



QUESTION WORKBOOK

Impulse and momentum as vectors

Further Mechanics 1 · Year FM

7 questions · 25 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Explain why a particle whose speed is unchanged may still have received an impulse. [2]

- A2** A particle of mass 3 kg moving with velocity $(2\mathbf{i} - 5\mathbf{j})$ m/s receives an impulse of $(6\mathbf{i} + 9\mathbf{j})$ N s. Find its new velocity and speed. [3]

SECTION B · Standard

- B1** A particle of mass 0.4 kg has its velocity changed from $(5\mathbf{i} + 2\mathbf{j})$ m/s to $(-\mathbf{i} + 6\mathbf{j})$ m/s. Find the impulse and its magnitude. [3]

- B2** A particle of mass 4 kg with velocity $(2\mathbf{i} + 3\mathbf{j})$ m/s coalesces with one of mass 6 kg with velocity $(-3\mathbf{i} + \mathbf{j})$ m/s. Find the common velocity and speed. [4]

- B3** A particle is struck and its direction of motion changes but its speed does not. State what this tells you about the direction of the impulse. [3]

- B4** A particle of mass 2 kg moving with velocity $(3\mathbf{i} + 4\mathbf{j})$ m/s receives an impulse that leaves it moving in the direction of $\mathbf{i}$ with speed 6 m/s. Find the impulse. [4]

SECTION C · Stretch

- c1** Two particles P and Q, each of mass 2 kg, are moving on a smooth horizontal plane. Before they collide P has velocity $(3\mathbf{i} + 4\mathbf{j})$ m/s and Q has velocity $(-\mathbf{i} + 2\mathbf{j})$ m/s. After the collision P has velocity $(\mathbf{i} + 6\mathbf{j})$ m/s. Find the velocity of Q after the collision and the impulse exerted on each particle. [6]