Question Number	Scheme	Marks
7.(a)	Attempts to use $31\,500 = 16\,200 + 9d$ to find 'd'	M1
	For 16 200 + their $d = (1700)$ where d has been found by an allowable method	M1
	Year 2 salary is (£)17 900	A1
		(3)
(b)	Attempts to use $31\,500 = 16\,200r^{9}$ to find 'r'	M1
	For 16 2000 × their $r = (1.077)$ where r has been found by an allowable method	M1
	Year 2 salary in the range $17440 \leqslant \mathbb{S} \leqslant 17450$	A1
		(3)
(c)	Attempts $\frac{10}{2}\{16200 + 31500\}$ or $\frac{16200\left(1.077^{10} - 1\right)}{1.077 - 1}$	M1
	Finds $\pm\left(\frac{10}{2}\{16200 + 31500\} - \frac{16200\left('1.077'^{10} - 1\right)}{'1.077' - 1}\right)$	dM1
	Difference = £7480 cao	A1
		(3)
		(9 marks)

Notes

(a)

M1 Attempts to use the AP formula in an attempt to find 'd'

Accept an attempt at $31\,500 = 16\,200 + 9d$ resulting in a value for d.

Accept the calculation $\frac{31500 - 16200}{9}$ condoning slips on the 31500 and 16200

M1 A correct attempt to find the second term by adding 16 200 to their 'd' which must have been found via an allowable method.

Allow d to be found from an "incorrect" AP formula with $10d$ being used instead of $9d$.

Eg $31\,500 = 16\,200 + 10d$ or more likely $\frac{31500 - 16200}{10} = 1530$ usually leading to an answer of 17730

A1 Year 2 salary is (£) 17 900

(b)

M1 Attempts to use the GP formula in an attempt to find 'r'

Accept an attempt at $31\,500 = 16\,200r^{9} \Rightarrow r^{9} = \frac{31500}{16200} \Rightarrow r = ...$ condoning numerical slips.

Accept the calculation $\sqrt[9]{\frac{31500}{16200}}$ or $\sqrt[9]{\frac{35}{18}}$ condoning slips on the 31500 and 16200.

It will most likely be implied by a value of r rounding to 1.08

Accept an attempt at $31\,500 = 16\,200r^{9}$ via logs condoning slips but correct log work must be seen

Question Number	Scheme	Marks

M1 A correct attempt to find the second term by multiplying 16 200 by their '*r*' which must have been found via an allowable method.
Allow *r* to be found from an "incorrect" GP formula with 10 being used instead of 9. Eg following $31\,500 = 16\,200r^{10}$ or $\sqrt[10]{\frac{31500}{16200}}$. You may also award, condoning slips, for an attempt at $16200 \times r$ where *r* is their solution of $31\,500 = 16\,200r^{n}$ where $n = 9$ or 10

A1 For an answer in the range $£17440 \leqslant \mathbb{S} \leqslant 17450$
Note that $r = 1.077 \Rightarrow 17447.40$

(c)
M1 A correct method to find the sum of either the AP or the GP
For the AP accept an attempt at either $\frac{10}{2}\{16200 + 31500\}$ or $\frac{10}{2}\{2 \times 16200 + 9 \times 'd'\}$
For the GP accept an attempt at either $\frac{16200\left('r'^{10} - 1\right)}{'r' - 1}$ or $\frac{16200\left(1 - 'r'^{10}\right)}{1 - 'r'}$

dM1 Both formulae must be attempted "correctly" (see above) and the difference taken (either way around)
FYI if *d* and *r* are correct, the sums are £238 500 and £231 019.(24)
A1 Difference = £7480 **CAO. Note that this answer is found using the unrounded value for *r*.**
Note that using the rounded value will give £7130 which is A0

If the solutions for (a) and (b) are reversed, eg GP in (a) and AP in (b) then please send to review.

(i) General approach to marking part (i) This is now marked M1 A1 M1 A1 on epen

M1 Takes log of both sides and uses the power law. Accept any base. Condone missing brackets
A1 For a correct linear equation in *x* which only involve logs of base 2 usually $\log_2 6$, $\log_2 2$ or $\log_2 8$ but sometimes $\log_2 \frac{3}{4}$ and others so read each solution carefully
M1 Attempts to use a log law to create a linear equation in $\log_2 3$
Eg. $\log_2 6 = \log_2 2 + \log_2 3$ which is implied by $\log_2 6 = 1 + \log_2 3$
Eg. $\log_2 \frac{3}{4} = \log_2 3 - \log_2 4$ which may be implied by $\log_2 3 - 2$
A1 For $x = -\frac{1}{3} + \frac{\log_2 3}{6}$ oe in the form required by the question. Note that $x = \frac{\log_2 3 - 2}{6}$ is A0

Question Number	Please read notes for 8(i) before looking at scheme				Marks
8.(i)	$8^{2x+1}=6\Rightarrow 2x+1=\log_8 6$	M1	$2^{6x+3}=6$		
	$\Rightarrow 2x+1=\dfrac{\log_2 6}{\log_2 8}$	A1	$\Rightarrow (6x+3)\log_2 2=\log_2 6$	M1 A1	
	$\Rightarrow 2x+1=\dfrac{\log_2 2+\log_2 3}{3}$	M1	$\Rightarrow (6x+3)=\log_2 2+\log_2 3$	M1	
	$\Rightarrow x=\dfrac{\log_2 3}{6}-\dfrac{1}{3}$	A1	$\Rightarrow x=\dfrac{\log_2 3}{6}-\dfrac{1}{3}$	A1	**(4)**
(ii)	$\log_5(7-2y)=2\log_5(y+1)-1$		$2\log_5(y+1)-\log_5(7-2y)=1$		
	$\log_5(7-2y)=\log_5(y+1)^2-1$		$\log_5(y+1)^2-\log_5(7-2y)=1$		M1
	$\log_5(7-2y)=\log_5(y+1)^2-\log_5 5$		$\log_5\dfrac{(y+1)^2}{(7-2y)}=1$		dM1
	$(7-2y)=\dfrac{(y+1)^2}{5}$		$\dfrac{(y+1)^2}{(7-2y)}=5$		A1
	$y^2+12y-34=0\Rightarrow y=$		$y^2+12y-34=0\Rightarrow y=$		ddM1
	$y=-6+\sqrt{70}$ oe only				A1
					(5)
					(9 marks)

Notes

There are many different ways to attempt this but essentially can be marked in a similar way.

If index work is used marks are not scored until the log work is seen

Eg 1: $8^{2x+1}=6\Rightarrow 8^{2x}\times 8=6\Rightarrow 8^{2x}=\dfrac{3}{4}$.

1ST M1 is scored for $2x=\log_8\dfrac{3}{4}$ and then 1ST A1 for $2x=\dfrac{\log_2\frac{3}{4}}{\log_2 8}$

but BOTH of these marks would be scored for $2x\log_2 8=\log_2\dfrac{3}{4}$

2nd M1 would then be awarded for $\log_2\dfrac{3}{4}=\log_2 3-\log_2 4$ which may be implied by $\log_2 3-2$

Two more examples where the candidate initially uses index work.

$8^{2x+1}=6\Rightarrow 2^{3(2x+1)}=6$ $3(2x+1)=\log_2 6$ is M1 A1 as it is a correct linear equation in x involving a $\log_2$ term	$8^{2x+1}=6\Rightarrow 64^{x}=\dfrac{3}{4}$ $\Rightarrow x=\log_{64}\dfrac{3}{4}$ is M1 But $\Rightarrow x\log_2 64=\log_2\dfrac{3}{4}$ is M1 A1