Daily Question Pure Mathematics Day 5 Mark Scheme

Question Number	Scheme	Marks
(a)	Attempts $S_N = \dfrac{25(1.1^N - 1)}{1.1 - 1} = 1000$	M1
	$\Rightarrow 1.1^N = 5$	A1
	$\Rightarrow N = \dfrac{\log 5}{\log 1.1}$	M1
	$\Rightarrow N = 17$	A1
		(4)
(b)	Uses $= 50 + 14 \times 20 = 330$	M1 A1
		(2)
(c)	Attempts $S_N = \dfrac{15}{2}\{2 \times 50 + 14 \times 20\}$ or $\quad S_N = \dfrac{15}{2}\{50 + 330\}$	M1
	Total $= 2850 \times 5 = (£)14250$ or Total $= \dfrac{15}{2}\{2 \times 250 + 14 \times 100\} = 14250$	dM1 A1
		(3)
		(9 marks)

(a)   Allow attempts with inequalities for all marks. Allow $N = n$

M1   Attempts to apply the correct sum formula $S_N = \dfrac{a(r^N - 1)}{r - 1}$ with $a = 25, r = 1.1$ and $S_N = 1000$

       Allow an attempt using the sum formula $S_N = \dfrac{a(1 - r^N)}{1 - r}$ with $a = 25, r = 1.1$ and $S_N = 1000$

A1   For proceeding to $1.1^N = 5$

M1   Uses logs correctly in an attempt to solve an equation of the form $a^N = b$ where both a and b are positive. This may be scored from a term equation. Eg $25 \times r^{N-1} = 1000$. Attempts via incorrect previous work that lead to for example $27.5^N = \dots$ or attempts from an incorrect sum equation $\dfrac{25(1.1^{N-1} - 1)}{1.1 - 1} = 1000$ have an opportunity to score this mark. Candidates are supposed to show sufficient working to make their methods clear so from $a^N = b$ score for an intermediate answer of $\dfrac{\log b}{\log a}$, $\log_a b$, or using the correct $1.1^N = 5$ expect to see a value of 16.8 or 16.9

A1 $N = 17$ from $1.1^N = 5$ and correct work.

(b)

M1   Uses $a + (n-1)d$ with $a = 50, d = 20$ and $n = 15$

A1   330.   This alone would score both marks

(c)

M1   Attempts $S_N = \dfrac{n}{2}\{2a + (n-1)d\}$ with $a = 50, n = 15, d = 20$ or $a = 250, n = 15, d = 100$

       Alternatively attempts $S_N = \dfrac{n}{2}\{a + l\}$ with $a = 50, n = 15, l = $ their '330' or

       $a = 250, n = 15, l = 5 \times$ their 330

       You may see listing which is acceptable. For this expect to see 15 terms with all terms correct.

       $50 + 70 + 90 + 110 + 130 + 150 + 170 + 190 + 210 + 230 + 250 + 270 + 290 + 310 + 330$

       (or 5 times these.)

dM1   Uses a method that calculates the total amount of money raised.

       If candidate attempts total number of people $\times £5$ it is dependent upon a correct sum formula having been used.

       Eg. Accept $\dfrac{15}{2}\{2 \times 50 + 14 \times 20\} \times 5$ or $\dfrac{15}{2}\{2 \times 250 + 14 \times 100\}$ or $\dfrac{15}{2}\{250 + "330" \times 5\}$ is used.

       Listing would be all the values above multiplied by 5

A1   £14250