**11** **5c** The table gives the speed $v$ of a jogger at time $t$ in minutes over a 20-minute period. The speed $v$ is measured in metres per minute, in intervals of 5 minutes. The distance covered by the jogger over the 20-minute period is given by $\int_0^{20} v\,dt$. Use Simpson's rule and the speed at each of the five time values to find the approximate distance the jogger covers in the 20-minute period. **3**

| $t$ | 0 | 5 | 10 | 15 | 20 |
|---|---|---|---|---|---|
| $v$ | 173 | 81 | 127 | 195 | 168 |

State Mean: **2.28/3**

$$\text{Dist} = \int_0^{20} v\ dt$$

$$\approx \frac{5}{3}[173 + 168 + 2 \times 127 + 4 \times (81 + 195)$$

$$= 2831.666...$$

$\therefore$ jogger covers approximately 2832 metres

* 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**

The majority of responses correctly used the 5 function-values, often in a table, to find the approximate distance. Common errors included the use of function notation in the quoted formula with incorrect substitutions and the incorrect calculation of the value of $h$ using a formula. While two separate applications of the formula using 3 function values was correctly done by some, it frequently led to errors. Incorrect weighting and missing brackets also resulted in errors. In some responses there was confusion about the relationship between velocity, displacement, integration and Simpson's rule, resulting in Simpson's rule not being applied. Numerical errors were also common, again highlighting the need to show full substitutions into a formula before any evaluation.

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