

EDEXCEL · GCSE COMBINED SCIENCE 1SC0

Physics — Higher Tier, Paper 1

June 2025 exam series

MARK SCHEME

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Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
In Combined Science Physics
(1SC0) Paper 1PH

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		Command Word	
Strand	Element	Describe	Explain
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required
AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Combined Science – Physics 1SC0_1PH

Question number	Answer	Additional guidance	Mark
1(a)(i)	use of $(F=)0.92$ (N) (1) substitution and rearrangement (1) (acceleration) = $\frac{0.92}{0.25}$ evaluation (1) (acceleration) = 3.7 (m/s²)	allow 0.92×0.25 OR $\frac{0.25}{0.92}$ allow MP2 for use of incorrect force giving $\frac{2.5}{0.25}$ OR $\frac{3.42}{0.25}$ OR $\frac{1.58}{0.25}$ OR $\frac{0.46}{0.25}$ allow values that round to 3.7 e.g. 3.68 allow values that round to 3.7×10^{-3} or 0.0037 for 2 marks (g instead of kg) allow for 2 marks an evaluation of 10(.0) OR 14 OR 13.7 OR 6.3(2) OR 1.8(4) (use of incorrect force) award full marks for the correct answer without working ignore negative values throughout if no other marks scored allow 1 mark for $a = \frac{F}{m}$	(3) AO2.1

Question number	Answer	Additional guidance	Mark
1(a)(ii)	1.6 (N) OR 1.58 (N)		(1) AO3.1

Question number	Answer	Additional guidance	Mark
1(b)(i)	2.4 (N) OR 2.375 (N) OR 2.38 (N)		(1) AO2.2

Question number	Answer	Additional guidance	Mark
1(b)(ii)	straight line extended to meet $h = 0.80$ m axis (1) 3.1 (N) (1)	judge by eye allow 3.05 to 3.20 inclusive award full marks for the correct answer without working	(2) AO2.2

Question number	Answer	Additional guidance	Mark
1(b)(iii)	select two points on the line (1) evaluation (1) 3.90 ± 0.10 (N/m)	allow triangle drawn on graph award full marks for the correct answer without working	(2) AO2.2

Total for Question 1 = 9 marks

Question number	Answer	Additional guidance	Mark
2(a)(i)	10(.0) (cm)		(1) AO1.1

Question number	Answer	Additional guidance	Mark
2(a)(ii)	12(.0) (cm)		(1) AO1.1

Question number	Answer	Additional guidance	Mark
2(a)(iii)	a description to include time a wave (crest) over a measured/fixed/known/stated distance (1) use (speed =) $\frac{\text{distance}}{\text{time}}$ (1) ALTERNATIVE METHOD (determine frequency by measuring) the time taken for a set number of waves to pass a point (1) use (speed =) $f \times \lambda$ (1)	measure how long it takes for a wave to travel a set distance measure distance travelled in a stated time (count) the number of waves in a specified time 'measure frequency' is not sufficient for this mark use (speed =) $f \times (0.)12$	(2) AO1.2

Question number	Answer	Additional guidance	Mark
2(b)(i)	any one from electromagnetic (wave) (1) ripples/water (waves) (1) (waves on a) string (1)	radio(waves) / microwaves / IR / infrared / visible / light / UV / ultraviolet / X(-ray) / gamma / γ allow sea / ocean / tidal wave ignore waves on a spring ignore earthquake or seismic P or S	(1) AO1.1

Question number	Answer	Additional guidance	Mark
2(b)(ii)	a description to include: (causes it to) vibrate/oscillate (1) perpendicular/at right angles to (the direction of travel of) the wave (1)	can be shown on diagram allow shake in this context allow double headed arrow(s) $\leftrightarrow$ or $\updownarrow$ centred on R on diagram (to show vibration) allow "up and down" or "forwards and backwards" for vibration perpendicular/at right angles to (direction of) energy transfer allow horizontal arrow(s) $\rightarrow$ or $\leftarrow$ centred on R on diagram (to show direction) allow side to side OR left to right OR in and out for perpendicular $\leftrightarrow$ centred on R scores 2 marks ignore possible eventual consequences e.g. rock breaks up / heats up	(2) AO2.1

Question number	Answer	Additional guidance	Mark
2(b)(iii)	calculation of distance from R to L (1) $(= 4500 \times 3.8)$ $= 17\,000 \text{ (m)}$ calculation of distance from X to R (1) $(= 20\,000 - 17\,000)$ $= 3000 \text{ (m)}$ ALTERNATIVE METHOD calculation of time X to L (1) $(20\,000 / 4500 =) 4.44$ calculation of distance from X to R (1) $(= (4.44 - 3.8) \times 4500)$ $= 3000 \text{ (m)}$	accept 17 100 allow ECF from MP1 accept numbers which round to 3000 e.g. 2900 accept numbers which round to 3000 e.g. 2900 award full marks for the correct answer without working	(2) AO2.1

