11	**3a**	A skyscraper of 110 floors is to be built. The first floor to be built will cost \$3 million. The cost of building each subsequent floor will be \$0.5 million more than the floor immediately below. (i) What will be the cost of building the 25th floor? (ii) What will be the cost of building all 110 floors of the skyscraper?	**2** **2**

Using 3 to represent \$3 million, ... the series is 3, 3.5, 4, ...

Arithmetic series with $a = 3$, $d = 0.5$

(i) $n = 25$, $T_n = a + (n - 1)d$

$T_{25} = 3 + (25 - 1) \times 0.5$

$= 3 + 24 \times 0.5$

$= 15$

$\therefore$ the cost is \$15 million

(ii) $n = 110$, $S_n = \frac{n}{2}[2a + (n - 1)d]$

$S_{110} = \frac{110}{2}[2(3) + (110 - 1) \times 0.5]$

$= 55[6 + 109 \times 0.5]$

$= 3327.5$

$\therefore$ the cost is \$3327.5 million

State Mean:
1.80/2
1.57/2

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

(i) In the majority of responses, candidates recognised that this question involved an arithmetic sequence and either substituted into the formula correctly or worked out the pattern for obtaining the cost of the 25th floor. The most common errors were to use the incorrect formula and to find the sum of a series, either arithmetic or geometric.

(ii) In better responses, candidates stated the formula for the sum and showed the substitution before any calculation was performed. Many incorrectly found the cost of the 110th floor rather than the total cost of all 110 floors.

In both subparts, many who substituted correctly into the relevant formula were then unable to correctly evaluate the final answer.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/