GCSE MARKING SCHEME

SUMMER 2017

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

3440U10-1 / 3440UA0-1

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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.
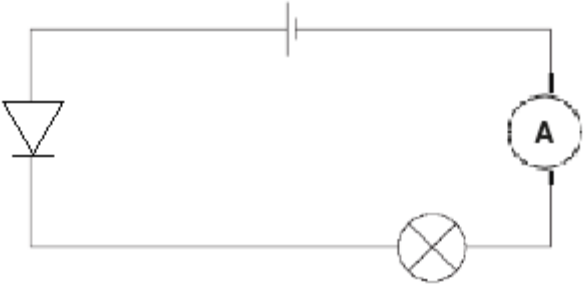
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.
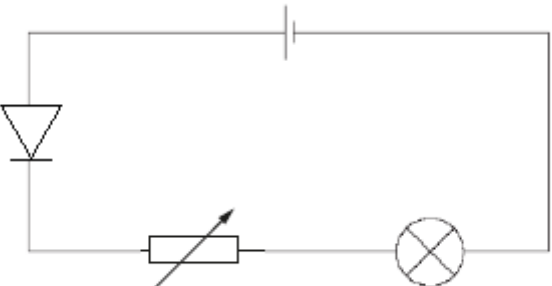
GCSE APPLIED SCIENCE (SINGLE AWARD)

UNIT 1 (NEW) 3440U10-1/3440UA0-1

SUMMER 2017 MARK SCHEME

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
1 FT	(a)		grass		1		1		
	(b)		sun(light)	1			1		
	(c)		shrew/owl		1		1		
	(d)		increase (1) fewer predators (1)		2		2		
			Question 1 total	**1**	**4**	**0**	**5**	**0**	**0**

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2 FT	(a)	(i)		Correct symbol of ammeter connected in series	1					1 FT
		(ii)		Measures current	1					1
		(iii)		Correct symbol of voltmeter connected in parallel with diode	1					1

	1	(iv)	Correct symbol of variable resistor connected in series	1						1
		(v)	Vary resistance / vary current / vary voltage <u>across the diode</u>	1						1
		(vi)	Goes out / lamp doesn't work(1) Diodes only conduct one way /current only flows one way through the diode (1)	2						2
	(b)		Second graph selected (top right)	1						1
	(c)	(i)	Subs 6 ÷ 0.5 (1) 12 [Ω] (1) Award (2) for correct answer only	1	1				2	3
		(ii)	Subs 6 × 0.5 (1) = 3 [W] (1)	1	1				2	2
			Question 3 total	**10**	**2**	**0**	**12**		**4**	**12**

Question				Marking details			Marks Available					
							AO1	**AO2**	**AO3**	**Total**	**Maths**	**Prac**
3 FT	(a)	(i)		<table><tr><td>Test</td><td>Observation</td><td>Conclusion</td></tr><tr><td>hydrochloric acid added</td><td>no change</td><td>carbonate not present (1)</td></tr><tr><td>barium chloride solution added</td><td>white precipitate</td><td>sulfate (present) (1)</td></tr><tr><td>sodium hydroxide solution added</td><td>pale green precipitate</td><td>Iron <u>(II)</u> (present) (1)</td></tr></table>					3			4
		(ii)		iron (II) sulfate allow ecf accept correct chemical formula				1				
	(b)			metal (ions)			1					1
				Question 2 total			**1**	**1**	**3**	**5**	**0**	**5**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4 FT	(a)			Fuel (1) Green plants (1) Animals (1)	3					
	(b)	(i)		Any 2 × (1) from: Until 1940 the temperature change increased with CO_2 concentration (1) After 1940 despite further increases in CO_2 concentration the temperature change decreased (1) The atmospheric CO_2 concentration was the same in 1910 and 1920 but the global temperature still increased (1)			2			
		(ii)		The surface of the Earth absorbs the Sun's rays. (1) Molecules of gas in the atmosphere absorb infra–red waves that have been emitted from the surface of the Earth. (1) The surface of the Earth emits infra-red waves. (1) (Ticks in boxes 2, 4 and 6) 4 boxes ticked – max (2) 5 boxes ticked – max (1) 6 boxes ticked (0)	3					
				Question 4 total	**6**	**0**	**2**	**8**	**0**	**0**
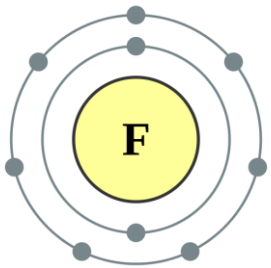
Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5 FT	(a)			The organisms in a population have small differences or **variations.** These differences make some organisms better **adapted** to their environment. The best suited organisms **survive**. They will now **reproduce** and pass on the useful feature. Over time, many of the organisms in the population have the feature. The population has changed or **evolved**. 5 correct (4) 3/4 correct (3) 2 correct (2) 1 correct (1)	4					
				Question 5 total	**4**	**5**	**3**	**12**	**0**	**0**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
(b)			**Indicative content** Isabella has ground vegetation as it has a wet climate. Dome shell shaped that live on Isabella island have short necks as they are ground feeders or their necks are short as they don't need to reach upwards for their food. Hood Island has little ground vegetation as it has a dry climate. Saddleback shell tortoises that live on Hood island have long necks so can feed on plants off the ground. The shape of the shell allows them to stretch upwards to reach small bushes and trees. **5-6 marks** Detailed description about shell shape and neck length in both tortoises. Link climate to type of vegetation for both islands. *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** Partial description about shell shape and neck length in tortoises. Link climate to type of vegetation. *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 of one tortoise or climate. *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.*		3	3			

