Exercise 2

Paper 1 style · No calculator

2 6 marks SL 5.9 · 5.11 ●●○ Typical

A particle moves in a straight line with velocity $v(t) = 4 - t^2$ m s^{-1}, for $0 \leq t \leq 3$.

(a) Find the displacement of the particle at $t = 3$ from its position at $t = 0$. **[3]**

(b) Find the total distance travelled by the particle. **[3]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$\int_0^3 (4 - t^2)\,\mathrm{d}t = \left[4t - \frac{t^3}{3}\right]_0^3$ **M1A1**

$= 12 - 9 = 3$ m **A1**

Total 3 marks

MARKSCHEME (b)

$v = 0$ at $t = 2$ **(M1)**

$\int_0^2 v\,\mathrm{d}t = \frac{16}{3}$, $\int_2^3 v\,\mathrm{d}t = -\frac{7}{3}$ **A1**

$\frac{16}{3} + \frac{7}{3} = \frac{23}{3}$ m **A1**

Total 3 marks