Question Number	Scheme	Marks
2 (a)	States or uses $r = 1.02$	B1
	Attempts $25000 \times 1.02^{13} = 32340$ or 32341 or 32300	M1 A1
		(3)
(b)	Attempts $\frac{a\left(r^n - 1\right)}{\left(r - 1\right)} = \frac{25000\left(1.02^{14} - 1\right)}{1.02 - 1}$ or $\frac{125000\left(1.02^{14} - 1\right)}{1.02 - 1}$	M1 A1
	£1 997 000	A1
		(3)
		(6 marks)

(a)

B1 States or uses $r = 1.02,\ 102\%,$ (1+2%) oe

M1 Attempts $25000 \times "r"^{12}$ or $25000 \times "r"^{13}$. Allow eg $r = 2$ for this mark. They may show the increase each year which is acceptable. Expect to see at least one correct increase for their *r* and attempting 12 or 13 increases by the same percentage. Allow a misread if 2500 or 250000 is used instead.
Awrt 31706 which is 25000×1.02^{12} is usually sufficient evidence for this mark.

A1 32340 (or 32341). Must be an integer. Allow 32300 which is the answer rounded to 3sf.

(b)

M1 Attempts $\frac{a(r^n - 1)}{r - 1}$ or $\frac{a(1 - r^n)}{1 - r}$ with $a = 25000$ or 125000, $n = 13$ or 14 and $r = 1.02$ or their *r* from part (a).

A1 For $\frac{25000(1.02^{14} - 1)}{1.02 - 1}$ or $\frac{125000(1.02^{14} - 1)}{1.02 - 1}$ or equivalent. Awrt 1 997 000 implies this mark.

A1 1 997 000 only

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Alt(b)

M1 If they attempt to add year by year then look for 13 or 14 values being added with the first year 25000 and at least one increase year to year of 2% or their *r*.

A1 All 14 values seen or implied from either column 2 or 3 of the table on the next page. Allow values to be truncated or rounded to 3 significant figures. Awrt 1 997 000 also implies this mark.

A1 1 997 000 only

n	x1.02^(n-1)	x5
1	25000	125000
2	25500	127500
3	26010	130050
4	26530	132651
5	27061	135304
6	27602	138010
7	28154	140770
8	28717	143586
9	29291	146457
10	29877	149387
11	30475	152374
12	31084	155422
13	31706	158530
14	32340	161701
	399348	1996742

Question Number	Scheme	Marks
3. (a)	$\left(1+\frac{x}{4}\right)^{12} = 1+12\left(\frac{x}{4}\right)^{1}+\frac{12\times11}{2}\left(\frac{x}{4}\right)^{2}+\frac{12\times11\times10}{3!}\left(\frac{x}{4}\right)^{3}+\ldots$	M1
	$=1+3x,+\frac{33}{8}x^{2}+\frac{55}{16}x^{3}$	B1, A1
		(3)
(b)	$\left(\frac{x^2+8}{x^5}\right)\left(1+\frac{x}{4}\right)^{12} =$	
	Sight of a term independent of x = "$\frac{55}{16}$" or $8\times{}^{12}C_5\left(\frac{1}{4}\right)^5\left(=\frac{99}{16}\right)$	B1ft,
	"$\frac{55}{16}$" $+8\times{}^{12}C_5\left(\frac{1}{4}\right)^5 = \frac{55}{16}+\frac{99}{16}=\frac{77}{8}$	M1 A1
		(3) **(6 marks)**

(a)

M1 For an attempt at the binomial expansion. Score for a correct attempt at term 3 or 4.

Accept sight of ${}^{12}C_2\left(\frac{x}{4}\right)^2$ or ${}^{12}C_3\left(\frac{x}{4}\right)^3$ condoning the omission of brackets. Accept any relevant coefficient appearing from Pascal's triangle. FYI ${}^{12}C_2 = 66$, ${}^{12}C_3 = 220$

B1 For $1+3x$ Must be simplified. Also allow $1,3x$ if written as a list.

A1 For $+\frac{33}{8}x^2+\frac{55}{16}x^3$ Accept $+4.125x^2+3.4375x^3$

(All four terms do not need to be written as a summation and may be written as a list).

(b)

B1ft Sight of "$\frac{55}{16}$" or $8\times{}^{12}C_5\left(\frac{1}{4}\right)^5\left(=\frac{99}{16}\right)$ which must be independent of x

Most candidates do not find the additional term in the expansion of $\left(1+\frac{x}{4}\right)^{12}$ so typically would only score a maximum of 100 in (b)

M1 For attempting to add their "$\frac{55}{16}$" to $8\times{}^{12}C_5\left(\frac{1}{4}\right)^5$ or $8\times792\left(\frac{1}{4}\right)^5$

A1 For $\frac{77}{8}$ oe eg 9.625