FREE REVISION PACK

Newton's Laws of Motion

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.5

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	Box pulled up a slope	AQA June 2024 · A-level Paper 1 · Q18	1 mark
2	Easy	Rocket thrust at take-off	AQA June 2018 · A-level Paper 1 · Q22	1 mark
3	Easy	Weighing scales in a lift	AQA June 2024 · A-level Paper 1 · Q23	1 mark
4	Medium	Doubling the mass of a trolley	AQA June 2023 · A-level Paper 1 · Q24	1 mark
5	Medium	Tension in a tow rope	AQA June 2022 · A-level Paper 1 · Q24	1 mark
6	Medium	Why a lighter car laps faster	AQA June 2016 · AS Paper 2 · Q23	1 mark
7	Hard	Newton's third-law pair for weight	AQA June 2022 · A-level Paper 1 · Q25	1 mark

Key ideas to have ready

- **First law:** with no resultant force, an object stays at rest or keeps moving at constant velocity.
- **Second law:** resultant force = mass × acceleration ($F = ma$). Find the resultant first, using a free-body diagram.
- **Third law:** if A pushes or pulls B, then B pushes or pulls A with an equal and opposite force of the same type. The two forces act on *different* bodies.
- On a slope the weight has a component $mg \sin \theta$ down the slope.

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

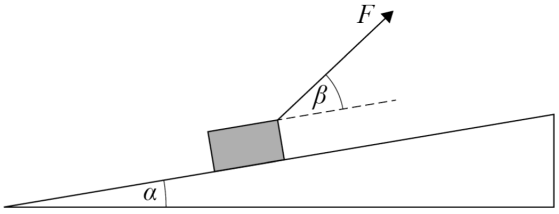
Definitions and one-step ideas. Most students get these right.

Questions 1–3

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

AQA June 2024 · A-level Paper 1 · Q18

1 A force of magnitude F acts on a box of mass m that moves along a frictionless slope.
The slope is at an angle α to the horizontal and the force acts at an angle β to the slope.



What is the magnitude of the acceleration of the block along the slope?

[1 mark]

A $\frac{F}{m}\sin\alpha - g\sin\beta$ ⬭

B $\frac{F}{m}\cos\beta - g\sin\alpha$ ⬭

C $\frac{F}{m}\cos(\alpha+\beta) - g\cos\beta$ ⬭

D $\frac{F}{m}\cos(\alpha+\beta) - g\sin\beta$ ⬭

AQA June 2018 · A-level Paper 1 · Q22

2 Immediately after take-off from the surface of the Earth, a rocket of mass $12\,000\ \text{kg}$ accelerates vertically upwards at $1.4\ \text{m s}^{-2}$

What is the thrust produced by the rocket motor?

[1 mark]

A $1.7 \times 10^4\ \text{N}$ ⬭

B $1.0 \times 10^5\ \text{N}$ ⬭

C $1.3 \times 10^5\ \text{N}$ ⬭

D $1.6 \times 10^5\ \text{N}$ ⬭

AQA June 2024 · A-level Paper 1 · Q23

3 A man has a mass of $75.0\ \text{kg}$.
He stands on weighing scales in a lift that accelerates upwards at $2.60\ \text{m s}^{-2}$.

What is the reading on the scales during the acceleration?

[1 mark]

A 195 N ⬭

B 541 N ⬭

C 736 N ⬭

D 931 N ⬭

Medium

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

Questions 4–6

AQA June 2023 · A-level Paper 1 · Q24

4 A trolley moves down a slope with constant acceleration.
The mass of the trolley is doubled and the trolley moves down the same slope again.
Air resistance and friction are negligible.

Which is correct?

[1 mark]

A The accelerating force is unchanged. ⬭

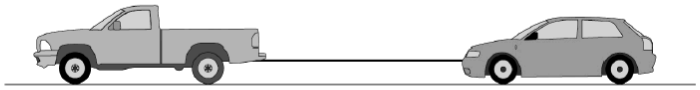
B The accelerating force is halved. ⬭

C The acceleration is unchanged. ⬭

D The acceleration is halved. ⬭

AQA June 2022 · A-level Paper 1 · Q24

5 A truck of mass 2.1×10^3 kg tows a car of mass 1.3×10^3 kg along a horizontal road.
The total resistive force on the car is 1100 N.
The acceleration of the car and truck is 2.3 m s^{-2}.



What is the tension in the tow rope?

[1 mark]

A 3000 N ⬭

B 4100 N ⬭

C 7800 N ⬭

D 8900 N ⬭

AQA June 2016 · AS Paper 2 · Q23

6 The mass of fuel in a racing car decreases during a race. As a result the lap time decreases.

Which of the following could explain this decrease?

[1 mark]

A There is less friction on the race track. ⬭

B The maximum speed of the car has increased. ⬭

C The maximum acceleration and deceleration are greater. ⬭

D The engine is more efficient. ⬭

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

AQA June 2022 · A-level Paper 1 · Q25

7 A parachutist descends to the ground at a constant speed with the parachute open.



Which force, together with the parachutist's weight, makes a pair according to Newton's third law of motion?

[1 mark]

A the drag force on the parachutist from the air ⬭

B the tension in the strings of the parachute ⬭

C the gravitational force of the parachutist on the Earth ⬭

D the lift force on the parachute from the air ⬭

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