Question			Marking details	AO1	AO2	AO3	Total	Maths	Prac
(c)	(i)		Goats compete for food / less food available		1				
	(ii)		More land used for homes/agriculture.		1				
			Question 5 total	**4**	**5**	**3**	**12**	**0**	**0**

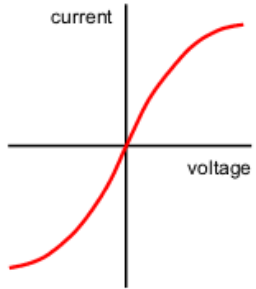| Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6 FT	(a)	(i)		6 m^2 selected (1) 6 × 500 = 3 000 W (1)		2			1	
		(ii)		Subs (1 200 ÷ 3 000) × 100 (allow ecf) (1) = 40[%](1)	1	1			2	
	(b)	(i)		Subs 2.5 × 20 (1) = 50 (1)	1	1			2	
		(ii)		50 (ecf) × 18 (1) = 900 p OR £9 (answer + unit) (1)	1	1			2	
	(c)	(i)		2.25 × 52 (1) = £117 (1)		1	1		2	
		(ii)		117 (ecf) + 435 (1) = 552 (1)	1	1			2	
		(iii)		6 000 ÷ 552 (ecf) (1) = 10.9 years so claim is not true (allow ecf) (1) OR In 10 years savings = 10 × £552 (ecf) = £5 520 so claim is not true (allow ecf) OR If the claim is true you save £6 000/10 = £600 per year which is more than £552			2		3	
				Question 6 total	**4**	**7**	**3**	**14**	**14**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7 FT **1** HT	(a)	(i)		$^{39}_{19}$ K		1				
		(ii)		(85-37 =) 48		1				
		(iii)		lithium		1				
		(iv)		20-35 ^{o}C			1			
	(b)	(i)		4 plots correct (2) (< one small square tolerance) 3 plots correct (1) (< one small square tolerance) 2 or less plots correct (0) best fit curve joining their points, ignore anomaly (1)		3			3	
		(ii)		There appears to be a trend agreeing with the statement (1) but there is one anomaly (1)			2			
		(iii)		Density values for the remaining/other (group 1) elements.			1			
	(c)	(i)		2,8,1		1				
		(ii)		All have one electron in <u>the outer shell</u>	1					
		(iii)		Rubidium		1				

