AS
PHYSICS
7407/1

Paper 1

Mark scheme

June 2026

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

Physics - Mark scheme instructions to examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1
In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2
A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3
Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

3. Marking points

3.1 Marking of lists
This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of errors/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (often prefaced by 'Ignore' in the mark scheme) are not penalised.

3.2 Marking procedure for calculations

Full marks can usually be given for a correct numerical answer without working shown unless the question states 'Show your working'. However, if a correct numerical answer can be evaluated from incorrect physics then working will be required. The mark scheme will indicate both this and the credit (if any) that can be allowed for the incorrect approach.
However, if the answer is incorrect, mark(s) can usually be gained by correct substitution/working and this is shown in the 'extra information' column or by each stage of a longer calculation.

A calculation must be followed through to answer in decimal form. An answer in surd form is never acceptable for the final (evaluation) mark in a calculation and will therefore generally be denied one mark.

3.3 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward, consequential marking and arithmetic errors

Allowances for errors carried forward are likely to be restricted to calculation questions and should be shown by the abbreviation ECF or *conseq* in the marking scheme.

An arithmetic error should be penalised for one mark only unless otherwise amplified in the marking scheme. Arithmetic errors may arise from a slip in a calculation or from an incorrect transfer of a numerical value from data given in a question.

3.5 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited (eg fizix) **unless** there is a possible confusion (eg defraction/refraction) with another technical term.

3.6 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.7 Ignore / Insufficient / Do <u>not</u> allow

'Ignore' or 'insufficient' is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

'Do **not** allow' means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

3.8 Significant figure penalties

Answers to questions in the practical sections (7407/2 – Section A and 7408/3A) should display an appropriate number of significant figures. For non-practical sections, an A-level paper may contain up to 2 marks (1 mark for AS) that are contingent on the candidate quoting the **final** answer in a calculation to a specified number of significant figures (sf). This will generally be assessed to be the number of sf of the datum with the least number of sf from which the answer is determined. The mark scheme will give the range of sf that are acceptable but this will normally be the sf of the datum (or this sf −1).

An answer in surd form cannot gain the sf mark. An incorrect calculation **following some working** can gain the sf mark. For a question beginning with the command word 'Show that…', the answer should be quoted to **one more** sf than the sf quoted in the question eg 'Show that X is equal to about 2.1 cm' – answer should be quoted to 3 sf. An answer to 1 sf will not normally be acceptable, unless the answer is an integer eg a number of objects. In non-practical sections, the need for a consideration will be indicated in the question by the use of 'Give your answer to an appropriate number of significant figures'.

3.9 Unit penalties

An A-level paper may contain up to 2 marks (1 mark for AS) that are contingent on the candidate quoting the correct unit for the answer to a calculation. The need for a unit to be quoted will be indicated in the question by the use of 'State an appropriate SI unit for your answer'. Unit answers will be expected to appear in the most commonly agreed form for the calculation concerned; strings of fundamental (base) units would not. For example, 1 tesla and 1 Wb m^{-2} would both be acceptable units for magnetic flux density but 1 kg m^2 s^{-2} A^{-1} would not.

3.10 Level of response marking instructions

Level of response mark schemes are broken down into three levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are two marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Determining a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2.

The exemplar materials used during standardisation will help you to determine the appropriate level. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Answers	Additional comments/Guidance	Mark	AO
01.1	number of nucleons = $3.45 \times 10^{-25} \div 1.7 \times 10^{-27}$ **OR** mass of protons = $82 \times 1.7 \times 10^{-27}$ **OR** number of neutrons = their nucleon number $- 82$ **OR** number of neutrons = their mass difference $\div 1.7 \times 10^{-27}$✓ (number of neutrons =) 121 ✓	Alternative Method: condone use of $1.67(5) \times 10^{-27}$ for mass of neutron and $1.67(3) \times 10^{-27}$ for mass of proton Accept any integer number in range 120 to 125 A correct answer gets both marks	2	AO2

