

**Level 3 Certificate/Extended Certificate**  
**APPLIED SCIENCE**  
**ASC1/P**

Unit 1 Key Concepts in Science  
Section C – Physics

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**Mark scheme**

June 2023

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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.

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## Level of response marking instructions

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

### Step 1 Determine 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 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

### Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. 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.

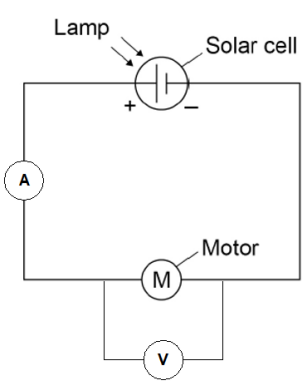
An answer which contains nothing of relevance to the question must be awarded no marks.

**Question 1**

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.1	the energy resource can be replaced / replenished	allow the energy resource will not run out  do <b>not</b> accept reused	1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.2	any <b>one</b> from: <ul style="list-style-type: none"> <li>• it produces no carbon dioxide</li> <li><b>or</b></li> <li>it produces no greenhouse gases</li> <li>• no fuel costs</li> </ul>	allow no carbon emissions allow no CO <sub>2</sub> ignore no pollution unqualified ignore environmentally friendly unqualified	1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.3	any <b>one</b> from: <ul style="list-style-type: none"> <li>• unreliable</li> <li><b>or</b> it is not always sunny</li> <li><b>or</b> it will not work at night</li> <li>• visual pollution</li> <li>• expensive (to build)</li> <li><b>or</b> high start-up costs</li> <li>• need many solar cells to produce the same amount of electricity as non-renewable power stations</li> <li>• they are less efficient than non-renewable power stations</li> </ul>	ignore weather dependent unqualified  allow named non-renewable source  allow named non-renewable source	1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.4</b>	correct ammeter symbol drawn in series with the solar cell <b>and</b> motor	ignore incorrect solar cell and / or motor symbols	1	AO1
	correct voltmeter symbol drawn in parallel with the solar cell / motor	an answer of  scores <b>2</b> marks	1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.5</b> (mark with <b>01.6</b> )	0.017 (A)	allow conversion at any stage of the calculation	1	AO2
	(use of $P = IV = 0.017 \times 3.2$ to give)  0.054(4) (W)	allow a correct calculation using an incorrect conversion of 17mA	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.6</b> (mark with <b>01.5</b> )	(use of $\frac{0.0544}{0.8}$ to give) 0.068	allow ecf from Question <b>01.5</b>  allow 0.0675 <b>or</b> 0.07 allow 6.8% <b>or</b> 7%	1	AO2

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.7</b>	(the speed of the motor) decreases		1	AO1
	(because) less light / energy absorbed by the solar cell	ignore heat	1	AO2
	(so) there is less voltage / energy / power transferred by the solar cell (to the motor)		1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.8</b>	any <b>one</b> from: <ul style="list-style-type: none"> <li>• the light in the room would affect the student's efficiency calculation</li> <li>• to ensure the solar cell only received light / energy from the lamp</li> <li>• the light in the room may change during the experiment (so affect the student's results).</li> </ul>	ignore the light in the room would affect the student's results unqualified  ignore to make it a fair test	1	AO3

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.9</b>	total resistance decreases		1	AO1

<b>Total Question 1</b>		<b>13</b>
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**Question 2**

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>02.1</b> (mark with <b>02.2</b> )	(use of $v = u + at$ to give) 6.27(2) ( $\text{m s}^{-1}$ )	allow 6.3  do <b>not</b> accept 6.2	1	AO2

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>02.2</b> (mark with <b>02.1</b> )	(use of $p = mv = 6.27 \times 0.45$ to give)	allow ecf from Question <b>02.1</b>	1	AO2
	2.82(24)	allow 2.8		AO1
	$\text{kg m s}^{-1}$ <b>or</b> N s	allow kg m/s	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>02.3</b>	the football exerts a (downwards) force on the steel surface (when it hits it)	allow <u>action</u> for force of football on surface	1	AO1
	(and) the steel surface exerts an equal and opposite / upwards force on the football (which makes it bounce up)	allow <u>reaction</u> for force of surface on football	1	AO1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>02.4</b>	energy is wasted / transferred (to heat / sound when the football hits the steel surface)	allow heat / sound produced	1	AO1
	so the ball bounces with less kinetic energy / speed <b>or</b> so will have less gravitational potential energy (compared to position <b>A</b> )	allow momentum decreases	1	

<b>Total Question 2</b>		<b>7</b>
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