

Dimensional Analysis – 2022 GCE AS Mechanics Further Mathematics A**1. June/2022/Paper_Y533/01/No.6**

A particle moves in a straight line with constant acceleration a . Its initial velocity is u and at time t its velocity is v .

It is assumed that v depends only on u , a and t .

- (a) Assuming that this dependency is of the form $u^\alpha a^\beta t^\gamma$, use dimensional analysis to find α and γ in terms of β . [5]
- (b) By noting that the graph of v against t must be a straight line, determine the possible values of β . [2]

You may assume that the units of the given quantities are the corresponding SI units.

- (c) By considering v when $t = 0$ seconds and when $t = 1$ second, derive the equation of motion $v = u + at$, explaining your reasoning. [3]