FREE REVISION PACK

Momentum & Collisions

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.6

Easy | Medium | Multiple choice · past-paper questions

6	6	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	What an inelastic collision conserves	AQA 2021 · AS Paper 2 · Q16	1 mark
2	Easy	Two objects sticking together	AQA June 2023 · AS Paper 2 · Q8	1 mark
3	Easy	Momentum of a falling object	AQA June 2024 · AS Paper 2 · Q20	1 mark
4	Medium	Railway trucks coupling together	AQA June 2019 · AS Paper 2 · Q26	1 mark
5	Medium	Rifle recoil	AQA June 2017 · AS Paper 2 · Q9	1 mark
6	Medium	Forces in an elastic collision	AQA June 2017 · AS Paper 2 · Q29	1 mark

Key ideas to have ready

- Momentum p = mv. It is a vector, so direction matters: give one direction a minus sign.
- In a system with no external forces, total momentum is **conserved** in every collision and explosion.
- In an **elastic** collision kinetic energy is also conserved. In an **inelastic** collision some kinetic energy is transferred to other stores. Objects that stick together always lose kinetic energy.
- Force = rate of change of momentum: $F = \Delta p / \Delta t$.

How to use this pack

1. The questions are grouped into levels (Easy and Medium). 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 2021 · AS Paper 2 · Q16

1 What is true for an inelastic collision between two isolated objects?

[1 mark]

A Both total momentum and total kinetic energy are conserved. ⬭

B Neither total momentum nor total kinetic energy is conserved. ⬭

C Only total kinetic energy is conserved. ⬭

D Only total momentum is conserved. ⬭

AQA June 2023 · AS Paper 2 · Q8

2 An object of mass $0.20\ \text{kg}$ moves with an initial velocity u. It collides with a stationary object of mass $0.30\ \text{kg}$.

The objects stick together when they collide.
No external forces act on the objects.

What is the final velocity of the two objects after the collision?

[1 mark]

A $0.40u$ ⬭

B $0.67u$ ⬭

C $1.5u$ ⬭

D $2.5u$ ⬭

AQA June 2024 · AS Paper 2 · Q20

3 An object is released and falls from rest.
Air resistance is negligible.

After falling for time t, the momentum of the object is

[1 mark]

A constant. ⬭

B proportional to $\sqrt{t}$. ⬭

C proportional to t. ⬭

D proportional to t^2. ⬭

Medium

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

Questions 4–6

AQA June 2019 · AS Paper 2 · Q26

4 A railway truck of mass $2000\ \text{kg}$ travelling horizontally at $1.5\ \text{m s}^{-1}$ collides with a stationary truck of mass $3000\ \text{kg}$.
After the collision they move together.

Which row is correct?

[1 mark]

	Speed of the trucks immediately after collision / m s^{-1}	Effect of collision on total kinetic energy	
A	0.6	no change	⬭
B	0.6	decrease	⬭
C	1.0	no change	⬭
D	1.0	decrease	⬭

AQA June 2017 · AS Paper 2 · Q9

5 A bullet of mass $10\ \text{g}$ is fired with a velocity of $100\ \text{m s}^{-1}$ from a stationary rifle of mass $4.0\ \text{kg}$. Consider the rifle and bullet to be an isolated system.

What are the recoil velocity of the rifle and the total momentum of the rifle and bullet just after firing?

[1 mark]

	Recoil velocity / m s^{-1}	Total momentum / kg m s^{-1}	
A	0.25	0	⬭
B	0.25	1.0	⬭
C	0.40	0	⬭
D	0.40	1.0	⬭

AQA June 2017 · AS Paper 2 · Q29

6 Two bodies of different masses undergo an elastic collision in the absence of any external force.

Which row gives the effect on the total kinetic energy of the masses and the magnitudes of the forces exerted on the masses during the collision?

[1 mark]

	Total kinetic energy	Magnitudes of forces	
A	remains unchanged	same on both masses	⬭
B	remains unchanged	greater on the smaller mass	⬭
C	decreases	same on both masses	⬭
D	decreases	greater on the smaller mass	⬭

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