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QUESTION WORKBOOK

# Centre of mass of a discrete distribution

Further Mechanics 2 · Year FM

6 questions · 22 marks

PRINT EDITION

**SECTION A** · Warm-up

- A1** Explain why the centre of mass is a weighted average rather than a plain average of the positions. [2]

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- A2** Masses of 3 kg, 5 kg and 2 kg lie at  $x = 0, 4$  and  $10$  on a light rod. Find the centre of mass. [3]

**SECTION B** · Standard

- B1** Masses of 1, 2, 3 and 4 kg are placed at  $(0, 0)$ ,  $(2, 0)$ ,  $(2, 3)$  and  $(0, 3)$ . Find the centre of mass. [4]

- B2** Masses of 4 kg and  $m$  kg are placed at  $x = 2$  and  $x = 8$ . The centre of mass is at  $x = 5$ . Find  $m$ . [4]

- B3** State two physical facts about a rigid body that follow directly from knowing where its centre of mass is. [3]

### SECTION C · Stretch

- C1** Particles of mass 2 kg, 3 kg and 5 kg are attached to a light rectangular framework at the points  $(1, 4)$ ,  $(-2, 0)$  and  $(3, -2)$  respectively. A fourth particle, of mass  $m$  kg, is attached at  $(5, 6)$ . Given that the centre of mass of the four particles lies on the line  $y = x$ , find  $m$ . [6]