Question	Answers	Additional comments/Guidance	Mark	AO
01.2	(specific charge =) $3.8(0) \times 10^{7}$ (C kg^{-1}) ✓	ECF = $\frac{82 \times 1.6 \times 10^{-19}}{(\text{their answer to } \mathbf{01.1} + 82) \times 1.67 \times 10^{-27}}$ Accept answers in range 3.7×10^{7} to 3.9×10^{7} (C kg^{-1})	1	AO2

Question	Answers	Additional comments/Guidance	Mark	AO
01.3	One alpha and two beta minus ✓	Tick in the 2nd box only Auto-marker	1	AO3
Total			**4**	

Question	Answers	Additional comments/Guidance	Mark	AO
02.1	dud ✓	**Mark with Question 02.2** • Accept dud combination in any order • Accept down, up, down in any order • Do not accept capital D for lower case d	1	AO2

Question	Answers	Additional comments/Guidance	Mark	AO
02.2	**X** = electron antineutrino ✓ (must be an antilepton) for conservation of (electron) lepton **number** with a(n) (anti)lepton on answer line ✓ (reference to **X** being neutral for) conservation of charge **AND** a neutral particle on answer line ✓	Condone **X**= antielectron neutrino **Mark with Question 02.1** MP1 Allow the symbol for electron antineutrino $\overline{\nu_e}$ MP2 Allow an attempted application of conservation of lepton number ($(-)1 + 0 \rightarrow 0 + (-)1$) Allow consistent signs on leptons but do not allow non-zero lepton numbers for baryons. MP3 Allow a clear application of conservation of charge (0 + 1(e) → 0 + 1(e)) **AND** a neutral particle on answer line Reference to other conservation laws is insufficient for MP2 or MP3.	3	2 x AO2 1 x AO3

Question	Answers	Additional comments/Guidance	Mark	AO
02.3	Use of their $E = \frac{hc}{\lambda}$ **OR** Use of their $E = hf$ and $c =$ their $f \times \lambda$ ✓ (wavelength =) 2.4×10^{-12} (m) ✓	'Use of' means clear substitution of their E, h and c or rearrangement of equation to give $(\lambda =) \frac{hc}{E}$ Expect to see $E = 8.2 \times 10^{-14}$ J ; allow POT on this substitution OR Condone 1.64×10^{-13} J An answer of 1.2×10^{-12} (m) gains MP1 Accept answer that rounds to 2.4×10^{-12} (m)	2	1 x AO1 1 x AO2
Total			**6**	

Question	Answers	Additional comments/Guidance	Mark	AO
03.1	• **Comment about energy**: ✓ - progressive waves transfer energy - stationary waves don't transfer energy • **Comment about displacement**: ✓ - all points reach max displacement in a progressive - max displacement only occurs at certain points in stationary wave - stationary waves have antinodes - there are points of permanently zero displacement in stationary wave - no points of permanently zero displacement in a progressive wave - stationary waves have nodes • **Comment about phase**: ✓ - points of equal phase are separated by a wavelength in progressive wave - all points are in phase between two nodes on a stationary wave - points of antiphase are separated by half of a wavelength in a progressive wave - points of antiphase are separated by nodes in a stationary wave - phase varies continuously in a progressive wave	Ignore description of how waves are formed. Condone: (oscillating) points are either in phase or antiphase in a stationary wave	3	AO1

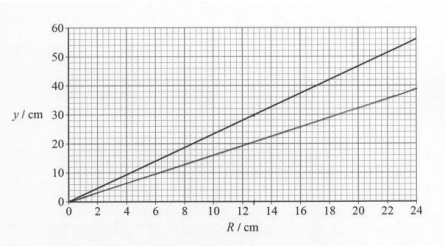
Question	Answers	Additional comments/Guidance	Mark	AO
03.2	Wavelength = 2×75 (cm) AND conversion to metres seen **OR** use of $v = f \times$ their λ ✓	Accept use of their lambda as: • 150 cm • 0.75 m Accept use of $f = \frac{v}{2L}$ by rearrangement or substitution of L and f condone POT error in L for this approach.	2	1 x AO1 1 x AO2
	(speed) = 68 (m s^{-1}) ✓	Calculator display=67.5 (ms^{-1})		