Total for Question 2 = 9 marks

Question number	Answer	Additional guidance	Mark
3(a)	a description of method to include four from: draw around the block (1) shine a ray on the block (1) mark/draw/trace where the ray enters (1) mark/draw/trace where the ray exits (1) join point of entry to point of exit (1)	point the ray box at the block can credit from drawing with glass block and ray box/light box labelled mark/draw/trace incident ray mark/draw/trace emerging ray allow 'draw light rays' for 1 mark if mp3 and mp4 not scored	(4) AO1.2

Question number	Answer	Additional guidance	Mark
3(b)(i)	(wavelength) increases (from glass to air)	gets longer/gets bigger allow quoted values allow (wavelength) decreases from air to glass	(1) AO3.1

Question number	Answer	Additional guidance	Mark
3(b)(ii)	(frequency) doesn't change	remains constant / stays the same / nothing allow quoted values	(1) AO3.1

Question number	Answer	Additional guidance	Mark
3(b)(iii)	substitution (1) (speed in glass =) $6.4 \times 10^{14} \times 350 \times 10^{-9}$ evaluation of speed in glass (1) 2.2×10^8 (m/s) subtraction involving 3×10^8 (m/s) (1) ALTERNATIVE METHOD calculation of change in wavelength for blue light (1) $470 \times 10^{-9} - 350 \times 10^{-9}$ OR 120×10^{-9} substitution (1) (difference in speed =) $6.4 \times 10^{14} \times 120 \times 10^{-9}$ evaluation (1) 7.7×10^7 (m/s)	allow numbers that round to 2.2×10^8 e.g. 2.24×10^8 independent mark 7.6×10^7 (m/s) scores 3 marks ecf their change in wavelength for this mark only award full marks for the correct answer without working	(3) AO3.2

Total for Question 3 = 9 marks

Question number	Answer	Additional guidance	Mark
4(a)(i)	rearrangement (1) $h = \frac{\Delta GPE}{m \times g}$ evaluation (1) (h) = 56 (m)	$h = \frac{39\,000}{70 \times 10}$ allow numbers that round to 56 (m) e.g. 55.71 allow numbers that round to 57 (m) e.g. 56.85 (use of $g=9.8\text{ N/kg}$) award full marks for correct answer without working	(2) AO3.2

Question number	Answer	Additional guidance	Mark
4(a)(ii)	selection of $v^2 - u^2 = 2 \times a \times x$ (1) rearrangement (1) $a = \frac{v^2 - u^2}{2 \times x}$ evaluation (1) 1.8 (m/s ²) ALTERNATIVE METHOD calculation of time = 14.814 using time = distance / average speed (1) substitution (1) $a = (v-u) / t = \frac{27(-0)}{14.814}$ evaluation (1) 1.8 (m/s ²)	$27^2 - 0^2 = 2 \times a \times 200$ allow $27^2 - 0^2 = 2 \times a \times \text{their (a)(i)}$ $a = \frac{27^2 - 0^2}{2 \times 200}$ allow $a = \frac{27^2 - 0^2}{2 \times \text{their (a)(i)}}$ no ecf for evaluation allow numbers that round down to 1.8 (m/s ²) e.g. 1.8225 award full marks for correct answer without working.	(3) AO3.2

Question number	Answer	Additional guidance	Mark
4(a)(iii)	An explanation linking (measure) GPE at top/start and KE at bottom/end (1) energy (at top) subtract energy (at bottom) (1)	allow subtraction of any energies allow difference for subtraction award 2 marks for GPE at top subtract KE at bottom allow for 2 marks 39 000 – 25 515 OR 13485	(2) AO3.3a

Question number	Answer	Additional guidance	Mark
4(b)(i)	Any one from: direction is changing (1) velocity is a vector (1)	allow velocity has magnitude and direction ignore acceleration ignore reference to centripetal force ignore speed is changing	(1) AO2.1

Question number	Answer	Additional guidance	Mark
4(b)(ii)	tangent drawn to curve (at 2.5 s) (1) evaluation of gradient (1) (gradient =) 6.0 ± 1.0 (m/s)	accept hypotenuse of triangle dependent on MP1	(2) AO3.2

Total for Question 4 = 10 marks

Question number	Answer	Additional guidance	Mark
5(a)(i)	selection of (p =) $m \times v$ (1) evaluation (1) (momentum =) 15 unit (1) kg m/s	(momentum =) 0.43×36 allow numbers that round to 15 e.g. 15.48 allow 15.5 award 2 marks for the correct value without working kg m s⁻¹ allow N s	(3) AO2.1

