20 MA **20** Kenzo is driving his car along a road while his friend records the velocity of the car, $v(t)$, in km/h every minute over a 5-minute period. The table gives the velocity $v(t)$, at time t hours. **2**

t	0	$\frac{1}{60}$	$\frac{2}{60}$	$\frac{3}{60}$	$\frac{4}{60}$	$\frac{5}{60}$
$v(t)$	60	55	65	68	70	67

The distance covered by the car over the 5-minute period is given by $\int_0^{\frac{5}{60}} v(t)\,dt$.

Use the trapezoidal rule and the velocity at each of the six time values to find the approximate distance in kilometres the car has travelled in the 5-minute period.

Give your answer correct to one decimal place,

$$\int_a^b f(x)\,dx \approx \frac{b-a}{2n}\{f(a) + f(b) + 2[f(x_1) + \ldots + f(x_{n-1})]\}$$

$$\int_0^{\frac{5}{60}} v(t)\,dt \approx \frac{\frac{5}{60}-0}{2(5)}[60 + 67 + 2(55 + 65 + 68 + 70)] \checkmark$$

$= 5.35833333\ldots$

$= 5.4$ (1 dec pl)

$\therefore$ Kenzo travelled approximately 5.4 km. ✔

State Mean: **1.32/2**

HSC Marking Feedback

Students should:

- demonstrate understanding of equal sub-intervals in the Trapezoidal rule
- identify the correct number of function values
- substitute the strip heights correctly into the Trapezoidal rule.

In better responses, students were able to:

- identify the correct number of values to use in the Trapezoidal rule
- substitute directly into the Trapezoidal rule
- find a correct numerical expression.

Areas for students to improve include:

- determining the correct number of function values
- simplifying fractions
- understanding the substitutions necessary for the Trapezoidal rule which is found on the Reference Sheet
- using strip heights rather than t-values in the substitution.