Question	Answers	Additional comments/Guidance	Mark	AO
03.3	Use of $f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$ **OR** fundamental frequency = $\frac{45}{2} = 22.5$ ✓ (tension =) 32 (N) ✓	In MP1, condone one error in substitution of their f or l AND Condone POT error in l Expect to see $l = 0.75$ m and $f = 22.5$ Hz Accept a rearrangement where T would be subject as 'use of' for **MP1** $(T =) f^2 4l^2 \mu$ Allow $c = f\lambda$ and $c = \sqrt{\frac{T}{\mu}}$ Expect to see f = 45 Hz and $\lambda = 0.75$ m **OR** Use of their $f_2 = \frac{1}{l}\sqrt{\frac{T}{\mu}}$ Expect to see $f_{(2)} = 45$ Hz and $l = 0.75$ m Accept a rearrangement where T would be subject as 'use of' for **MP1** $(T =) f^2 l^2 \mu$ Calculator display = 31.89375	2	1 x AO1 1 x AO3

Total			**7**

Question	Answers	Additional comments/Guidance	Mark	AO
04.1	Max **one** from: ✓ • spectrometers / to analyse light to determine λ (of named light source) / to analyse light to identify elements (in a sample) • analysis of light from Sun / stars / produce line spectra with light from stars • provide monochromatic source / select particular λ • multiplexing / demultiplexing • tuning elements in lasers / stabilize / filter laser light • creating holograms • x-ray crystallography • in optical encoders for high-precision motor control • in e-readers to spread light evenly • identify (some) authentic bank notes • application associated with entertainment, eg light shows / diffraction glasses		1	AO1

Question	Answers	Additional comments/Guidance	Mark	AO
04.2	Max **two** from: ✓✓ • Calculates θ in range $47.7°$ to $50.2°$ • Use of $n\lambda = d \sin\theta$ with their θ less than $90°$ and their integer value for n • Identifies **P** (or **Q**) as second order / $n = 2$ (slit spacing =) 1.7×10^{-3} (mm) ✓	Accept answer in range 1.6×10^{-3} to 1.7×10^{-3}	3	1 x AO1 1 x AO2 1 x AO3

Question	Answers	Additional comments/Guidance	Mark	AO
04.3	Idea that slit spacing increases as number of lines per mm decreases ✓ (for $n = 2$) Idea that change in $\sin\theta$ is inverse of their change in d✓ straight line with a less steep gradient that passes through origin seen on **Figure 5** **AND** idea that y will be smaller (for any given R) / y is directly proportional to $\sin\theta$	Accept d for slit spacing. Condone use of s for the slit spacing in **MP1**.  **MP3**: Do not allow a discussion based on incorrect physics such as: • $w = \frac{\lambda D}{s}$ • less diffraction	3	AO3
Total			**7**	

Question	Answers	Additional comments/Guidance	Mark	AO
05.1	Force multiplied by distance (from **X**) ✓ Idea that the distance is the perpendicular distance between the line of action of the force and **X** **OR** Idea that the force is the component of 31N perpendicular to beam and distance is from rod connection to **X** ✓	Do not accept moment = Fd unless F and d have been defined or labelled in **Figure 6**. Accept the idea that the distance is the horizontal distance between **X** and the rod / (line of action of) force Need to see **Figure 6** when marking this part.	2	AO1

Question	Answers	Additional comments/Guidance	Mark	AO
05.2	attempted use of principle of moments✓ Use of weight = mg with their weight✓ (mass =) 7.1 (kg) ✓	Base judgement of use of 452 N and 134 N (39 x 3.4+) **452 x 0.8** = ((24.1+ W) x3.4) + **134 x 1.3** Accept an answer that rounds to 7.1 kg in MP3 Forgetting to subtract mass of bucket: Award two marks for answer = 9.6 kg Award two marks for an answer = 70.0 (N)	3	2 x AO2 1 x AO3

