



Mark Scheme (Results)

June 2014

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 1: Principles of Science (20460E)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1(a)	Kinetic - car (1) Gravitational potential - cat (1)		More than one line from any box for each marking point.	2
1(b)(i)	Light			1
1(b)(ii)	Heat	Thermal, sound		1
Total				4 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2(a)(i)	Gamma / Ultraviolet / Microwave			1
2(a)ii	Infrared			1
2(b)(i)	Radio			1
2(b)(ii)	Gamma			1
2(c)	<p>Two from the following</p> <p>(Microwaves are) absorbed by {food/fat/sugar/water}(1)</p> <p>{particles/atoms/molecules/matter/bonds} in food {vibrate/move}(1)</p> <p>(vibrations/movements) produce heat (1)</p>			2
Total				6 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3(a)	C wave 2 has a larger amplitude than wave 1			1
3(b)	Number of {waves/cycles/oscillations} per second	Accept other time scales/per unit time		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3 (c)(i)	<p>1 500 000 (2)</p> <p>or</p> $\frac{300\,000\,000}{200} \quad (2)$ <p>or</p> <p><u>wavespeed</u> = frequency (1) wavelength</p> <p>or</p> <p>300 000 000 = frequency x 200 (1)</p>	<p>1 500 kHz (2) 1.5 MHz (2) 1.5 x 10⁶ (2)</p> <p>If followed by any further incorrect working, max 1 mark</p> <p>1.5 to any power of 10 gains 1 mark if no other is awarded and no units are given</p>		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4(a)(i)	Sperm			1
4(a)(ii)	Nucleus	nuclei		1
4 (b)(i)	Egg	ovum/ova		1
4(b)(ii)	Controls substances {in / out} (of cell)			1
4(c)(i)	Carry oxygen (around body)	carry carbon dioxide		1
4(c)(ii)	Large surface area/concave	contains haemoglobin does not have a nucleus. Flexible		1
Total				6 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5(a)(i)	X at highest peak	X on axis below highest peak.		1
5(a)(ii)	Answer between 6.30 (am) and 8.00 (am)			1
5(b)(i)	insulin			1
5(b)(ii)	liver			1
5(c)	<u>Glucagon</u> (released by the pancreas) (1) Converts <u>glycogen</u> back into glucose (1)		phonetic spellings for glucagon and glycogen	2
Total				6 marks

Question Number	Acceptable Answers	Additional Guidance	Reject	Mark
6	<p>Award one mark for any valid point up to a maximum of 3 marks and one mark for each relevant extension.</p> <p>Beneficial effect Any one of the following linked pairs:</p> <p>Can produce useful characteristics (1) help the organism survive/adapt to the environment/adaptations passed down to offspring (1)</p> <p>Can produce greater diversity in organisms (1) therefore greater chance of survival of species (1)</p> <p>Harmful effect Any two of the following linked pairs:</p> <p>Can cause cells to divide uncontrollably (1) and cause cancer (1)</p> <p>Can cause changes in sex cells (1) and therefore harmful mutations are passed on to offspring (1)</p> <p>Can cause severe changes to cells (1) cause cells to die (1)</p>	<p>Can give examples e.g. skin colour mutations, fair skin, cooler climate, vitamin D production</p> <p>Can give examples e.g. haemophilia, sickle cell anaemia, Huntington's disease</p> <p>Credit passed down to offspring once only</p>		
			Total	6 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
7(a) 1	Nucleus			1
7 (a) 2	+1	Positive/ + / +ve / plus		1
7 (a) 3	-1	Negative/- / -ve /minus		1
7(b)	C Protons plus number of neutrons			1
Total				4 marks

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8(a)	Mg		Do not credit incorrect case letters e.g. mg / MG / mG	1
8(b)(i)	12	Twelve		1
8(b)(ii)	3	Three		1
8(c)	D salt			1
8(d)(i)	Sulphuric (acid)	H ₂ SO ₄ Ignore formula if correct answer is given.	If formula given it must be correct e.g. H ₂ SO ₄ / H ² SO ₄ / h ₂ SO ₄ etc	1
8 (d)(ii)	Hydrogen	H ₂ Ignore formula if correct answer is given.	If formula given it must be correct h ₂ / H ² / H etc	1
8 (e)	LHS correct 2 (1) RHS ZnCl ₂ (1)	Correct multiples.	Incorrect balancing. ZnCl ₂ / ZnCl ² etc	2
Total				8 marks

Question Number	Indicative content	
9	<p>Examples of tests that can be carried out</p> <p>Add indicator to which contain acid Acids will turn red (or correct colour if named indicator given)</p> <p>Use a pH probe pH below 7 indicates acid Lower pH indicates higher concentration</p> <p>Addition of a suitable metal or carbonate e.g. add magnesium ribbon The sample that fizzes/reacts fastest is the most concentrated</p> <p>Titrate samples with sodium hydroxide (or suitable alkali) and indicator For the same volume of acid if more alkali is used, the more concentrated the acid.</p> <p>Bubble carbon dioxide/blow through samples. Limewater will turn cloudy/milky/white precipitate.</p>	
Level	Mark	Descriptor
	0	No rewardable material
Pass	1-2	A simple description and explanation for one test or a few key points identified. E.g. Use litmus paper on the substances and if it is acid it will turn red.
Merit	3-4	A description and explanation of two tests or a simple description of three tests with at least one explained. E.g. Use universal indicator on the substances and if it is an acid it will turn red. Bubble carbon dioxide through the limewater and a white precipitate will form.
Distinction	5-6	A detailed description of three tests with an explanation of at least two. E.g. add a piece of magnesium to the substances, the acid would fizz, the more concentrated acid will fizz faster. Bubble carbon dioxide through limewater which would form a white precipitate.

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