking instructions	AO	Marks	Typical solution
10(b)(i)	Deduces $90 - \text{their } 68.2$ Ignore rounding after value of $90 - \text{their } 68.2$ seen	2.2a	B1F	$90 - 68.2 = 21.8$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
10(b)(ii)	Deduces $14.2 + \text{their } \sqrt{29}$ Condone missing or wrong units Accept answer with more than 1 decimal place	2.2a	B1F	$14.2 + \sqrt{29} = 19.6^\circ \text{C}$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
10(b)(iii)	Equates a complete model for the temperature to 15 eg $14.2 - \text{their}'\sqrt{29} \sin(d + 68.2)' = 15$ or $14.2 - (2 \sin d^\circ + 5 \cos d^\circ) = 15$ Allow use of inequality Condone use of another letter for d throughout PI by correct answer or angles	3.4	M1	$14.2 - \sqrt{29} \sin(d + 68.2) = 15$ $\sin(d + 68.2) = -\frac{0.8}{\sqrt{29}}$ $d + 68.2 = -8.54, 188.54, 351.46$ $d = 120.34, 283.26$ $\frac{283.26 - 120.34}{7} = 23 \text{ weeks}$
	Rearranges their equation correctly to obtain $\sin(d + \text{their}68.2) = \dots$ Allow use of inequality PI by correct answer or angles	1.1a	M1	
	Obtains AWFW [188.2, 189] and AWFW [351, 351.5] or obtains AWFW [120, 120.8] and AWFW [282.8, 283.3] Ignore additional values PI by correct answer	1.1b	A1	
	Subtracts their two positive values of d or their two positive values of $d + \text{their } 68.2$ and divides by 7 PI by correct answer	3.1b	M1	
	Obtains AWFW [23.1, 23.4] or 23 ISW	1.1b	A1	
	Subtotal		5	
	Question 10 Total		10	