



GCSE MARKING SCHEME

ADDITIONAL APPLIED SCIENCE

JANUARY 2014

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE ADDITIONAL APPLIED SCIENCE. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were 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 conferences was to ensure that the marking schemes were 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' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

Question	FOUNDATION TIER	Marks
(b) (i)	8 (m/s)	1
(ii)	Subs $8/2$ [1] and 4 (m/s ²) [1]	2
(iii)	Area of rectangle = 10 [1] x 8 [1] = 80 (m) [1]	3
4 (a)	A tick in each of the second and third boxes only. Mark for each correct tick. If three boxes ticked, maximum of 1 mark. All boxes ticked, 0 marks.	2
(b) (i)	Nickel	1
(ii)	Nickel	1
(iii)	Lowered	1
(iv)	Nickel	1
(c) (i)	Polymer gel	1
(ii)	Shape memory	1
(iii)	Piezoelectric	1
(iv)	Thermochromic	1
5 (a) (i)	All plots correct [1] Best fit line [1]	2
(ii)	28 (accept reading between 27.5 and 28.5)	1
(iii)	Normal	1
(b)	Subs $70/1.6^2$ [1] = 27.3 [1]	2

Question	FOUNDATION TIER	Marks
6	(i) Copper (ions present) [1] Carbonate (present) [1] Sulfate (present) [1]	3
	(ii) Copper carbonate, copper sulfate.	2
7	(a) Working down, the order is: <ul style="list-style-type: none"> • trachea • bronchiole • bronchus • alveoli 1 each correct, to maximum of 3	3
	(b) Indicative content: When you inhale: <ul style="list-style-type: none"> • Intercostal muscles contract, expanding the ribcage • The diaphragm contracts, pulling downwards to increase the volume of the chest. • Pressure inside the chest is lowered and air is sucked into the lungs. When you exhale: <ul style="list-style-type: none"> • The intercostal muscles relax, the ribcage drops inwards and downwards. • The diaphragm relaxes, moving back upwards, decreasing the volume of the chest. • Pressure inside the chest increases and air is forced out. Marking bands 5-6 marks. The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.	6 QWC
	(c) Nitrogen stays the same [1] Oxygen decreases (to about 16%) [1] Carbon dioxide increases (to about 4%) <u>and</u> more water vapour [1]	3
	(d) Increases oxygen	2

Question	HIGHER TIER	Marks
1	<p>(a) A material that can change properties [1] in response to external stimuli/named stimulus [1]</p> <p>(b) Melting point is lower than both/lowest [1] density <u>and</u> electrical resistivity is in between [1] thermal conductivity lower than both/lowest [1] tensile strength lower than both/lowest [1] (Penalise no mention of both only once).</p> <p>(c) (i) Polymer gel</p> <p>(ii) Shape memory</p> <p>(iii) Piezoelectric</p> <p>(iv) Thermochromic</p>	<p>2</p> <p>4</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
2	<p>(i) Copper (ions present) Copper (ions present) Carbonate (present) Chloride (present)</p> <p>(ii) CuCO_3 CuCl_2</p>	<p>4</p> <p>2</p>
3	<p>(a) (i) All plots correct [1] Line [1]</p> <p>(ii) 28 (accept readings between 27.5 & 28.5)</p> <p>(b) 97 (accept between 96-98)</p> <p>(c) Conversion to 1.6 [1] subs $70/1.6^2$ [1] (Correct answer of 27.3 award 2) $70/160^2$ - award 1mark only</p>	<p>2</p> <p>1</p> <p>1</p> <p>2</p>
4	<p>(a) Working down, the order is:</p> <ul style="list-style-type: none"> • trachea • bronchiole • bronchus • alveoli <p>1 each correct to maximum of 3</p>	<p>3</p>

Question	HIGHER TIER	Marks
(b)	<p>Indicative content</p> <p>When you inhale:</p> <ul style="list-style-type: none"> • Intercostal muscles contract, expanding the ribcage • The diaphragm contracts, pulling downwards to increase the volume of the chest. • Pressure inside the chest is lowered and air is sucked into the lungs. <p>When you exhale:</p> <ul style="list-style-type: none"> • The intercostal muscles relax, the ribcage drops inwards and downwards. • The diaphragm relaxes, moving back upwards, decreasing the volume of the chest. • Pressure inside the chest increases and air is forced out. <p>Marking bands</p> <p>5-6 marks. The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6 QWC
(c)	<p>Nitrogen stays the same [1] Oxygen decreases (to about 16%) [1] Carbon dioxide increases (to about 4%) and more water vapour [1]</p>	3
(d)	<p>Body needs more energy / respire more (quickly) [1] so rate of oxygen supply needs to increase [1] The points must be correctly and coherently connected for 2 marks.</p>	2

Question	HIGHER TIER	Marks
5	<p>(a) (i) From squat [1] to upright [1] stride increases [1] Assume answer is about F if A or F not mentioned. Max of 2</p> <p>(ii) To get upright / to normal stride quicker [1]</p> <p>(iii) D [1]</p> <p>(iv) Time is 0.5 s [1] sub 3/0.5 [1] ans 6(m/s) [1] Allow ecf for incorrect time</p> <p>(b) (i) Subs 8/2 [1] ans 4 (m/s²) [1]</p> <p>(ii) Area of rectangle = 10 x 8 =80 m [1] Area of triangle = ½ x 2 x 8 = 8 m [1] Total distance =88 m [1] /allow areas added correctly Recognition that distance = area under graph e.g. 8x12 even if incorrect [1]</p>	<p>3</p> <p>1</p> <p>1</p> <p>3</p> <p>2</p> <p>3</p>
6	<p>(a) Ammonium nitrate [1] HNO₃ [1] NH₃ [1]</p> <p>(b) Any two of:</p> <ul style="list-style-type: none"> • phosphorous • potassium • magnesium • water 	<p>3</p> <p>2</p>

Question	HIGHER TIER	Marks
(c)	<p>Indicative content:</p> <ul style="list-style-type: none"> • (Heavy) rainfall runs from the surface of the soil, taking fertiliser into streams and rivers. • Fertiliser in the river water increases plant and algae growth. • Called eutrophication. • Eventually die in large numbers. • Bacteria feeding on the dead plant material use up the oxygen in the water. • Fish may then die through lack of oxygen. <p>5-6 marks. The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>	6 QWC



WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk