



GCSE MARKING SCHEME

SUMMER 2017

**GCSE (NEW)
APPLIED SCIENCE (DOUBLE AWARD) - UNIT 2
3445U20-1 / 3445UB0-1**

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 (DOUBLE) AWARD

UNIT 2 (NEW) 3445U20-1/3445UB0-1

SUMMER 2017 MARK SCHEME

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
1 FT	(a)	(i)	oil will last longer/won't use as much oil	1					
		(ii)	any 1 × (1) from: more landfill needed (1) take a long time to biodegrade / rot (1)	1					
		(iii)	any 2 × (1) from: animals could suffocate (1) animals could get tangled in bags (1) animals may swallow (1)	2					
	(b)	(i)	280 [million]		1			1	
		(ii)	$\frac{70}{350} \times 100$ (1) = 20% (1) Answer only (2)		2			2	
	(c)	(i)	pathogens	1					
		(ii)	White blood cells	1					
			Question 1 total	6	3	0	9	3	0

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
2 FT	(a)	(i)		H	1						
			(ii)	Hh or HH	1						
	(b)			<p style="text-align: right;">(2 × 1)</p> <p>50% chance (1) compared with 75% chance (1)</p>		4					
	(c)			<p>whether to have children / whether to terminate pregnancy / risk of foetal testing / possible misuse of information</p> <p>Accept: may pass on to children</p>	1						
				Question 2 total	3	4	0	7	0	0	

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
3 FT	(a)			Absorbed (1) Chemical make up (1) Moving away from us (1)	3						
	(b)	(i)		1		1					
		(ii)		3		1					
		(iii)		The same			1				
		(iv)		1		1					
				Question 3 total	3	3	1	7	0	0	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4 FT	(a)	(i)		1 in 6 / $\frac{1}{6}$ / $\frac{20}{120}$		1			1	1
		(ii)		20			1			1
	(iii)		Remove those with a 6 (or any other number) facing up	1						1
	(iv)		The remaining dice were rolled again (and again) (1) taking away the 6's (or stated side) each time (1)	2						2
(b)	(i)			19 (1) 50 (1)		2				2
		(ii)		60		1		1	1	
	(iii)		4 throws			1		1	1	
	(iv)		120 → 60 → 30 → 15 (1) Half-lives =3 (1) Accept 3 on answer line for 2 marks		2			2	2	
(c)	(i)			Longer <u>half-life</u> (1) So will not need replacing as often (1) OR Chromium has a shorter half-life (1) So needs replacing more often (1)			2			
		(ii)		Beta and gamma (emitter) (1) will penetrate packing (1) OR Bismuth emits alpha (1) Which won't penetrate the packing (1)			2			
				Question 4 total	3	6	6	15	5	11

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
				<p>1-2 marks The candidate describes that glucose levels rise after a meal and decreases at other times.</p> <p><i>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.</i></p> <p>0 marks No attempt made or no response worthy of credit.</p>							
	(b)			<p>any 2 × (1) from: control/low sugar diet (1) <u>insulin</u> injections (1) pancreatic tissue transplant (1)</p>	2						
	(c)	(i)		<p>Benedict's test (1) Boil/heat (1)</p>	2						
		(ii)		<p>(blue→) green / amber / (brick) red (1) Blue/no colour change (1)</p>	2						
				Question 5 total	12			12			6

