Mark Scheme (Second draft)

February 2021

BTEC Level 1/Level 2 Firsts in Applied Science

Unit 1: Principles of Science

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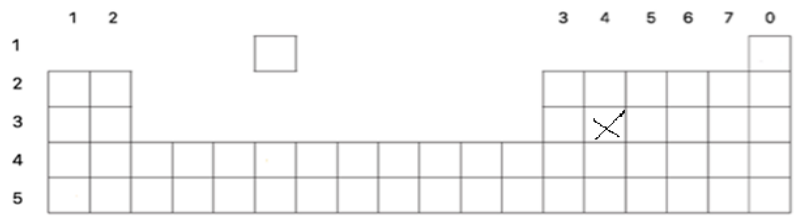
General Marking Guidance

- 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.
- All marks on the mark scheme should be used appropriately.
- All 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 a 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 about applying 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.
- Phonetic spelling should be accepted.

BTEC Next Generation Mark Scheme Template

<<Applied Science>> <<20460>> <<2021>> <<02>> <<Draft no.1>>

Question Number	Answer	Additional guidance	Mark
1 (a)	**C** a metal		1 MCQ
1 (b)	copper + oxygen (1) copper oxide (1)	allow formula if fully correct do not allow copper oxygen/copper oxate	2 grad
1 (c)	**C** 64.00		1 MCQ
		Total	**4 marks**

Question Number	Answer	Additional guidance	Mark
2 (a)	2.8.4		1 clerical
2 (b)(i)	nucleus	do not allow neutron/neutral	1 clerical
2 (b)(ii)	0/zero	allow no (net) charge/neutral	1 grad
2 (c)	x in box showing group 4 period 3  		1 clerical
2 (d)	mass number = 28 atomic number = 14		2 clerical
		Total	**6 marks**

Question Number	Answer	Additional guidance	Mark
3 (a)	irritant/skin sensitiser/harmful/acute toxicity	allow hazardous to the ozone layer do not allow toxic alone	1 grad
3 (b)	NaOH	allow OHNa/NaHO/HONa/Na^+OH do not allow NAOH/naoh/HNaO	1 grad
3 (c)	three (different) elements (1) (chemically) {bonded/joined} (1)	 allow combined	2 grad
3 (d)	red shows that solution A is an acid (1) (when solution B is added it turns) green because it is neutral (1) solution B is an alkali (1) the {solution B/alkali} has neutralised the {solution A/acid} (1)	 allow 'starts to become yellow/orange as it becomes less acidic'	4 expert
		Total	**8 marks**

Question Number	Answer	Additional guidance	Mark
4 (a)(i)	(blood) glucose (level)	allow (blood) sugar allow increases (blood) glucose level	1 grad
4 (a)(ii)	pancreas	allow phonetic spelling	1 clerical
4 (a)(iii)	in the blood (stream)	allow by the blood	1 grad
4 (b)	do not have to go through the brain/it is a reflex arc	allow do not have to think about them allow only goes to the spinal cord and back	1 expert
4 (c)	motor (neurone) (1) sensory (neurone) (1)	can be in either order reject relay neurone for both	2 clerical

Total	**6 marks**

Question Number	Answer	Additional guidance	Mark
5 (a)	tail	allow flagellum allow phonetic spelling clip with Figure 7	1 clerical
5 (b)(i)	nucleus	reject nuclear/nucleoid	1 clerical
5 (b)(ii)	double (1) helix (1)	allow two allow a series of complementary base pairs allow (strands in) spirals allow (strands) wrapped	2 expert
5 (c)	(mitochondria are a) site of respiration/provide energy (1) to move (the tail) (1)		2 expert
		Total	**6 marks**

Question Number	Answer	Mark
6	Any **six** marks with a maximum of **four** marks from either cell. **xylem** lose their end walls (1) to form a hollow tube (1) cells have lignin (1) which strengthens them (1) transports water and minerals (1) from the roots to the leaves (1) **phloem** cells contain sieve tubes (1) to transport sugars (1) from leaves to the rest of the plant (1) have no nuclei (1) have companion cells for energy (1)	6 expert
	Total	**6 marks**

Question Number	Answer	Additional guidance	Mark
7 (a)	kinetic/mechanical/heat/sound/light (energy)	ignore movement (energy)	1 grad
7 (b)(i)	10 000 alone gains 1 mark OR 27 000 – 17 000 (1)		1 grad
7 (b)(ii)	450 W alone gains 2 marks 450 (1) W (1) OR $\frac{27\,000}{60}$ (1)	allow 0.450 kW (2) allow w/watt(s) allow J/s	2 expert
	Total		**4 marks**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>8 (a)</td><td>thermal</td><td>allow heat</td><td>1
clerical</td></tr>
<tr><td>8 (b)</td><td>chemical</td><td></td><td>1
clerical</td></tr>
<tr><td>8 (c)</td><td><table><tr><th>energy source</th><th>renewable</th><th>non-renewable</th></tr><tr><td>propane</td><td>no</td><td>yes</td></tr><tr><td>biofuel</td><td>yes</td><td>no</td></tr><tr><td>hydroelectric</td><td>yes</td><td>no</td></tr><tr><td>nuclear</td><td>no</td><td>yes</td></tr><tr><td>wind</td><td>yes</td><td>no</td></tr></table>
4 or 3 correct 2 marks
2 correct 1 mark</td><td></td><td>2
clerical</td></tr>
<tr><td>8 (d)</td><td>An explanation linking four from:

the water particles at the bottom gain energy (1)

(the water particles at the bottom) move further apart (1)

(so the water at the bottom) becomes less dense (1)

(the less dense water) rises (1)

the water at the top then cools and becomes more dense (1)

and falls (1)

this produces convection/{currents/movement} in the water (1)</td><td></td><td>4
expert</td></tr>
<tr><td colspan="2">Total</td><td></td><td>8 marks</td></tr>
</table>

Question Number	Indicative content	Mark
9	• radio waves and gamma rays travel at the same speed • radio waves are low(er) frequency/gamma rays are high(er) frequency • radio waves have a long(er) wavelength/gamma rays have a short(er) wavelength • radio waves are reflected/refracted by objects • radio waves are not hazardous and pose no (known) health risks • high energy/frequency gamma rays are highly penetrating/can penetrate anything • gamma rays can damage/destroy living cells • gamma rays can produce gene mutations • gamma rays can cause cancer • gamma rays can damage materials	6

Level	Descriptor
0 0 marks	No rewardable material.
1 1-2 marks	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 the question.
2 3-4 marks	Some points identified, **or** a few key points described. The answer is unbalanced. Most points made will be relevant to the situation in the question, but the link will not always be clear.
3 5-6 marks	Range of points described, **or** a few key points explained in depth. The majority of points made will be relevant and there will be a clear link to the situation in the question.