

Predicted Mock Paper 2: mark scheme

Physics · Higher Tier · for the June 2027 exams · 100 marks

How to use this mark scheme

- Each marking point is worth 1 mark unless stated. Alternative acceptable answers are shown with **allow**; answers that do not score are shown with **do not accept**.
- **Calculations:** full marks for the correct answer with no working. If the answer is wrong, award marks for correct working (substitution, rearrangement, unit conversion).
- **Errors carried forward (ecf):** an error in one part is only penalised once; credit later working that correctly uses an earlier wrong value.
- **Lists:** if more answers are given than asked for, a wrong answer cancels a right one.
- **6-mark questions** are marked by levels. Decide the level from the overall quality, then the mark within the level from how much of the indicative content is covered.
- Grade estimate (Higher): roughly 70%+ ≈ 7, 55% ≈ 6, 45% ≈ 5, 35% ≈ 4. These are a guide only: real grade boundaries change every year.

Why these questions? (the prediction)

The prediction is based on AQA's published examiner reports for recent series (June 2023–2025), the specification, and the 2027 arrangements (the Physics Equations Sheet is provided again in 2027).

- **Weak areas are revisited.** In June 2025, Paper 2H induction in transformers (about 2% full marks), the motor effect, momentum and safety features, standard form with prefixes, and scale drawings of resultant forces were answered poorly. Each is tested again here.
- **Recently-tested practicals rotate.** Force and extension (RP6) featured in 2025, so this paper uses acceleration (RP7) and infrared radiation (RP10).
- **Physics-only content** such as moments, pressure in fluids, ultrasound, the generator effect and orbits is weighted more heavily because it has appeared less often.
- **Graph skills** (gradient and area under a velocity–time graph) are a reliable Higher-tier source of marks, so they are included.

Question 1

Why it's predicted: In June 2025, few students drew resultant-force vector diagrams correctly (missing arrowheads, wrong angles), so a scale drawing is very likely to reappear.

Q	Answers / marking points	Mark	Spec
01.1	• Displacement	1	4.5.1.1
01.2	• W = 2.4 × 3.7 • W = 8.9 N (allow 8.88 N)	2	4.5.1.3
01.3	• vertical resultant = 30 − 24 = 6 N (upwards) • 6 N and 8 N drawn tip-to-tail at right angles, to scale, with arrowheads • resultant = 10 N (allow 9.8–10.2 N) • direction: about 37° above the horizontal (allow 35°–39°) in the direction of the wind / 53° from the vertical	4	4.5.1.4
01.4	• a = F ÷ m = 10 ÷ 2.4 • a = 4.2 m/s² Allow ecf from 01.3.	2	4.5.6.2.2

Question 2

Why it's predicted: Required practical 7 (acceleration) has been asked less often than RP6, which appeared in 2025. The 2025 report showed students mixing up the gradient and its reciprocal.

Q	Answers / marking points	Mark	Spec
02.1	**Level 3:** A detailed and coherent answer that covers the points below in a logical sequence, linking ideas clearly. (5–6 marks) **Level 2:** A clear answer covering several relevant points, but with some gaps or less logical order. (3–4 marks) **Level 1:** Simple, relevant statements with little linking or structure. (1–2 marks) **Level 0:** No relevant content. (0 marks) **Indicative content** • trolley on a runway / bench, attached by string over a pulley to a mass hanger • hanging weight provides the accelerating force • light gates (and data logger) / ticker timer / video measure the acceleration (or time between two points and calculate a = Δv ÷ t) • change the force by moving masses from the trolley to the hanger • so the total mass of the system stays constant • release the trolley from the same point each time • repeat for each force and calculate a mean • tilt the runway slightly to compensate for friction Level 3 must include how acceleration is measured and how the total mass is kept constant.	6	4.5.6.2.2 RP7
02.2	• friction acts on the trolley • so a small force is needed before the trolley starts to accelerate / the resultant force is less than the weight on the hanger	2	WS
02.3	• gradient = 2.0 (m/s² per N) (allow 1.9–2.1) • mass = 1 ÷ gradient = 0.50 kg	2	4.5.6.2.2

Question 3

Why it's predicted: Stopping distance calculations with $v^2 - u^2 = 2as$ are common, and in 2025 many students confused equations for constant and changing velocity.