Question number	Answer	Additional guidance	Mark
5(a)(ii)	selection of force = <u>change in momentum</u> (1) time evaluation (1) 0.0056 (s) ALTERNATIVE METHOD selection of $F=ma$ and $a=(v-u)/t$ (1) evaluation (1) 0.0057 (s)	$2700 = \frac{15}{\text{time}} \text{ OR}$ $2700 = \frac{\text{time}}{\text{their (a)(i)}} \text{ OR}$ $(\text{time}) = \frac{15}{2700} \text{ OR}$ $(\text{time}) = \frac{\text{their (a)(i)}}{2700}$ allow numbers that round to 0.0056 e.g. 0.005555 (using $\Delta p=15$) or numbers that round to 0.0057 e.g. 0.005733 (using $\Delta p=15.48$) allow ECF from their (a)(i) for 2 marks without working allow numbers that round to 0.0057 e.g. 0.00573 award full marks for the correct value without working	(2) exp AO2.1

Question number	Answer	Additional guidance	Mark
5(a)(iii)	explanation linking equal and opposite forces (1) (which are) force exerted by the foot (on the ball) (1) (and) force exerted by the ball (on the foot) (1)	accept action and reaction are equal and opposite (which are) force exerted (by the foot) on the ball (1) (and) force exerted (by the ball) on the foot (1) award 2 marks for force on ball = force on foot award 3 marks for force on ball = force on foot but in opposite direction ignore references to other named forces and energy	(3) AO2.1

Question number	Answer	Additional guidance	Mark
5(b)	explanation linking (total) momentum of the system is constant (1) (therefore as) momentum = mass x velocity (1) (and) more <u>mass</u> (is moving after collision) (1)	momentum before collision = momentum after collision momentum is conserved / stays the same $p = mv$	(3) AO1.1

Total for Question 5 = 11 marks

Question Number	Answer	Mark
6(a)(i)	The only correct answer is D Bq <i>A is not correct because it is the unit of pressure</i> <i>B is not correct because it is the unit of moment</i> <i>C is not correct because it is the unit of time</i>	(1) AO1.1

Question Number	Answer	Mark
6(a)(ii)	The only correct answer is A <i>C and D are not correct because they start with most penetrating</i> <i>B is not correct because gamma is more penetrating than beta</i>	(1) AO1.1

Question Number	Answer	Additional guidance	Mark
6(a)(iii)	selection of (KE =) $\frac{1}{2} mv^2$ (1) evaluation (1) $6.6 \times 10^{-18} \text{ (J)}$	$\frac{1}{2} \times 9.1 \times 10^{-31} \times [3.8 \times 10^6]^2$ allow values that round to $6.6 \times 10^{-18} \text{ (J)}$ e.g. $6.5702 \times 10^{-18} \text{ (J)}$ award full marks for the correct answer without working	(2) AO2.1

Question Number	Indicative content	Mark
6c*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. AO1 alpha nature (may be in context of emitted from nucleus) • made up of 4 particles / 2 protons and 2 neutrons • helium nucleus • is positively charged (+2) alpha decay effect on nucleus • when emitted, atomic/proton number of nucleus goes down by 2 • when emitted, mass/nucleon number of nucleus goes down by 4 • element changes • charge goes down by 2 • mass goes down by 4 gamma nature • (considered to be) a (electromagnetic / EM) wave • photon • (very) high frequency / short wavelength • no charge / no mass gamma decay effect on nucleus • nucleus does not change (in atomic number or mass number) • nucleus undergoes rearrangement / becomes more stable / loses energy / mass converts to energy • element does not change Ionisation / penetration • gamma is weakly ionising / highly penetrating / stopped by (thick) lead • alpha is highly ionising / weakly penetrating / stopped by paper / few cm of air	(6) AO1.1

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	- Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) - Presents a comparison with some structure and coherence. (AO1)
Level 2	3-4	- Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) - Presents a comparison that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	- Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) - Presents a comparison that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels
	0	No rewardable material.	e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the response at the top, or the bottom, of that level. At each level ionising/penetrating ability may be used instead of a nature or an effect to place the response in the lower end of that level.
Level 1	1–2	<u>Additional guidance</u> isolated facts: related to alpha or gamma	<u>Possible candidate responses</u> alpha is a helium nucleus OR gamma is a wave
Level 2	3–4	<u>Additional guidance</u> Limited comparison that includes nature of both or effect of decay of both or nature and effect of one or nature of one and effect of other	<u>Possible candidate responses</u> Alpha is a helium nucleus and gamma is a wave. OR When alpha emitted the mass number decrease by 4 and when gamma emitted nucleus doesn't change. OR Gamma is a wave and when gamma is emitted the nucleus loses energy. OR Alpha is positively charged and when gamma is emitted nucleus undergoes rearrangement.
Level 3	5–6	<u>Additional guidance</u> detailed comparison that includes nature and effect of either alpha or gamma AND nature or effect of the other	<u>Possible candidate responses</u> Alpha is helium nucleus. When alpha emitted the mass number decreases by 4. When gamma emitted nucleus doesn't change.

Total for Question 6 = 12 marks

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