FREE REVISION PACK

Projectile Motion

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	Time of flight	AQA June 2018 · A-level Paper 1 · Q23	1 mark
2	Easy	Particle deflected sideways	AQA June 2024 · A-level Paper 1 · Q21	1 mark
3	Easy	Three objects leaving a bench	AQA June 2019 · AS Paper 2 · Q25	1 mark
4	Medium	Two balls falling side by side	AQA June 2017 · AS Paper 2 · Q28	1 mark
5	Medium	Displacement at maximum height	AQA June 2023 · A-level Paper 1 · Q18	1 mark
6	Medium	Doubling the launch speed	AQA June 2024 · A-level Paper 1 · Q20	1 mark
7	Hard	Acceleration on a trampoline	AQA June 2018 · AS Paper 2 · Q22	1 mark

Key ideas to have ready

- Treat horizontal and vertical motion separately. They share only the time.
- With no air resistance, the horizontal velocity is constant and the vertical acceleration is g downwards.
- Resolve the launch velocity: horizontal u cos θ, vertical u sin θ.
- Use the vertical motion to find the time of flight, then use it horizontally: range = horizontal velocity × time.

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

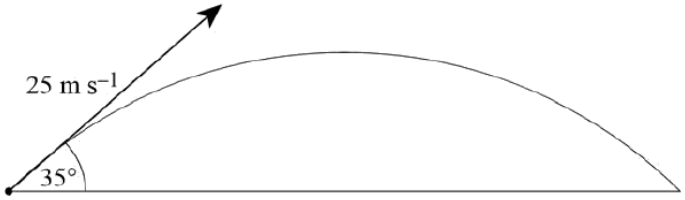
Definitions and one-step ideas. Most students get these right.

Questions 1–3

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

AQA June 2018 · A-level Paper 1 · Q23

1 A projectile is launched with a speed of $25\ \text{m s}^{-1}$ at an angle of $35°$ to the horizontal, as shown in the diagram.



Air resistance is negligible.

What is the time taken for the projectile to return to the ground?

[1 mark]

A 1.5 s ⬭

B 2.1 s ⬭

C 2.9 s ⬭

D 4.2 s ⬭

AQA June 2024 · A-level Paper 1 · Q21

2 A particle travelling horizontally at $1.0 \times 10^{7}\ \text{m s}^{-1}$ enters a region where it has a constant vertical acceleration of $4 \times 10^{14}\ \text{m s}^{-2}$.

What is the horizontal distance the particle has travelled in the region when its vertical displacement is $8 \times 10^{-2}\ \text{m}$?

[1 mark]

A $0.2\ \text{m}$ ⬭

B $0.1\ \text{m}$ ⬭

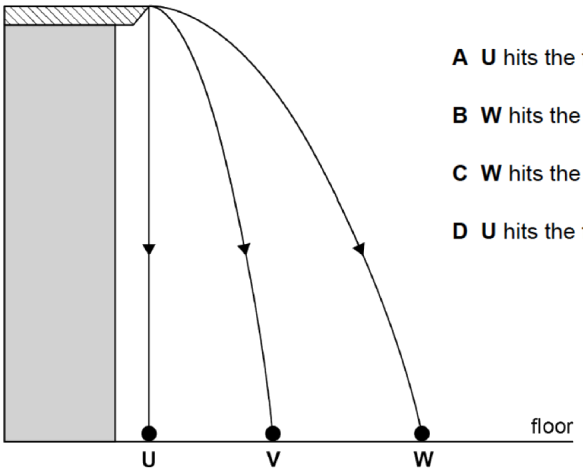
C $2 \times 10^{-8}\ \text{m}$ ⬭

D $0.4 \times 10^{-9}\ \text{m}$ ⬭

AQA June 2019 · AS Paper 2 · Q25

3 Three objects **U**, **V** and **W** leave the edge of a bench at the same time.
The objects fall in the same vertical plane with negligible air resistance.
U is released from rest so that it falls vertically.
V and **W** are projected horizontally.

The paths of the three objects are shown. Which statement is correct?



A **U** hits the floor before **V** and **W**. ⬭

B **W** hits the floor before **V**. ⬭

C **W** hits the floor with the greatest speed. ⬭

D **U** hits the floor with the greatest speed. ⬭

Medium

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

Questions 4–6

AQA June 2017 · AS Paper 2 · Q28

4 Two identical balls, **X** and **Y**, are at the same height and a horizontal distance of $25\ \text{cm}$ apart.

X is projected horizontally with a velocity of $0.10\ \text{m s}^{-1}$ towards **Y** at the same time that **Y** is released from rest. Both **X** and **Y** move freely in the absence of air resistance.

What is the distance between the balls $1.0\ \text{s}$ later?

[1 mark]

A $0.15\ \text{m}$ ⬭

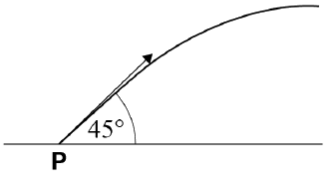
B $0.25\ \text{m}$ ⬭

C $2.4\ \text{m}$ ⬭

D $4.9\ \text{m}$ ⬭

AQA June 2023 · A-level Paper 1 · Q18

5 A ball is kicked from point **P** on level ground. The ball initially travels at $45°$ to the horizontal.
The ball reaches its maximum height after a time of $2.0\ \text{s}$.
Air resistance can be ignored.



What is the displacement of the ball from **P** when at its maximum height?

[1 mark]

A $20\ \text{m}$ ⬭

B $40\ \text{m}$ ⬭

C $45\ \text{m}$ ⬭

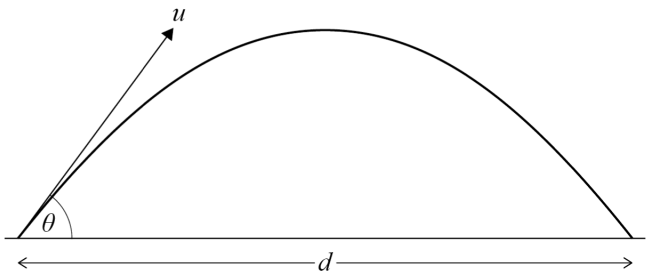
D $60\ \text{m}$ ⬭

AQA June 2024 · A-level Paper 1 · Q20

6 A projectile is fired from ground level over horizontal ground.

Its initial velocity is u at an angle θ to the horizontal.

The range of the projectile is d.



A second projectile is fired with a velocity $2u$ at the same angle.

What is the range of this projectile?
Assume that air resistance is negligible.

[1 mark]

A $\sqrt{2}d$ ⬭

B $2d$ ⬭

C $2\sqrt{2}d$ ⬭

D $4d$ ⬭

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

AQA June 2018 · AS Paper 2 · Q22

7 A girl is bouncing on a trampoline.

Assuming that air resistance is negligible, her acceleration

[1 mark]

A is zero when she is at maximum height. ⬭

B is constant when she is in the air. ⬭

C changes direction as she rises and then falls. ⬭

D is maximum just before she lands on the trampoline. ⬭

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