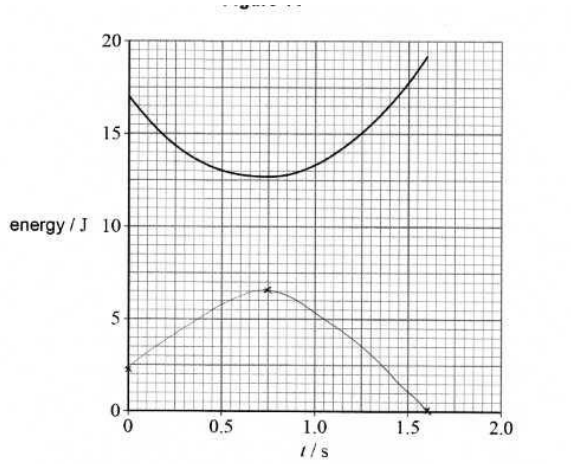
Question	Answers	Additional comments/Guidance	Mark	AO
05.3	Use of $E_p = mg\,h$ with 452 N and their h **OR** Determines $h = 0.35$ m ✓	Do not accept their $h \geq 1.5$ m Alternative: (ΔE_p of counterweight =) ΔE_p of water +ΔE_p of bucket + ΔE_p of beam – work done by operator With their h for the beam's centre of mass **OR** height gained by centre of mass of beam = 0.57 m	2	AO3
	(change in GPE =) 160 (J) ✓	Accept answer in range 158.2 (using 0.35m) to 159.6 (using 0.353m). Condone a negative sign on answer or in working		

Question	Answers	Additional comments/Guidance	Mark	AO
05.4	Max **two** from: ✓✓ **Empty bucket downwards:** • when dropped, bucket transfers (all) its (gravitational) potential energy to kinetic energy as it falls (A) • when lowered using pivoted beam, the bucket transfers its (gravitational) potential energy to the counterweight (storing this energy) / idea of person doing work due to raising the counterweight. (B) **Bucket of water upwards:** • using rope, person must give the bucket (of water) (gravitational) potential energy as it is lifted (C) • using the pivoted beam, the counterweight transfers (some of its stored) energy to the bucket of water (D) idea of **no / very little / less** work done by person when dropping empty bucket / idea of person does **more** work due to raising the counterweight. (E) ✓ person does more work in using rope (to lift bucket of water) than using pivoted beam (to lift bucket of water because the counterweight reduces force required) / Idea that person does less work (overall) using the pivoted beam than when using the rope to lift the bucket (F) ✓	Where work is described must be (chemical energy) to (gravitational) potential energy to the counterweight Where no other mark is scored, allow one mark for the idea that less force is required (to raise the bucket of water) when using the pivoted beam (G)	4	2 x AO1 2 x AO3
Total			**11**	

Question	Answers	Additional comments/Guidance	Mark	AO
06.1	Attempted use of appropriate equation(s) of motion ✓ (h =) 2.18 (m) ✓	For MP1, 'use of' includes a correct algebraic rearrangement where h would be subject OR expect to see substitution into: $v = u + at$ and $s = ut + \frac{1}{2}at^2$ (A) **OR** $v = u + at$ and $s = \frac{u+v}{2}t$ (B) **OR** $v^2 = u^2 + 2as$ (C) Condone one error in substitution, BUT do not allow u=0 or v =0 in MP1 do not allow inconsistent signs	2	1 x AO1 1 x AO2

Question	Answers	Additional comments/Guidance	Mark	AO
06.2	Use of Pythagoras's theorem $30.7^2 = U_H^2 + 18.4^2$ ✓ $(U_H =)\ 24.6\ (\text{m s}^{-1})$ ✓ numerical answer to 3 significant figures with some supporting work seen ✓	Alternative Use of trigonometry, For example: Cos $\theta = \frac{18.4}{30.7}$ and Sin $\theta = \frac{U_H}{30.7}$ Condone one error in use of in MP1 Award 2 marks for an answer that would round to $24.6\ (\text{m s}^{-1})$	3	2 x AO1 1 x AO2

