GET BETTER AT PHYSICS · MARK SCHEME

Drag & Terminal Velocity: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.4 · 7 questions · 7 marks

1 mark per correct letter

Worked reasoning for every question

How students did = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5	Q6	Q7
D	D	A	D	B	B	D

Easy

Questions 1–2

1 **D**

Reading a falling-object graph · AQA June 2024 · AS Paper 2 · Q11

The curve rises and then levels off at a constant value. That is the speed of an object reaching terminal speed, which only happens if air resistance is not negligible. With no air resistance the speed would rise in a straight line.

How students did: This was one of the more successful questions on the June 2024 paper.

2 **D**

Two skydivers of different mass · AQA June 2025 · AS Paper 2 · Q13

At terminal speed the upward drag equals the weight, so the upward force on X (120 kg) is greater than on Y (90 kg). X needs a higher speed before the drag is large enough to balance its weight, so X takes longer to reach terminal speed.

How students did: In June 2025 the correct answer was the most popular choice.

Medium

Questions 3–5

3 **A**

Terminal speed with drag kv · AQA June 2023 · A-level Paper 1 · Q23

At terminal speed the drag balances the weight: kv = mg, so v = mg / k.

Watch out: Check with units: mg is in N and k is in N s m^{-1}, so mg / k is in m s^{-1}.

4 **D**

Same size, different mass · AQA June 2018 · AS Paper 2 · Q24

The spheres have the same size, so they have the same drag at the same speed. P is heavier, so it needs a larger drag to balance its weight, which happens at a higher speed: $v_P > v_Q$. Q, with less weight, reaches equilibrium at a lower terminal velocity.

How students did: 38.7% of students got this right in June 2018.

5 **B**

Acceleration of an object thrown upwards · AQA June 2024 · A-level Paper 1 · Q22

On the way up, weight and drag both act downwards, so the deceleration is greater than g. As the object slows the drag gets smaller, so the acceleration falls towards g, reaching g at the top where the speed (and drag) is zero: graph B.

How students did: In June 2024 a wrong answer was the most popular choice.

Hard

Questions 6–7

6 **B**

Opening a parachute · AQA June 2025 · A-level Paper 1 · Q21

At both terminal velocities the drag equals her weight, so the drag at v_2 equals the drag at v_1. Opening the parachute slows her down, but she keeps moving downwards (A is wrong).

> **Watch out:** C: weight and drag act on the same body, so they cannot be a third-law pair. D: gravity also does work on her, so the drag's work is not equal to the change in kinetic energy alone.

How students did: In June 2025 the correct answer was the least popular choice.

7 **D**

Heavy and light balls with drag · AQA June 2022 · AS Paper 2 · Q24

The balls are the same size, so at the same velocity they feel the same drag. The drag gives a smaller deceleration to the heavier ball P ($a = F / m$), so P's motion is closer to motion with no air resistance. P falls faster, so it lands first ($t_P < t_Q$), and drag reduces its horizontal distance less, so $d_P > d_Q$.

> **Watch out:** With no air resistance both balls would land together at the same distance (A). Here the question says air resistance is not negligible.

How students did: This was one of the less successful questions on the June 2022 paper.

End of mark scheme

Answers from AQA's published keys; explanations written for this pack. AQA material is © AQA.
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