Level 3 Certificate/Extended Certificate
APPLIED SCIENCE
ASC1/P

Unit 1 Key Concepts in Science

Section C – Physics

Mark scheme

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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 Assessment Writer.

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.

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

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	Answers	Additional comments	Mark	AO	ID
01.1	variable resistor		1	AO1	A
01.2	voltage is directly proportional to current	allow (strong) positive correlation allow as the voltage increases the current increases	1	AO3	E
01.3	correct values of voltage and current read from the graph (use of $R = \frac{V}{I}$ to give) 12.5(0) ohms or Ω	an answer of 12.5 scores 2 marks allow correct substitution and evaluation of incorrect values read from graph for 2nd mark	1 1 1	AO2 AO2 AO1	E
01.4	(the energy transferred) increases	allow correct calculations showing an increase in energy/power between 2 V and 10 V	1	AO1	E
01.5	2 (V) 0.8(0) (A)		1 1	AO2 AO3	E
01.6	straight line drawn through origin lower gradient than original line		1 1	AO1 AO2	E
01.7	increases ions (in the resistor) vibrate more (as the temperature increases) (so) there are more collisions between electrons and ions,	 ignore ions move more allow atoms instead of ions ignore reference to particles ignore electrons vibrate/move more allow this makes it more difficult for the current/	1 1 1	AO1 AO1 AO1	E

	(which increases the resistance)	electrons to pass through (the resistor) allow the current decreases for the same voltage (which increases the resistance)			

Total			**13**		

Question	Answers	Additional comments	Mark	AO	ID
02.1	any **one** from: • no CO_2 produced/no greenhouse gases produced/no air pollution • predictable/reliable • no fuel costs • does not take up land • <u>more</u> efficient (than other methods of generating electricity) • does not contribute to global warming	ignore renewable ignore it will not run out ignore it can be replaced/replenished ignore no pollution unqualified ignore environmentally friendly unqualified ignore it is free once built ignore reference to costs unqualified	1	AO1	E
02.2	(movement of) water/tides turns a turbine/generator (a generator transfers the) kinetic energy into electrical energy	ignore waves ignore motor	1 1	AO1 AO1	E
02.3	(calculation of the total power = 269 × 1.5 =) 403.5 (MW) use of E = P × t (= 403.5 × 7200) 2 905 200 (MJ)	an answer of 2 905 200 scores 3 marks an answer of 807 (MJ) scores 2 marks (use of t = 2 hours) an answer of 48420 (MJ) scores 2 marks (use of t = 120 minutes) accept 2 900 000 MJ, 2 905 000 MJ or 2 910 000 MJ	1 1 1	AO2 AO2 AO2	E

02.4	any **one** from: • some energy is wasted • it is not 100% efficient • (friction produces) thermal energy • (electrical resistance produces) thermal energy • sound energy is produced	ignore some energy is lost allow friction produces heat allow electrical resistance produces heat	1	AO1	E

Total			**7**