

Question 9

A velocity is measured every second:

t (s)	0	1	2	3	4
v (m/s)	0	3	5	6	4

Use T_4 to estimate displacement.

Question 9 – Solution

Step 1: Find the time width.

$$h = \frac{4 - 0}{4} = 1 \text{ second.}$$

Step 2: Apply the trapezoidal formula.

$$\begin{aligned} T_4 &= \frac{h}{2}[v_0 + 2v_1 + 2v_2 + 2v_3 + v_4] \\ &= \frac{1}{2}[0 + 2(3) + 2(5) + 2(6) + 4] \\ &= \frac{1}{2}[0 + 6 + 10 + 12 + 4] \\ &= \frac{1}{2}(32) = 16. \end{aligned}$$

Step 3: Include units. Velocity times time gives displacement in meters.

$$\boxed{16 \text{ m}}$$