

Dr Oliver Mathematics

Kinematics: Part 1

1. A particle moves in a straight line with velocity

$$v(t) = t^2.$$

How far does the particle move between $t = 1$ and $t = 2$?

Solution

We integrate to find the position:

$$v(t) = t^2 \Rightarrow s(t) = \frac{1}{3}t^3 + c,$$

for some constant c . Finally,

$$\begin{aligned} \text{distance} &= \left[\frac{1}{3}t^3 + c \right]_{t=1}^2 \\ &= \left(\frac{8}{3} + c \right) - \left(\frac{1}{3} + c \right) \\ &= \underline{\underline{\frac{7}{3} \text{ or } 2\frac{1}{3}}}. \end{aligned}$$