GCSE MARKING SCHEME

SUMMER 2018

GCSE (NEW)
APPLIED SCIENCE (SINGLE AWARD) - UNIT 1
344OU10-1 / 344OUA0-1

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE APPLIED SCIENCE (SINGLE AWARD) UNIT 1 (NEW)

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GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.
One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).
Question totals should be written in the box at the end of the question.
Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.
Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.
Crossed out responses not replaced should be marked.
Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

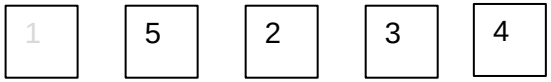
A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

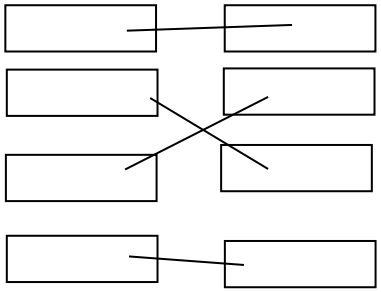
Marking abbreviations

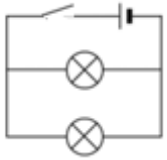
The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

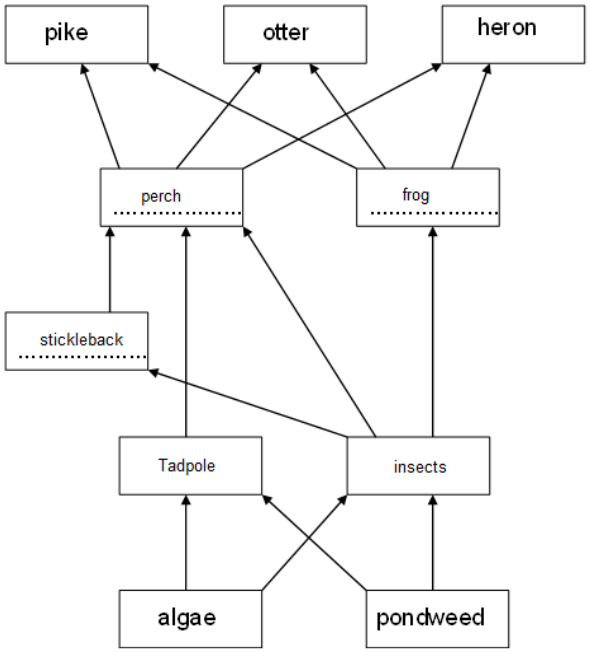
cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

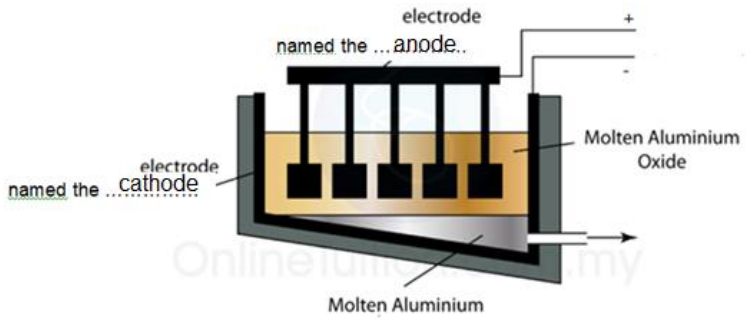
Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1 FT	(a)			acid + metal → **salt** (1) **+ hydrogen** (1) acid + metal oxide → **salt** (1) **+ water** (1) ONLY 1 mark for salt	3			3		
	(b)	(i)		Units used = 15 × 7 = 105 (1) answer		1		1	1	
		(ii)		Total cost = 105 (ecf) × 20 = 2100 p / £21 (1) answer		1		1	1	
				Question 1 total 5	**3**	**2**	**0**	**5**	**2**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2 FT				 4 correct (3) 3 correct (2) 1 or 2 correct (1)	3			3		
				Question 2 total 3	**3**	**0**	**0**	**3**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3 FT	(a)			There is a continuous creation of matter in the gaps	1			1		
	(b)	(i)		 4 correct – (3) marks 2 or 3 correct – (2) marks 1 correct – (1) mark	3			3		
		(ii)		Big Bang	1			1		
	(c)	(i)		<table><tr><td>X rays (1)</td><td>ultra violet light</td><td>visible light</td><td>I-R (1)</td><td>microwaves(1)</td></tr></table>	3			3		
		(ii)		The same speed as (1) Shorter than (1) Higher than (1)		3		3		
				Question 3 total 11	**8**	**3**	**0**	**11**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4 FT	(a)	(i)		 in series	1			1		1
		(ii)			1			1		1
	(b)			Tick 3,4,5	3			3		3
	(c)	(i)		Total resistance in series = 12 + 12 = 24		1		1	1	1
		(ii)		I = 6 ÷ 24 (ecf) subs (1) = 0.25 A / ¼ A (1)	1	1		2	2	2
	(d)			1/total resistance in parallel = $\frac{1}{12} + \frac{1}{12} = \frac{2}{12}$ (1) so total R = 6 Ω (1) which is half of 12 so statement is true (1)			3	3	3	3
				Question 4 total 11	**6**	**2**	**3**	**11**	**6**	**11**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5 FT	(a)			 all correct (4), 4 correct (3), 3 correct (2), 1 or 2 correct (1)		4		4		
	(b)	(i)		Sun(light)	1			1		
		(ii)		Insects or tadpoles (ecf)		1		1		
		(iii)		Insects or tadpoles (ecf)		1		1		
		(iv)		Otters or pike		1		1		
		(v)		Perch compete for food with frogs (1) Less competition means increase in population so disagree (1) OR pike/otter/heron only eat perch (1) so numbers decrease so disagree (1)			2	2		
				Question 5 total 10	**1**	**7**	**2**	**10**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6 FT	(a)	(i)		 Both required for (1)	1			1		
		(ii)		Cathode/negative (1) aluminium ion is positive /opposite charges attract (1)	2			2		
	(b)			**Indicative content:** Less waste has been sent to landfill sites so less pollution in the surrounding soil and groundwater. There's less waste decomposition so less methane and other greenhouse gases produced. There has been an increase in producing energy from waste. Waste incineration plants can be located near where waste is generated, which decreases the costs and energy associated with transporting waste. Burning waste can be used to produce electricity and heat for nearby buildings, and the ash produced can be used by the construction industry. It reduces the use of fossil fuels. Recycling has increased which helps to reduce energy usage, reduce the consumption of fresh raw materials, reduce air pollution and water pollution (from land filling) and also reduces greenhouse gases emissions.		3	3	6		