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
6 FT	(a)	(i)		92.1	1						
		(ii)		1995	1						
	(b)	(i)		897		1					
		(ii)		CFC	1						
	(c)			Temperature changes track sunspot changes up to {(about)1940/initially/early on the time scale} (1) Temperature trend tracks CO ₂ after {(about) 1950/after on the timescale}(1) Accept: the trend tracks CO ₂ all along (1)			2		2		
7 FT 1 HT	(a)	(i)		Any 2 × (1) from: Increases after 1990 or by 1995 (1) Drops in 2000 (1) Rises by 2005/2010 (1) Remains approximately steady after 2010 (1) Each marking point must include a relevant year Increases, decreases and increases (1 mark only)			2			3	
			(ii)		Scales (x axis 5 years per 2 cm square, y axis 50 per 2 cm square) (1) 7 correct plots (within appropriate small square) (2) 6 correct plots (within appropriate small square) (1) 5 correct plots (0) curve of best fit / joining points with curve / point to point (1)			4		4	
				(iii)		CO ₂ emissions decrease (over time)/negative correlation (1) Rate of decrease in the last 10 years is greater than the first 10 years / smaller decrease before 2005 than after 2005 (1) Ignore reference to plateau. Allow ecf from incorrect plot			2		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(iv)	<p>Graph 1 shows an increase over time (1) so does not correlate with drawn graph (1)</p> <p>OR</p> <p>My graph shows emissions (from UK) decrease (1) but atmospheric concentration is increasing (1)</p>			2			
		(v)	<p>Rate of photosynthesis varies throughout the year (1) Uptake of CO₂ varies (1) Lower rate (in November) corresponds with peak / Higher rate (in May) correlates with dip (1)</p> <p>Accept:</p> <p>Rate of decay varies throughout the year (1) CO₂ release varies (1) higher rate (of decay/respiration of decomposers) corresponds with peak / lower rate (of decay/respiration of decomposers) corresponds with dip (1)</p>			3			

Question		Marking details					Marks Available					
							AO1	AO2	AO3	Total	Maths	Prac
(b)		288 000	68 520	11 880	368 400	72.37		3			3	(b)
		17 808	12 117	6 720	36 645	7.20/7.1986/ 7.19/7.00						
		3 × (1)										
(c)		Water vapour becomes largest factor (1) All others decrease (1)						2				(c)
(d)		man made contributions are very small / natural contributions are high							1			(d)
(e)	HT Only	<p>Indicative content</p> <p>In graph 2, variations in the sunspot cycle length and the temperature anomaly are closely linked. This is true for the whole time scale. Between 1910 and 1970 the CO₂ concentration gradually increases but during this time the temperature anomaly increases steeply, peaks and falls.</p> <p>In graph 3, there is a close match between the increasing trends of CO₂ concentration and temperature anomaly. The steepest increase in temperature since 1960 is matched by a fluctuating but steady sunspot activity.</p> <p>The evidence is not conclusive since graph 2 supports solar activity being responsible for global warming but graph 3 supports the CO₂ cause.</p> <p>5-6 marks</p> <p>Comprehensive comparison of trends of the 3 variables in both graphs. A statement that the evidence is inconclusive is required.</p> <p><i>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.</i></p>										

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>3-4 marks Comparison of trends of at least two variables in both graphs. May not state that evidence in graphs contradicts each other. <i>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.</i></p> <p>1-2 marks Limited comparisons made of trends or some analysis of one graph. No conclusions made. <i>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.</i></p> <p>0 marks No attempt made or no response worthy of credit.</p>						
				Section B total	3	14	8	25	12	0

Question			Marking details	Marks Available						
				AO1	AO2	AO3	Total	Maths	Prac	
2 HT	(a)	(i)	<ul style="list-style-type: none"> The 90 dice were rolled (1) Any that landed with a 6 (or any other) facing upwards were removed (1) The remaining dice were rolled again and again, taking away the 6's (or the same number) each time (1) 	3						3
		(ii)	15		1			1	1	
		(iii)	smooths out variations/finds anomalies/more repeatable/ more reproducible	1						1
(b)	(i)		85 185		2					2
		(ii)	4 throws		1			1	1	
(c)	(i)		Any construction lines (1) Around 3.8-3.9 (1)		2			2	2	
		(ii)	More accurate	1						1
(d)	(i)		Caesium-137			1				
		(ii)	Beta and gamma will penetrate packing (1) Will not need replacing very often due to its half-life (1) If chromium selected in d(i) Accept: gamma will penetrate packing (1)			2				
			Question 2 total	5	6	3	14	4	11	