10

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
(d)	(i)				1				
	(ii)		potassium loses outer electron (1) fluorine gains one electron (1)	2					
(e)	(i)		$2KF \rightarrow 2K + (F_2)$ both symbols (1) for balancing (1) no ecf on balancing		2				
	(ii)		Any 1 × (1) from: gains an electron loses oxygen gains hydrogen	1					
			Question 7 total	**4**	**11**	**4**	**19**	**3**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2 HT	(a)			Combustion / burning(1) Respiration (1) Photosynthesis (1) Death (1)	4					
	(b)	(i)		both lines show same trend (1) so mean global temperature linked to concentration of carbon dioxide (1)		1	1			
		(ii)		Sun's rays absorbed by Earth causing warming (1) I-R emitted from surface (1) Absorbed by gas molecules in the atmosphere (and re-emitted back to Earth) (1)	3					
				Question 4 total	**7**	**1**	**1**	**9**		

Question			Marking details	AO1	AO2	AO3	Total	Maths	Prac
3 HT	(a)		6m² selected (1) 6 × 500 = 3000 W (1) 3000 (ecf) × 40% (subs and manip) (1) = 1200W (1) OR 40% of 500(1) =200 W(1) Selecting 6 (1) =1200 W (1)		4			3	
	(b)	(i)	2.5 (1) × 20 = 50 (1) 50 (ecf) × 18 (1) = 900 p OR £9 (1)	1	2 1			4	
		(ii)	£9 (ecf) ÷ 4 (1) = £2.25 (1)		2			2	
	(c)		2.25 (ecf) × 52 = £117 (1) 117 (ecf) + 435 (1) = 552 (1) 6 000 ÷ 552 (ecf) = 10.9 years (1) so claim is not true. (1)			5		4	
			Question 3 total	**1**	**9**	**5**	**15**	**13**	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4 HT	(a)			**Indicative content** A series circuit is set up including a d.c. power supply, a variable resistor, a lamp and ammeter. A voltmeter is connected in parallel across the lamp. The variable resistor is set at its minimum/maximum value and readings of current and voltage are taken. The variable resistor is adjusted and a further pair of readings is taken. This is repeated 5/6 times. Then the power supply/lamp is reversed and the process repeated. **5-6 marks** Detailed description of circuit and methodology including references to positive and negative orientation of the power supply. *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** Detailed description of circuit with some references to methodology. *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** Basic list of components and reference to taking readings. *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.*	6					6

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
(b)			current / voltage graph forward bias (1) reverse bias (1)	2					2
(c)			No difference.	1					1
(d)			If R is constant then I ∞ V (1) so line should be straight but it is curved (1)	2					2
(e)			Extra lamp in series increases resistance (1) Extra lamp in parallel decreases resistance (1) Either series results in lower current OR parallel results in higher current (1)	3					
			Question 2 total	**14**			**14**		**11**

15

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5 HT	(a)			advantageous mutation (1) led to finches with best adapted beaks (1) These finches survived and reproduced (1) so advantageous allele passed on to future generations (1)	1 1	1 1				
	(b)	(i)		Dome shell shaped tortoise on Isabela island with short neck so ground feeder (1) so wet climate. (1) Saddle backed shell tortoise on Hood island with long neck so can feed on plants off the ground (1) so dry climate (1)			4			
		(ii)		Goats competed for food (1) so less tortoises survive (1) More land used for homes/agriculture (1) Affects habitats of tortoises (1)		4				
				Question 5 total	**2**	**6**	**4**	**12**		

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6 HT		(i)		Flame test	1					1
		(ii)		3 max for: sulfate present bromide present No carbonate present Iron (II) present 4 marks for: Iron bromide + iron sulfate solutions are present		4				4
		(iii)		$FeBr_2$ or $FeSO_4$			1			
				Question 6 total	**1**	**4**	**1**	**6**		**5**

Summary FT

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	4	0	5	0	0
2	10	2	0	12	4	12
3	**1**	**1**	**3**	**5**	0	5
4	6	0	2	8	0	0
5	4	5	3	12	0	0
6	4	7	3	14	14	0
7	4	11	4	19	3	0
Total	**30**	**30**	**15**	**75**	**21**	**17**

Summary HT

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	**5**	**10**	4	**19**	**3**	
2	**14**			**14**		11
3	1	9	5	15	**13**	
4	**7**	**1**	**1**	**9**		
5	2	6	**4**	**12**		
6	**1**	**4**	**1**	**6**		5
Total	**30**	**30**	**15**	**75**	**16**	**16**

GCSE/Applied Science (SA) Unit 1 (New) MS Summer 2017/GH