Q	Answers / marking points	Mark	Spec
03.1	• 18 cm	1	4.5.6.3.2
03.2	• $s = v\,t = 25 \times 0.60$ • $s = 15$ m	2	4.5.6.3.1
03.3	• $0^2 - 25^2 = 2 \times (-6.25) \times s$ • $s = 625 \div 12.5$ • $s = 50$ m	3	4.5.6.1.5
03.4	• 65 m (allow ecf)	1	4.5.6.3.1
03.5	• less friction between the tyres and the road • so a smaller braking force / smaller deceleration and a longer braking distance • thinking distance is not affected, so the stopping distance increases	3	4.5.6.3.3

Question 4

Why it's predicted: In 2025, only 15% of students gained full marks explaining a safety feature using momentum. Expect this to be tested again.

Q	Answers / marking points	Mark	Spec
04.1	• $p = 0.16 \times 25$ • $p = 4.0$ kg m/s	2	4.5.7.1
04.2	• momentum before = $2.0 \times 3.0 = 6.0$ kg m/s • momentum after = momentum before: $6.0 = 3.0 \times v$ • $v = 2.0$ m/s	3	4.5.7.2
04.3	• the foam crushes / squashes, which increases the time for the head to stop • the change in momentum is the same • so the rate of change of momentum is smaller • so the force on the head is smaller ($F = m\,\Delta v \div \Delta t$) Do not accept 'cushions the impact' or 'absorbs the force' on their own.	4	4.5.7.3

Question 5

Why it's predicted: Moments and pressure in fluids are Physics-only topics that have appeared less often recently, and the 2025 report noted weak explanations of pressure.

Q	Answers / marking points	Mark	Spec
05.1	• $M = 40 \times 0.25$ • $M = 10$ N m	2	4.5.4
05.2	• anticlockwise moment = $300 \times 1.5 = 450$ N m • $450 = 750 \times d$ (principle of moments) • $d = 0.60$ m	3	4.5.4
05.3	• $p = 12 \times 1030 \times 9.8$ • $p = 120\,000$ Pa (allow 121 128 Pa / 1.2×10^5 Pa)	2	4.5.5.1.2
05.4	• pressure in a liquid increases with depth • so the pressure on the bottom surface of the object is greater than on the top surface • this creates a resultant force upwards (upthrust)	3	4.5.5.1.2

Question 6

Why it's predicted: In 2025, about half of students could not convert a wavelength using standard form and prefixes. Ultrasound and EM hazards are reliable Paper 2 content.

Q	Answers / marking points	Mark	Spec
06.1	• radio, microwaves, infrared, visible	1	4.6.2.1
06.2	• 98 MHz = 9.8×10^7 Hz • $\lambda = v \div f = 3.0 \times 10^8 \div 9.8 \times 10^7$ • $\lambda = 3.1$ m (allow 3.06 m)	3	4.6.1.2
06.3	• ultraviolet has a higher frequency / transfers more energy • it can damage cells / it is ionising, causing skin to age prematurely and increasing the risk of skin cancer	2	4.6.2.3
06.4	• distance travelled = $1500 \times 1.2 \times 10^{-4} = 0.18$ m • this is there and back, so ÷ 2 • distance = 0.09 m (9 cm)	3	4.6.1.5
06.5	• longitudinal	1	4.6.1.1

Question 7

Why it's predicted: Required practical 10 has rarely been the extended-response practical, and black body radiation (Physics only) links to climate questions.