				5– 6 marks Complete description of trends linked to environmental & economic benefits. There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** Incomplete description of trends linked to environmental & economic benefits. There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** List of trends. There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate used limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** No attempt made or no response worthy of credit.						
				Question 6 total 9	**3**		**6**	**9**		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7 FT	(a)	(i)		B		1		1	1	
		(ii)		D		1		1	1	
		(iii)		D		1		1	1	
		(iv)		Mass required is {over 20g / 36 ± 1g}/dissolved mass is under 36g		1		1	1	
	(b)			Add known mass of solute to (100 g) of water (1) Filter to remove undissolved solute (1) Dry and weigh excess solute (1) OR accept Add known mass of solute to (100 g) of water (1) heat until it dissolves then allow to cool (1) record temperature at which crystals first appear (1) Accept 'weight' for mass	3			3		3
				Question 7 total 7	**3**	**4**		**7**	**4**	**3**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
8 FT **1** HT	(a)	(i)		0.88 × 1.75 (1) subs = 1.54 [W] (1)	1	1		2	2	2
		(ii)		Scales 2 cm Ξ 10/15^{o} and 2 cm Ξ 0.2 W (1) 7 correct points ± < 1 square tolerance (2) 6 correct points ± < 1 square tolerance (1) 5 or less correct points (0) suitable smooth curve (1)		4		4	4	4
		(iii)	I	Agree with graph e.g. 1.48 ± 0.2		1		1	1	1
			II	Increases then decreases (1) maximum at 45^{o} (1)		2		2	2	2
	(b)	(i)		Maximum efficiency from data occurs at 45^{o} where P = 1.62 (1) % Efficiency = (1.62 ÷ 4) × 100 (1) subs = 40.5 so not valid (1) If a value of P other than 1.62 is selected from the table then the 2nd and 3rd marking point only are available	1		1 1	3	3	3
		(ii)		Number of cells = 5 ÷ 0.01 = 500 (1) Max P = 500 × 4 = 2 000 W / 2 kW(1)			2	2	2	2
	(c)			(Translucent) cover e.g. tracing paper used to cover the cell		1		1		1
	(d)	(i)		loses oxygen	1			1		
		(ii)		Gains electrons	1			1		
		(iii)		2C (1) 2CO (1)		2		2		
				Question 1/8 total	**4**	**11**	**4**	**19**	**14**	**15**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2 HT	(a)			**Indicative content:** Treefrogs are eaten by snakes and birds. Grey Treefrogs blend well in dark wooded areas on tree bark and Green Treefrogs blend in well with green vegetation found in marshes and swamps. A Green Treefrog on the bark of a tree is easier for a predator to find, compared to a Green Treefrog on a green leaf. So, Green Treefrogs that go into habitats where they are not camouflaged are more likely to be eaten by predators. Since Treefrogs that have been eaten do not live to have offspring, natural selection has favoured Treefrogs that live in habitats in which they are more camouflaged. **5– 6 marks** Detailed description to include references to both frogs, both habitats and predators. There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** Some description that may include references to both frogs and either habitats or predators. There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** Limited description which may give details of either frog/habitat. There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate used limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** No attempt made or no response worthy of credit.	4	2		6		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		*cinerea*		1		1		
		(ii)		Avoid confusion / duplication with common names / universally recognised	1			1		
				Question 2 total 8	**5**	**3**		**8**		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3 HT	(a)			In the steady-state theory, the density of matter in the expanding Universe remains unchanged (1) due to a continuous creation of matter (1) so the observable Universe is the same at any time as well as at any place (1)	3			3		
