

Q	Marking instructions	AO	Marks	Typical solution
7(a)	Explains that a represents the initial population. OE	2.4	E1	a is the population in 2010
Subtotal			1	

Q	Marking instructions	AO	Marks	Typical solution
7(b)	Takes logarithms to base 10 of both sides	1.1a	M1	$P = a(10^{bt})$ $\log_{10} P = \log_{10}(a10^{bt})$ $= \log_{10} a + \log_{10}(10^{bt})$ $= \log_{10} a + bt$
	Completes derivation convincingly AG	2.1	R1	
Subtotal			2	

Q	Marking instructions	AO	Marks	Typical solution		
7(c)(i)	Completes table correctly, figures seen in table or text or used in part (c)(ii)	3.3	B1			
				Year	2013	2015
				t	3	5
				P	10 200	12 800
				$\log_{10} P$	4.0086	4.1072
Subtotal			1			

Q	Marking instructions	AO	Marks	Typical solution
7(c)(ii)	Uses data to set up a pair of simultaneous equations	3.1a	M1	$4.0086 = 3b + \log_{10} a$ $4.1072 = 5b + \log_{10} a$ $b = 0.0493$ $\log_{10} a = 3.8607$ $a = 7256$
	Solves equations for either b or $\log_{10} a$ correct	1.1b	A1	
	Converts $\log_{10} a$ to obtain a value of a or uses their b and data to calculate a	1.1a	M1	
	Obtains both b and a correct. AWRP 0.049 and AWWF 7200 to 7300	1.1b	A1	

Subtotal**4**

Q	Marking instructions	AO	Marks	Typical solution
7(c)(iii)	Substitutes their values of a and b into model and $t = 14$	3.4	M1	$7256 \times 10^{(14 \times 0.0493)}$ $= 35555$
	Calculates correct value of population AFWW 35500 to 35600 FT provided >12800	1.1b	A1F	
Subtotal			2	

Q	Marking instructions	AO	Marks	Typical solution
7(d)(i)	States an appropriate assumption about the model.	3.5b	E1	The value of constant b does not change after 2020
Subtotal			1	

Q	Marking instructions	AO	Marks	Typical solution
7(d)(ii)	Makes appropriate comment about limited data, or length of extrapolation, changing food supply, disease or equivalent specific factor.	3.5a	E1	Not very reliable, because it is only based on data from two years
Subtotal			1	

Question Total**12**