Question	Scheme	Marks	AOs
5(a)	Volume = $r\times(r+1)\times(r+2)$	B1	1.1b
	A complete method for finding the total volume of n blocks and expressing it in sigma notation. This can be implied by later work. $\sum_{r=1}^{n}\left(r^3+3r^2+2r\right)$	M1	3.1b
	$V=\frac{1}{4}n^2(n+1)^2+3\times\frac{1}{6}n(n+1)(2n+1)+2\times\frac{n}{2}(n+1)$	M1	2.1
	$V=\frac{1}{4}n(n+1)\left[n(n+1)+2(2n+1)+4\right]$	dM1	1.1b
	$V=\frac{1}{4}n(n+1)\left[n^2+5n+6\right]$ $\Rightarrow V=\frac{1}{4}n(n+1)(n+2)(n+3)$ *	A1*	1.1b
		(5)	
(b)	Sets $\frac{1}{4}n(n+1)(n+2)(n+3)=n^4+6n^3-11710$ $\frac{1}{4}n^4+\frac{3}{2}n^3+\frac{11}{4}n^2+\frac{3}{2}n=n^4+6n^3-11710$ simplifies $\left(3n^4+18n^3-11n^2-6n-46840=0\right)$ and solves $n=\ \ldots$	M1	1.1b
	There are 10 blocks or n = 10	A1	3.2a
		(2)	
			(7 marks)

Notes:

(a)

B1: Correct volume of a block

M1: Expressing the total volume of all n blocks as a series in terms of r, r^2 and r^3

M1: Substitutes at least one of the standard formulae into their volume.

dM1: Attempts to factorise $\frac{1}{4}n(n+1)$ having used at least one standard formula correctly. Each term must contain a factor of $n(n+1)$

A1*: Obtains the printed result with no errors seen, no bracketing errors and following from $V=\frac{1}{4}n(n+1)\left[n^2+5n+6\right]$ o.e.

Note: Going from $\frac{1}{4}n\left(n^3+6n^2+11n+6\right)$ to $\frac{1}{4}n(n+1)(n+2)(n+3)$ with no reasoning shown scores **dM0 A0**

(b)

M1: Sets the printed answer $= n^4 + 6n^3 - 11710$, simplifies, collects terms and uses their calculator to solve a quartic equation to find a value for *n*.

A1: Selects *n* = 10 or states that there are **10 blocks** from a **correct equation**