



QUESTION WORKBOOK

Connected particles and pulleys

Mechanics · Year 12–13

6 questions · 24 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Two particles are joined by a light inextensible string over a smooth pulley. Explain why they share one acceleration and one tension. [2]

- A2** Explain why each particle in a connected system gets its own $F = ma$ equation. [2]

SECTION B · Standard

- B1** Masses of 7 kg and 3 kg hang from a light string over a smooth pulley. Write the two equations of motion and find the acceleration and the tension, taking $g = 9.8 \text{ m s}^{-2}$. [5]

- B2** A 1000 kg car tows a 250 kg trailer with driving force 2000 N, against resistances of 400 N on the car and 100 N on the trailer. Find the acceleration and the tension in the towbar. [5]

- B3** A 4 kg block on a smooth table is joined by a string over a smooth pulley at the table's edge to a 2 kg mass hanging freely. Find the acceleration and the tension. [4]

SECTION C · Stretch

- c1** The 7 kg and 3 kg masses hang from a light string over a smooth pulley, with the 7 kg mass 1.4 m above the floor and the 3 kg mass on the floor. The system is released from rest. Find the speed at which the 7 kg mass strikes the floor, and the greatest height above the floor reached by the 3 kg mass. [6]