GET BETTER AT PHYSICS · MARK SCHEME

Newton's Laws of Motion: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.4.1.5 · 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
B	C	D	C	B	C	C

Easy

Questions 1–3

1 **B**

Box pulled up a slope · AQA June 2024 · A-level Paper 1 · Q18

Along the slope: the force F has component F cos β up the slope and the weight has component mg sin α down it. There is no friction, so a = (F cos β − mg sin α) / m = (F/m) cos β − g sin α.

How students did: Over 70% of students got this right in June 2024.

2 **C**

Rocket thrust at take-off · AQA June 2018 · A-level Paper 1 · Q22

The resultant force is upwards: T − mg = ma, so T = m(g + a) = 12 000 × (9.81 + 1.4) = 1.3×10^5 N.

Watch out: 1.7×10^4 N (A) is just ma. The thrust must also support the weight.

How students did: 56.7% of students got this right in June 2018.

3 **D**

Weighing scales in a lift · AQA June 2024 · A-level Paper 1 · Q23

The scales read the upward push R on the man. R − mg = ma, so R = 75.0 × (9.81 + 2.60) = 931 N.

Watch out: 736 N (C) is his weight, which is the reading only when the lift moves at constant velocity.

Medium

Questions 4–6

4 **C**

Doubling the mass of a trolley · AQA June 2023 · A-level Paper 1 · Q24

The accelerating force down the slope is mg sin θ, which doubles when m doubles. Acceleration = mg sin θ / m = g sin θ, which does not depend on the mass, so it is unchanged.

Watch out: A, B and D all forget that the force and the mass change together.

5 **B**

Tension in a tow rope · AQA June 2022 · A-level Paper 1 · Q24

Apply F = ma to the car alone. Forward tension minus resistance = ma: T − 1100 = 1300 × 2.3 = 2990, so T = 4090 N ≈ 4100 N.

Watch out: 7800 N (C) is the total mass × acceleration. The rope only has to accelerate the car.

6 **C**

Why a lighter car laps faster · AQA June 2016 · AS Paper 2 · Q23

With less fuel the car's mass is smaller. The same engine and braking forces then give a larger acceleration and deceleration (a = F / m), so the car speeds up and slows down for corners more quickly.

How students did: 43% of students got this right in June 2016.

Hard

Question 7

7 **C**

Newton's third-law pair for weight · AQA June 2022 · A-level Paper 1 · Q25

The parachutist's weight is the Earth's gravitational pull on the parachutist. Its third-law partner is the same type of force acting on the other body: the parachutist's gravitational pull on the Earth.

> **Watch out:** The drag and tension balance the weight because the speed is constant (first law), but they act on the parachutist, so they are not a third-law pair with the weight.

How students did: In June 2022 the correct answer was the least popular choice.

End of mark scheme

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