Q	Answers / marking points	Mark	Spec
07.1	**Level 3:** A detailed and coherent answer that covers the points below in a logical sequence, linking ideas clearly. (5–6 marks) **Level 2:** A clear answer covering several relevant points, but with some gaps or less logical order. (3–4 marks) **Level 1:** Simple, relevant statements with little linking or structure. (1–2 marks) **Level 0:** No relevant content. (0 marks) **Indicative content** • use a Leslie cube with four different surfaces (e.g. matt black, shiny black, matt white, shiny silver) • fill the cube with hot water from a kettle • use an infrared detector / thermometer to measure the infrared emitted by each surface • place the detector the same distance from each surface • take readings at the same time / same water temperature for each surface • repeat and calculate means • safety: take care with hot water (e.g. place the cube on a heat-proof mat) • the surface with the highest reading is the best emitter Level 3 must include a way of making sure each surface is at the same temperature and the detector is the same distance away.	6	4.6.3.1 RP10
07.2	• the Earth absorbs radiation from the Sun • the Earth emits radiation into space • the rates are (roughly) equal, so the temperature stays constant	3	4.6.3.2

Question 8

Why it's predicted: In 2025, only about a third of students scored any marks on the motor effect, and motors were often confused with generators. Both are tested here.

Q	Answers / marking points	Mark	Spec
08.1	• iron is magnetically soft / loses its magnetism quickly when the current is switched off (so the electromagnet can be turned off) • steel keeps its magnetism / is magnetically hard	2	4.7.1.2
08.2	• 5.0 cm = 0.050 m • F = 0.080 × 2.5 × 0.050 • F = 0.010 N	3	4.7.2.2
08.3	• rotate the coil faster • use more turns on the coil / a stronger magnet Any two.	2	4.7.3.2
08.4	• a dynamo produces a direct p.d. / the p.d. does not reverse (it stays positive) • because a split-ring commutator is used instead of slip rings	2	4.7.3.2

Question 9

Why it's predicted: In 2025, only about 2% of students gained full marks explaining induction in a transformer. This is one of the strongest predictions on the paper.

Q	Answers / marking points	Mark	Spec
09.1	• an alternating current in the primary coil produces a changing magnetic field • the iron core is easily magnetised and carries the changing field to the secondary coil • the changing magnetic field in the core passes through the secondary coil • this induces an (alternating) potential difference across the secondary coil Do not accept 'the current flows through the core' or 'creates a p.d.' instead of 'induces'.	4	4.7.3.4
09.2	• 11 kV = 11 000 V • Vs = 11 000 × 46 ÷ 2200 • Vs = 230 V	3	4.7.3.4

Question 10

Why it's predicted: Orbits and the formation of elements are Physics-only content. In 2025, circular orbit physics was weak, so explaining speed and radius is likely.

Q	Answers / marking points	Mark	Spec
10.1	• Helium	1	4.8.1.2
10.2	• elements heavier than iron are formed in a supernova (explosion of a massive star) • the explosion spreads the elements throughout the universe • the Earth formed from a cloud of dust and gas containing these elements	3	4.8.1.2
10.3	• closer to the Earth, the gravitational force is stronger • to stay in a stable orbit with a smaller radius • the satellite must move faster	3	4.8.1.3
10.4	• the expansion of the universe is accelerating • dark energy has been suggested to explain this (it is not yet understood)	2	4.8.2

Question 11

Why it's predicted: Gradient and area under a velocity–time graph are Higher-tier skills that appear regularly on Paper 2.

Q	Answers / marking points	Mark	Spec
11.1	• constant velocity of 8 m/s	**1**	4.5.6.1.5
11.2	• a = 8 ÷ 10 • a = 0.80 m/s²	**2**	4.5.6.1.5
11.3	• area under the graph • = ½ × 10 × 8 + 30 × 8 + ½ × 20 × 8 = 40 + 240 + 80 • = 360 m	**3**	4.5.6.1.5
11.4	• v = 360 ÷ 60 • v = 6.0 m/s (allow ecf from 11.3)	**2**	4.5.6.1.2