Mark Scheme

June 2015 (1511)

NQF BTEC Level 1/Level 2 Firsts in Applied Science

Unit 1: Principles of Science (20460E)

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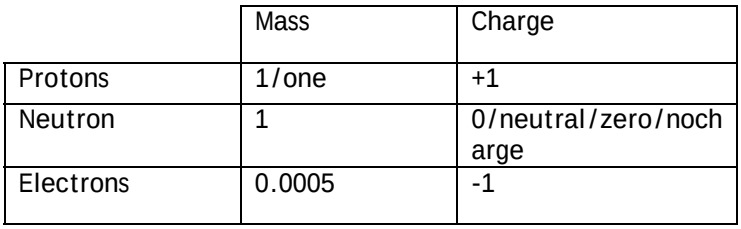
General Marking Guidance

- 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.
- Accept phonetic spellings, unless stated otherwise

Question number	Correct answer	Additional guidance	Reject	Mark
1(a)(i)	**A -** corrosive			1
1(a)(ii)	hydrochloric (acid)	allow phonetic spelling		1
1(a)(iii)	universal (indicator)	ignore pH paper	Reject Litmus paper	1
1(a)(iv)	Any value less than 7	allow a range e.g 3-4		1
			Total	**4 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
2(a)	2 electrons in first shell 1 electron in second shell			1
2(b)	**B** 3			1
2(c)	 1 mark for each correct.			2
2(d)	outer shell (1) one electron (1)	allow second/last shell second mark dependent on the first mark		2
			Total	**6 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
3(a)(i)	Lit splint/flame (1) Squeaky pop (1)	 Second mark dependent on first mark		2
3(a)(ii)	$MgSO_4$ (1) H_2 (1)	All symbols and subscripts must be correct. Any incorrect attempt at balancing equation, award maximum of 1.		2
3(b)	Explanation linking any four of the following indigestion is due to excess stomach acid (1) This is a neutralisation reaction (1) Calcium carbonate is a base (1) Calcium carbonate reacts with acid (in stomach) (1) To form a calcium salt (+ water + carbon dioxide) (1) pH of stomach is raised/increased (1)	 allow calcium carbonate acts as a alkali As an alternative to MP4 and 5 accept: calcium carbonate + hydrochloric acid → calcium chloride (+ water + carbon dioxide) (2) ignore lowers acid		4
			Total	**8 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
4(a) (i)	Nucleus/cell membrane/cytoplasm/mitochondria /ribosomes			1
4 (a)(ii)	Any chloroplast labelled			1
4(a)(iii)	To {absorb/take in} (sun)light (1) for photosynthesis (1)	Allow uses (sun)light Allow to make glucose/sugars		2
4 (b)	Large surface area/biconcave/contain haemoglobin/no nucleus (1) To absorb/carry {more/large amounts/lots of} oxygen (1) OR Flexible (1) to pass through small blood vessels (1)			2
			Total	**6 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
5(a)	Homeostasis (1)	Allow phonetic spellings		1
5(b)	Brain (1)	Allow phonetic spellings		1
5(c)(i)	Endocrine (system)	Allow phonetic spellings		1
5(c)(ii)	Insulin	Allow phonetic spellings		1
5(d)	(a layer of) air is trapped next to the skin (1) to insulate the skin from heat loss (1)	allow reduce heat loss (1)	reject traps heat inside the body	2
			Total	**6 marks**

Question number	Answer	Mark
6	Award one mark for any valid point up to a maximum of 3 marks and one mark for each relevant extension. Electrical {signals/nerve impulses/messages} along the neurons (1) are very fast (1) Chemical signals/neurotransmitter (across the synapses) are slow (1) but do not have to travel far (1) Signals do not have to go to the brain (1) so there is no thinking time/less distance (1) If no other marks have been scored, allow **maximum 1 mark** from the following: Receptors detect {stimuli /heat}(1) (Electrical {signals/nerve impulses/messages} from motor neurons) move the muscle/effector (1)	**6**
	Total	**6 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
7(a)	Wind/solar/geothermal /hydroelectric/biofuels /wave/tidal		Nuclear	1
7(b)	Chemical	Allow phonetic spellings		1
7(c)	Sound/light			1
7(d)	Kinetic If you see a list, please send it to review	Allow phonetic spellings		1
			Total	**4 marks**

Question number	Correct answer	Additional guidance	Reject	Mark
8(a)	Any two from: light (1) sound (1) kinetic (1)			2

8(b)	300 (J) (2) or 5 x 60 (2) or $5 = \frac{\quad}{60}$ (1) or power x time = energy (1)			2
8(c)	3.4×10^{-1} (4) or 3×10^{8} / 8.8×10^{8} (3) or 300 000 000 / 8.8×10^{8} (2) or 300 000 000 / 880 000 000 = (2) or 300 000 000 = wavelength x 8.8×10^{8} (1) or wave speed / frequency = wavelength (1)	Allow 0.34 (3) Allow 3.4 to any power of 10 (2) allow 300 000 000/8.8 (1) if no other mark scored, allow one mark for 880 000 000 OR 3×10^{8}		4
			Total	**8 marks**

Question number	Indicative content	
9	<u>Advantages</u> <u>Detects cancer</u> Shows where the cancer is in the body Shows size of tumour/cancer (Repeated) scans can show changes in the size/shape/spread of cancer/tumour Only low doses of a tracer are taken into the body The tracer is not highly ionising The radiation penetrates the body so can be easily detected <u>Treats cancer</u> Gamma rays can be targeted to hit just the tumour/cancer So that cancer cells are destroyed/tumour is shrunk Without damaging cells around it Intensity can be controlled <u>Disadvantages</u> Causes side effects e.g. tiredness/burns/hair loss/sickness Gamma rays can destroy/damage/mutate cells/change cell growth Gamma rays can cause uncontrolled cell growth Gamma rays can cause cancer Health care professional are at risk	
Level	Mark	Descriptor
	0	No rewardable material.
Pass	1-2	A few key points identified, **or** one point described in some detail. The answer is likely to be in the form of a list. Points made will be superficial/generic and not applied/directly linked to the situation in question, E.g. gamma rays can show where the cancer is and how big it is.
Merit	3-4	Some points described, **or** a few key points explained. The answer is unbalanced. Most points made will be relevant to the situation in question, but the link will not always be clear, e.g. gamma rays can be targeted so that it only kills the tumour but it can cause tiredness and may cause cancer OR gamma rays show where the cancer is and the size of the cancer. The gamma rays can be targeted so cancer cells can be killed without damaging surrounding normal cells.
Distinction	5-6	A detailed discussion of advantages/disadvantages. The majority of points made will be relevant and there will be some clear link to the situation in question. A view is given and fully justified, e.g. gamma rays show where tumours are and how big they are and can be targeted to hit just the tumour; but gamma rays can cause sickness and may cause uncontrolled cell growth.

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