Question	Answers	Additional comments/Guidance	Mark	AO
06.3	Idea that (gravitational) potential energy has been transferred to kinetic energy✓	answers that include any upwards motion need a detailed explanation that includes all energy transfers correctly.	1	AO2

Question	Answers	Additional comments/Guidance	Mark	AO
06.4	Curve of correct shape that does not go above E_k curve✓ $E_p = 2.2$ (J) when $t = 0$ / $E_p = 0$ when $t = 1.6$ (s) ✓ $E_p = 6.4$ (J) when $t = 0.7(5)$ (s) ✓	 plotted co-ordinates must be within 1 square vertically and $\frac{1}{2}$ square horizontally of true co-ordinates.	3	1 x AO2 2 x AO3

Question	Answers	Additional comments/Guidance	Mark	AO
06.5	Reads off the minimum kinetic energy of the ball ✓1 Use of $E_k = \frac{1}{2}mv^2$ with their E_k to determine their u_H **OR** Use of (horizontal) distance = their $u_H \times 1.6$✓2 (horizontal distance =) 19 to 19.5 (m) ✓	Range for minimum E_k is 12.5 J to 12.8 J Do not award MP1 where there is more than one E_k value used in their calculation. Alternative Use of $E_k = \frac{1}{2}mv^2$ with their initial E_k to determine their initial speed **OR** Use of horizontal distance = their $u_H \times 1.6$ ✓1 Use of $v = u + at$ and $t = 0.75$ s to find initial vertical velocity u_V **AND** their initial speed$^2 = u_H^2 + u_V^2$ to find u_H ✓2 from correct working	3	2 x AO2 1 x AO3

Question	Answers	Additional comments/Guidance	Mark	AO
06.6	Maximum height is reduced ✓ Horizontal distance is reduced ✓ Idea that (on the way up) (vertical) acceleration is downwards and greater than before✓ Idea that Horizontal acceleration is in opposite direction to horizontal velocity ✓	Allow: increases the vertical deceleration of the ball (as it travels upwards) Allow: (horizontal) deceleration due to force being in opposite direction (to horizontal motion)	4	2 x AO1 2 x AO2
Total			**16**	

Question	Answers	Additional comments/Guidance	Mark	AO
07.1	Resistivity is same (because it is a property of the material) ✓ Idea that resistance of **A** is half of the resistance of **B** ✓	Do not award MP1 where answer is supported by incorrect physics	2	1 x AO1 1 x AO2

Question	Answers	Additional comments/Guidance	Mark	AO
07.2	Cross-sectional area (CSA) of element = 3.22×10^{-7} (m^2) **OR** Cross-sectional area (CSA) of element = $\pi \times (3.2 \times 10^{-4})^2$ ✓ Use of $\rho = \frac{RA}{L}$ with their CSA✓ (ρ =) 1.8×10^{-6} ✓ Unit = Ω m ✓	Condone POT errors in MP1 and MP2 Accept other units for length such as Ω cm or Ω mm but must be consistent with numerical answer for 4 marks 1.8×10^{-4} Ω cm 1.8×10^{-3} Ω mm	4	2 x AO1 2 x AO2

Question	Answers	Additional comments/Guidance	Mark	AO
07.3	Calculates lost volts = 15.3×0.11 **OR** Use of $\varepsilon = I(R+r)$ by substitution or rearrangement where IR would be subject✓ Subtracts their lost volts from 12.0 **OR** Determines their external resistance R✓ (Terminal pd =) $10(.3)$ (V) ✓	Mark with **Questions 07.4** and **07.5** Alternative: Calculates the total resistance, R_{Te}, of the 8 elements✓ Use of potential divider with their R_{Te} and 0.11 **OR** Use of $V = 15.3$ x their R_{Te} ✓ (Terminal pd =) 10.3 (V) ✓	3	1 x AO1 2 x AO2

Question	Answers	Additional comments/Guidance	Mark	AO
07.4	(current =) 5.7 A ✓	Mark with **Questions 07.3** and **07.5** ECF $= \frac{\text{their terminal pd}}{5.4} \times 3$	1	AO2

