



QUESTION WORKBOOK

Work, energy and power

Further Mechanics 1 · Year FM

7 questions · 30 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** State the formula for work done by a constant force, and explain why the normal reaction never appears in an energy equation. [2]

- A2** A force of 40 N acts at 25° to the direction of motion while an object moves 12 m. Find the work done. [2]

SECTION B · Standard

- B1** A particle of mass 60 kg slides from rest 10 m down a slope at 20° to the horizontal, with coefficient of friction 0.3. Find its speed at the bottom, taking $g = 9.8 \text{ m/s}^2$. [6]

- B2** A car of mass 900 kg works at 12 kW. At 20 m/s the resistance is 400 N. Find the acceleration then, and the maximum speed if the resistance stays constant.

[5]

- B3** Explain why a car's acceleration falls as it speeds up, even though the engine works at constant power.

[3]

- B4** A cyclist and bicycle of total mass 80 kg ride at a steady 6 m/s up a slope of 1 in 20 against a resistance of 25 N. Find the power developed.

[4]

SECTION C · Stretch

- C1** A car of mass 1000 kg has an engine working at a constant 20 kW. The resistance to motion is 500 N at all speeds. Find the greatest speed on a level road, the greatest speed up a hill of 1 in 14, and the acceleration up that hill at the moment when the speed is 10 m/s. Take $g = 9.8 \text{ m/s}^2$. [8]