Daily Question Pure Mathematics Day 5 Mark Scheme

Question Number	Scheme	Marks
(i)	$\sum_{r=1}^{20}(3+5r)=8+13+18+.....+103$	M1
	Use of $S_n=\frac{n}{2}(2a+(n-1)d)$ or $S_n=\frac{n}{2}(a+l)$ with a=3or 8, n=19 or 20, d=5 and l=103	M1
	$S_{20}=\frac{20}{2}(8+103)=1110$	A1
		(3)
(ii)	$\sum_{r=0}^{\infty}\frac{a}{4^r}=16\Rightarrow\frac{a}{1}+\frac{a}{4}+\frac{a}{16}....=16 \quad r=\frac{1}{4}$ oe	B1
	Use of $S_\infty=\frac{a}{1-r}$ with $0<\lvert r\rvert<1$ and $S_\infty=16$	M1
	$16=\frac{a}{1-'r'}\Rightarrow a=..$	dM1
	$a=12$	A1
		(4)
		(7 marks)

(i)

M1 Minimal evidence of the sum of an arithmetic sequence .
Accept as evidence the first 3 terms written out as 8+13+18.. or $8+13+..+103$
or 8,13,18 followed by the sum formula $S_n = \frac{n}{2}(2a+(n-1)d)$
or 8,13,...103 followed by the sum formula $S_n = \frac{n}{2}(a+l)$
Do not accept on its own however $3+5\times 20$ or 103 without any reference to a sum

M1 Uses $S_n = \frac{n}{2}(2a+(n-1)d)$ with $a=3$ or $8, d=5$ and $n=19$ or 20
or $S_n = \frac{n}{2}(a+l)$ with $n=19$ or 20 , $a=3$ or 8 , and l=103
Accept a list of 20 terms as long as all terms are written out.

A1 1110. Accept this for all 3 marks as long as no incorrect working is seen.

Alt (i)

M1 Splits the sum into two separate parts, and uses/states $\sum 1 = n$ *and* $\sum r = \frac{n(n+1)}{2}$ both
$\sum 3+5r = \sum 3 + \sum 5r = 3\times n + 5\times \frac{n(n+1)}{2}$

M1 sub 20 or 19 into the above

A1 1110

(ii)

B1 For stating or implying that $r = \frac{1}{4}$.
You may see a series or sequence of terms with $\times\frac{1}{4}$ or $\times 0.25$.
Accept variations on $a+\frac{a}{4}+\frac{a}{4^2}$ or even $\frac{a}{4}, \frac{a}{16}, \frac{a}{64}, \ldots$

M1 For using the formula $S_\infty = \frac{a}{1-r}$ with $S_\infty = 16$ and $0<|r|<1$

dM1 Dependent upon the previous M. For proceeding to $a=..$

A1 12