Marked example 3

Paper 2 style · Graphic display calculator

3 6 marks SL 5.9 ●●○ Typical

A particle moves in a straight line with velocity $v(t) = 5e^{-0.3t} - 2\ \text{m s}^{-1}$, for $0 \leq t \leq 8$. At $t = 0$ it is 3 m from a point O.

(a) Find the time at which the particle is at rest. **[1]**

(b) Find the displacement of the particle at $t = 8$ from its position at $t = 0$. **[2]**

(c) Find the total distance travelled. **[2]**

(d) Find the distance of the particle from O at $t = 8$. **[1]**

MARKSCHEME (a)

$t = 3.05 \quad (3.05430\ldots)$ **A1**

Total 1 mark

MARKSCHEME (b)

$\int_0^8 v(t)\,\mathrm{d}t$ **(M1)**

$= -0.845\ \text{m} \quad (-0.845299\ldots)$ **A1**

Total 2 marks

MARKSCHEME (c)

$\int_0^8 |v(t)|\,\mathrm{d}t$ **(M1)**

$= 8.63\ \text{m} \quad (8.62808\ldots)$ **A1**

Total 2 marks

MARKSCHEME (d)

$3 - 0.845\ldots = 2.15\ \text{m}$ **A1**

Total 1 mark

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