	(b)	(i)		(During the Big Bang) gamma rays / high energy waves / short wavelengths were produced (1) which have 'stretched' over time to become <u>microwaves</u> (1) as the Universe has expanded (1)	3			3		
		(ii)		B and C have the same pattern of dark lines (1) so have the same chemical composition (1) The lines in B have a red shift / lines in C have (a greater) red shift (1) so C must be <u>moving away</u> (from Earth) <u>faster</u> (than B) (1)			4	4		
				Question 3 total 10	**6**	**0**	**4**	**10**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4 HT	(a)	(i)		Herons are predators of <u>frogs and perch</u> (1) (Herons leave) frog and perch numbers increase initially (1) More food / less competition for pike (1) Pike numbers increase (1)		4		4		
		(ii)		Rapid growth of algae and pondweed (1) As algae and plants die microbes which break them down increase in number (1) and use up more and more dissolved oxygen (1) Fish may suffocate so no food for their predators (1)	4			4		
	(b)	(i)		Iron(III)(1) sulfate (1)			2	2		2
		(ii)		$Fe_2(SO_4)_3$ ecf for iron(II) sulfate $FeSO_4$		1		1		1
				Question 4 total 11	**4**	**5**	**2**	**11**	**0**	**3**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5 HT	(a)			$ZnSO_4$(aq) (1) + H_2O (*l*) (1)	2			2		1
	(b)			Units used = 15 × 50 (= 750) (1) subs Total cost = 750 (ecf) × 19 (= 14 250) (1) subs Cost for year = 14 250 (ecf) × 52 = 741 000 p OR £7 410 (1) answer plus unit	1 1	 1		3	3	
				Question 5 total 7	**4**	**1**		**5**	**3**	**1**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6 HT	(a)	(i)		F (1) Contains most calcium <u>and</u> magnesium (ions) (1)	1	1		2		
		(ii)		H	1			1		
		(iii)		480 ÷ 4 (1) = 120g (1)		2		2	2	
	(b)	(i)		NH_3		1		1		1
		(ii)		KCl		1		1		1
		(iii)		Solubility increases with temperature / positive correlation (1) At an increasing rate / each 10^{o}C rise causes more and more dissolving (1)		2		2		
		(iv)		No because it is under 115 g / would require more than 115 g to be saturated		1		1	1	1
		(v)		For 100g mass of precipitate would be 40 – 20 = 20 (1) So for 50g, mass = 20 ÷ 2 = 10g (1) OR Halving may occur first so 20 – 10 (1) = 10g (1) Award (1) for 20 on answer line		2		2	2	2
				Question 6 total 10	**2**	**10**	**0**	**12**	**5**	**5**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7 HT	(a)	(i)		Any 2 × (1) from: $I_0 > I$ (1) Series – current is the same through the battery and resistors (1) Parallel – sum of the currents through the resistors equals the current through the battery (1)	2			2		
		(ii)		Series – sum of the voltages across each resistor adds up to the battery voltage (1) Parallel – voltage across battery is the same as across each resistor (1)	2			2		
	(b)			Correct symbol in parallel (with R_2)	1			1		
	(c)			Total resistance in series = 8 + 12 + 24 = 44 (1) 1/Total resistance in parallel = $\frac{1}{8}+\frac{1}{12}+\frac{1}{24}=\frac{6}{24}$ (1) so total R = 4 (1) Either I = 12 ÷ 44 = 0.27(3) A and I_0 = 12 ÷ 4 = 3 A (1) I_0 = 11 × I so statement not true (1) OR Series R = 11 × parallel resistance (1) Therefore I_0 = 11 × I so statement not true (1)			5	5	5	1
				Question 7 total 10	**5**	**0**	**5**	**10**	**5**	**1**

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	4	11	4	19	14	15
2	5	3	0	8	0	0
3	6	0	4	10	0	0
4	4	5	2	11	0	3
5	4	1	0	5	3	1
6	2	10	0	12	5	5
7	5	0	5	10	5	1
Total	30	30	15	75	27	25

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	3	2	0	5	2	0
2	3	0	0	3	0	0
3	8	3	0	11	0	0
4	6	2	3	11	6	11
5	1	7	2	10	0	0
6	3	0	6	9	0	0
7	3	4	0	7	4	3
8	4	11	4	19	14	15
Total	31	29	15	75	26	29