



QUESTION WORKBOOK

Drag and terminal speed

Mechanics · Year 12

AQA 3.4.1.4 · CIE 3.2 · OCR A 3.2.2

9 questions · 27 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Name the resistive or contact forces that act on a solid object moving through air, and state the direction of each relative to the motion. [3]

A2 Define terminal speed. [2]

A3 State how the drag force on an object depends on its speed, for motion through a fluid. [2]

SECTION B · Standard

B1 A skydiver of weight 750 N falls at terminal speed. State the size and direction of the drag force on them, and explain your reasoning. [3]

- B2** A small sphere falls at terminal speed through a liquid. Its weight is 0.30 N and the upthrust on it is 0.05 N . Calculate the drag force on the sphere, and explain why it is not accelerating. [4]

- B3** Sketch and describe the shape of the velocity–time graph for an object dropped from rest that reaches terminal speed, explaining the changing gradient. [3]

SECTION C · Stretch

- C1** A parachutist is falling at terminal speed when the parachute opens. Explain, in terms of the forces, why the speed decreases and how a new, lower terminal speed is reached. [4]

- C2** Assuming the drag force is proportional to the square of the speed, an object experiences a drag of 20 N at 5.0 m s^{-1} . Calculate the drag force at 10 m s^{-1} . [3]

- C3** Explain why a heavier skydiver of the same shape and size reaches a higher terminal speed than a lighter one. [3]