FREE REVISION PACK

Drag & Terminal Velocity

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.4

Easy Medium Hard **Multiple choice · past-paper questions**

7	7	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Reading a falling-object graph	AQA June 2024 · AS Paper 2 · Q11	1 mark
2	Easy	Two skydivers of different mass	AQA June 2025 · AS Paper 2 · Q13	1 mark
3	Medium	Terminal speed with drag kv	AQA June 2023 · A-level Paper 1 · Q23	1 mark
4	Medium	Same size, different mass	AQA June 2018 · AS Paper 2 · Q24	1 mark
5	Medium	Acceleration of an object thrown upwards	AQA June 2024 · A-level Paper 1 · Q22	1 mark
6	Hard	Opening a parachute	AQA June 2025 · A-level Paper 1 · Q21	1 mark
7	Hard	Heavy and light balls with drag	AQA June 2022 · AS Paper 2 · Q24	1 mark

Key ideas to have ready

- Drag (air resistance) acts against the motion and increases as speed increases.
- A falling object reaches **terminal velocity** when the upward drag equals its weight: the resultant force and acceleration are then zero.
- For objects of the same size and shape, a heavier one needs more drag to balance its weight, so its terminal velocity is higher.
- While drag acts, acceleration = (weight − drag) / mass for a falling object; it is less than g and falls to zero.

How to use this pack

1. The questions are grouped into levels (Easy, Medium and Hard). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

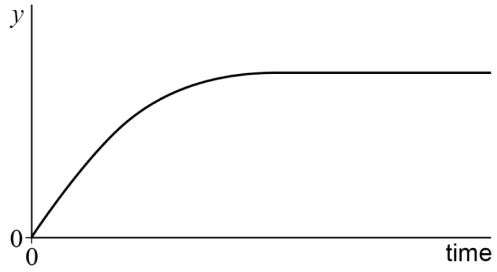
Definitions and one-step ideas. Most students get these right.

Questions 1–2

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2024 · AS Paper 2 · Q11

1 The graph shows the variation with time of a quantity y for an object as it falls through the air.



Which row gives y and the amount of air resistance?

[1 mark]

	y	Air resistance	
A	distance	negligible	⬭
B	distance	not negligible	⬭
C	speed	negligible	⬭
D	speed	not negligible	⬭

AQA June 2025 · AS Paper 2 · Q13

2 Two skydivers **X** and **Y** step out of a stationary hot-air balloon at the same time.
Both skydivers reach terminal speed.

mass of **X** = 120 kg
mass of **Y** = 90 kg

Which row is correct?

[1 mark]

	Time to reach terminal speed	Upward force at terminal speed	
A	time for **X** < time for **Y**	upward force on **X** > upward force on **Y**	⬭
B	time for **X** = time for **Y**	upward force on **X** = upward force on **Y**	⬭
C	time for **X** > time for **Y**	upward force on **X** = upward force on **Y**	⬭
D	time for **X** > time for **Y**	upward force on **X** > upward force on **Y**	⬭

Medium

Two or three steps. Roughly a third to a half of students get these right.

Questions 3–5

AQA June 2023 · A-level Paper 1 · Q23

3 A sphere of mass m falls with speed v.
The resistive force on the sphere is kv, where k is a constant.

What is the terminal speed of the sphere?

[1 mark]

A $\frac{mg}{k}$ ⬭

B $\frac{km}{g}$ ⬭

C kmg ⬭

D $\frac{k}{mg}$ ⬭

AQA June 2018 · AS Paper 2 · Q24

4 Two spheres, **P** and **Q**, have the same volume but **P** has a greater mass. The spheres fall in air at their terminal velocities v_P and v_Q respectively.

Which row states the relationship between v_P and v_Q and the reason?

[1 mark]

	Relationship between v_P and v_Q	Reason	
A	$v_P = v_Q$	Terminal velocity is unaffected by mass	⬭
B	$v_Q > v_P$	The mass of **Q** is less and it accelerates more	⬭
C	$v_Q > v_P$	**P** reaches equilibrium at a lower terminal velocity	⬭
D	$v_P > v_Q$	**Q** reaches equilibrium at a lower terminal velocity	⬭

AQA June 2024 · A-level Paper 1 · Q22

5 An object is thrown vertically upwards at time $t = 0$

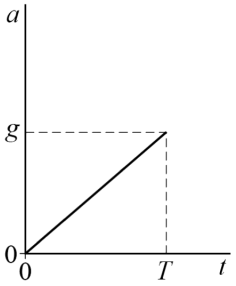
The object reaches its maximum height when $t = T$ and reaches its terminal speed on the way down.

The magnitude of the object's acceleration is a.

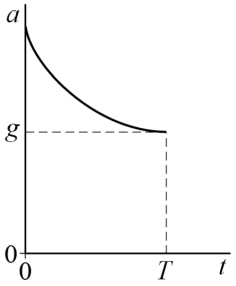
Which graph shows the variation of a with t?

[1 mark]

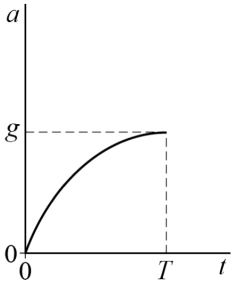
A



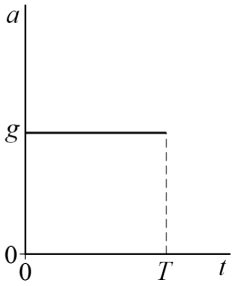
B



C



D



Hard Several steps, often with a trap built in. Fewer than 3 in 10 students get these right. **Questions 6–7**

AQA June 2025 · A-level Paper 1 · Q21

6 A skydiver is falling at a terminal velocity v_1.
When she is at a height h_1 she opens her parachute.
When she is at a height h_2 she reaches a new terminal velocity v_2.

Which is true?

[1 mark]

A The increased air resistance when her height is h_1 causes her initially to move upwards. ⬭

B The drag force when her velocity is v_2 is equal to the drag force when her velocity is v_1. ⬭

C At v_1, her weight and the drag force are an action–reaction pair according to Newton's third law. ⬭

D Between h_1 and h_2, the work done by the drag force is equal to the change in the kinetic energy of the parachute and skydiver. ⬭

AQA June 2022 · AS Paper 2 · Q24

7 **P** and **Q** are two balls of the same diameter. **P** has a greater mass than **Q**.

Both balls are projected at the same time from the top of a tall building that stands on horizontal ground.
Both balls are projected with the same horizontal velocity.
P reaches the ground after time t_P and at a horizontal distance d_P from the building.
Q reaches the ground after time t_Q and at a horizontal distance d_Q from the building.

The air is still and air resistance is **not** negligible.

Which row is correct?

[1 mark]

	Time	Horizontal distance	
A	$t_P = t_Q$	$d_P = d_Q$	⬭
B	$t_P = t_Q$	$d_P > d_Q$	⬭
C	$t_P < t_Q$	$d_P = d_Q$	⬭
D	$t_P < t_Q$	$d_P > d_Q$	⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**