Question	Answers	Additional comments/Guidance	Mark	AO
07.5	Max **two** from: ✓✓ • Divides the total current by 8 **OR** Divides their current at **X** by 3 • Use of P = (their I)^2 × their R **OR** Use of P = (their I) × their terminal pd (ecf from **07.3**) *OR* Use of $P = \frac{\text{their terminal pd}^{\ 2}}{R}$ (ecf from **07.3**) • Use of Energy = their power × 180 (Energy =) 3.6×10^3 (J) ✓ accept 3.5×10^3 (J) to 3.6×10^3 (J) (potential ecf from their answer to **Question 07.3 and 7.4**)	Mark with **07.3** and **07.4** potential ecf with their current at **X** **Alternative** Alternative Max **two** from: ✓✓ • Divides the total current by 8 **OR** Divides their current at **X** by 3 • Use of Q= (their I) × 180 • Use of Energy = their charge × their terminal pd (Energy =) 3.6×10^3 (J) ✓ accept 3.5×10^3 (J) to 3.6×10^3 (J) Max **two** from: ✓✓ • Divides 5.4 by 8 to find total resistance • Use of $P = (I)^2 \times$ their R **AND** divides their power by 8 • Use of Energy = their power × 180 (Energy =) 3.6×10^3 (J) ✓ accept 3.5×10^3 (J) to 3.6×10^3 (J) (potential ecf from their answer to **Question 07.3 and 07.4**)	3	1 x AO1 2 x AO2

<table>
<tr><th>Question</th><th>Answers</th><th>Additional comments/Guidance</th><th>Mark</th><th>AO</th></tr>
<tr>
<td>07.6</td>
<td>The mark scheme gives some guidance as to what statements are expected to be seen in a 1- or 2-mark (L1), 3- or 4-mark (L2) and 5- or 6-mark (L3) answer. Guidance provided in section 3.10 of the 'Mark Scheme Instructions' document should be used to assist marking this question.
<table>
<tr><th>Mark</th><th>Criteria</th></tr>
<tr><td>6</td><td>All three areas covered in some detail.
6 marks can be awarded even if there is an error and/or parts of one aspect missing.</td></tr>
<tr><td>5</td><td>All three areas covered, at least two in detail.
Whilst there are gaps, there should only be an occasional error.</td></tr>
<tr><td>4</td><td>Two areas successfully discussed, or one discussed and two others covered partially. Whilst there will be several gaps, there should only be an occasional error.</td></tr>
<tr><td>3</td><td>One area discussed and one discussed partially, or all three covered partially. There are likely to be several errors and omissions in the discussion.</td></tr>
<tr><td>2</td><td>Only one area discussed or makes a partial attempt at two areas.</td></tr>
<tr><td>1</td><td>Only one area covered and that partially.</td></tr>
<tr><td>0</td><td>No relevant comments.</td></tr>
</table>
</td>
<td>In each area, a partial response covers one bullet point, a detailed response requires two.
The following statements are likely to be present.
Resistance in circuit:
• resistance increases (because there are fewer elements in parallel)
• resistance increases because smaller effective area of cross-section for current (Refers to $R = \frac{\rho L}{A}$)
• refers to formula $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$
OR $R_{Te} = \frac{5.4}{5} = 1.08\ \Omega$ OR $R_t = 1.19\ \Omega$
Current in fuse:
• student is correct, fuse does not melt
• current decreases OR current $= 10.1\ \text{A}$
• resistive load below X has increased OR fewer elements drawing current OR refers to $V=IR$ to support current decrease</td>
<td>6</td>
<td>2 x AO1
2 x AO2
2 x AO3</td>
</tr>
</table>

Question	Answers	Additional comments/Guidance	Mark	AO
07.6 cont…		**pd across elements:** • lost volts decrease • terminal pd increases • more pd across each element **OR** pd = 10.9 V **OR** More current in each element **OR** $I = 2.01\text{A}$ • (student is correct) with reference to: increased power by relating $P = \frac{V^2}{R}$ **OR** correct reference to increased power by relating $P = I^2R$ **OR** correct reference to increased power by relating $P = VI$		
Total			**19**	