Cambridge International AS & A Level

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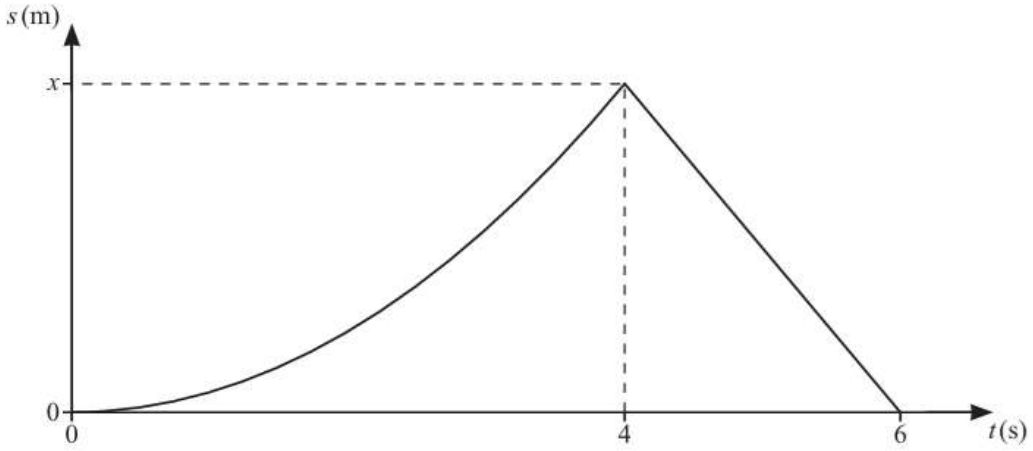
Mathematics 9709/42

Paper 4 Mechanics October/November 2025

Question No (1)

1



The diagram shows the displacement-time graph for the motion of a particle. The particle starts from rest at a point O and travels with constant acceleration $a\,\text{m s}^{-2}$, taking 4 s to move a distance of x m. The particle then returns to O with constant speed of $40\,\text{m s}^{-1}$, over a period of 2 s.

Find the value of x and the value of a.

Solution:

when the particle returns to O

Distance = Speed x time

$x = 40 \times 2$

$x = 80\ m$

Now we shall find the acceleration

Given data

$u = 0$ (start from rest)

$t = 4\ s$

$s = 80\ m$ $\therefore x = 80\ m$

using the formula

$s = ut + \frac{1}{2}at^2$

$80 = 0(4) + \frac{1}{2}(a)(4)^2$

$80 = 8a$

$a = \frac{80}{8}$

$a = 10$

$a = 10\ m/s^2$