Question				Marking details	Marks Available																																									
					AO1	AO2	AO3	Total	Maths	Prac																																				
3 HT	(a)	(i)		A form of a gene	1																																									
		(ii)		Masks the contribution of another allele	1																																									
		(iii)		Genetic make up of a pair of alleles/type of genes an individual has	1																																									
	(b)			<p style="text-align: center;"> Parent with Huntington's Parent with Huntington's </p> <table style="margin: auto; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center; padding: 0 10px;">H</td> <td style="text-align: center; padding: 0 10px;">h</td> <td></td> <td style="text-align: center; padding: 0 10px;">H</td> <td style="text-align: center; padding: 0 10px;">h</td> </tr> <tr> <td style="text-align: center; padding: 5px 0;">Normal Parent</td> <td style="border: 1px solid black; padding: 5px;">h</td> <td style="border: 1px solid black; padding: 5px;">Hh</td> <td style="border: 1px solid black; padding: 5px;">hh</td> <td style="text-align: center; padding: 5px 0;">Parent with Huntington's</td> <td style="border: 1px solid black; padding: 5px;">H</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">h</td> <td style="border: 1px solid black; padding: 5px;">Hh</td> <td style="border: 1px solid black; padding: 5px;">hh</td> <td></td> <td style="border: 1px solid black; padding: 5px;">h</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="border: 1px solid black; padding: 5px;">H</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="border: 1px solid black; padding: 5px;">Hh</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="border: 1px solid black; padding: 5px;">hh</td> </tr> </table> <p>(Gametes (1) cross (1) (ecf)) × 2</p> <p>50% chance compared with 75% chance of being affected (ecf)(1)</p> <p>Accept 50% chance compared to 25% chance of not being affected (ecf)</p>		H	h		H	h	Normal Parent	h	Hh	hh	Parent with Huntington's	H		h	Hh	hh		h						H						Hh						hh		5			1	
	H	h		H	h																																									
Normal Parent	h	Hh	hh	Parent with Huntington's	H																																									
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	(c)			Any 2 × (1) from: whether to have children (1) whether to terminate pregnancy (1) risk of foetal testing (1) possible misuse of information (1)	2																																									
				Question 3 total	5	5		10	1																																					

Question			Marking details	Marks Available						
				AO1	AO2	AO3	Total	Maths	Prac	
4 HT		(i)	A Sensory neuron/sensory nerve (1) B Spinal cord (1) C Motor neuron/motor nerve (1)	3						
		(ii)	Impulse sent along <u>sensory</u> neuron (1) Travels through <u>relay</u> neuron (1) Sent back to muscle through <u>motor</u> neuron (1) Causes extensor muscle to contract (1)	4						4
		(iii)	Extensor muscle <u>contracts</u> flexor <u>relaxes</u> (1) Leg straightens (1 or*) Flexor <u>contracts</u> extensor <u>relaxes</u> (1) Leg bends (or 1*) Accept either* in correct context	3						
			Question 4 total	10			10			4

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5 HT	(a)	(i)		Natural resources will last longer (1) Used for other purposes (1)	2					
		(ii)		Any 3 × (1) from: Less litter/landfill/waste (1) Less harm to wildlife (1) Less damage caused by extracting natural resources (1) Less emissions during production (1)	3					
	(b)			Dropped to 1/5 or 20% (1) So assume similar drop in England of 20% (1) = 1.5 billion / 1 500 million (1) Accept 1 500 million for (3) 1 500 only award (2)		3			1	
	(c)			Some bacteria are harmful/pathogens/cause disease/make you ill (1) Cause <u>food poisoning</u> in humans (1)	2					
				Question 5 total	7	3		10	1	

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6 HT	(a)			Absorption of light as it passes through (named) gas (1) Characteristic of elements present (1) At certain wavelengths (1)	3					
	(b)			Same <u>pattern</u> of lines (1) All <u>red-shifted</u> (1) By different amounts/more/less (1)		3				
				Question 6 total	3	3		6		

SUMMARY HT

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	0	13	12	25	10	0
2	5	6	3	14	4	11
3	5	5	0	10	1	0
4	10	0	0	10	0	4
5	7	3	0	10	1	0
6	3	3	0	6	0	0
TOTAL	30	30	15	75	16	15

SUMMARY FT

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	6	3	0	9	3	0
2	3	4	0	7	0	0
3	3	3	1	7	0	0
4	3	6	6	15	5	11
5	12	0	0	12	0	4
6+7	3	14	8	25	12	0
TOTAL	30	30	15	75	20	15