Mark Scheme

16 March 2015 (1503)

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)	B homeostasis (1)			1
1(b)	Sweating- water evaporates from skin(1) Shivering- muscles contract (1)		reject more than one line from each response.	2
1(c)	Endocrine/ Hormone (system) (1)	allow Hormonal/hormones		1
			Total	4 marks

Question Number	Correct Answer	Additional guidance	Reject	Mark
2(a)(i)	A Brain (1)			1
2(a)(ii)	B Dropping a hot pan (1)			1
2(b)(i)	(Touching the) sharp edge/broken edge/sharp glass/broken glass (1)	allow pain		1
2(b)(ii)	Motor neurone (1)			1
2 (c)	Converts glucose to <u>glycogen</u> (1) (Glycogen) stored in liver (1)		reject glucose/ insulin stored in liver	2
			Total	6 marks

Question Number	Correct Answer	Additional guidance	Reject	Mark
3(a)(i)	Nucleus			1

<table>
<tr><td>3(a)(ii)</td><td>Give instructions for individual characteristics/features/ traits (1)</td><td>allow control your characteristics

allow determine named feature eg eye colour</td><td></td><td>1</td></tr>
<tr><td>3(b)(i)</td><td>All the offspring (tomatoes/plants) will have the dominant allele/R (1)

If a dominant allele is present only dominant traits are seen (1)</td><td>allow the correct Punnett square showing all offspring are heterozygous

<table><tr><td></td><td>R</td><td>R</td></tr><tr><td>Y</td><td>Ry</td><td>Ry</td></tr><tr><td>Y</td><td>Ry</td><td>Ry</td></tr></table>
allow all tomatoes are red as they all have the dominant allele

ignore all red tomatoes are dominant</td><td>reject gene once</td><td>2</td></tr>
<tr><td>3(b)(ii)</td><td>Marking points are independently marked.

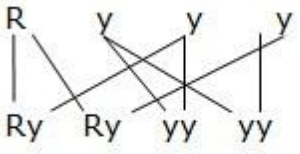
Type 2 alleles (yy) correct in square (1)

Type 3 alleles (Ry) correct in square (1)

Genotypes of offspring correct for Punnett square drawn (1)

Correct percentage and colour from Punnett square drawn (1)</td><td>Alleles can be either way round throughout.

If no Punnett square drawn, allow 50% red/yellow

<table><tr><td></td><td>R</td><td>y</td></tr><tr><td>y</td><td>Ry</td><td>yy</td></tr><tr><td>y</td><td>Ry</td><td>yy</td></tr></table>
  </td><td>reject 100% or 0%</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td>total</td><td>8 marks</td></tr>
</table>

Question Number	Correct Answer	Additional guidance	Reject	Mark
4(a)(i)	B lithium (1)			1
4(a)(ii)	D 7 (1)			1
4(a)(iii)	24 (1)			1
4(b)(i)	Correct labels for A. Electron (1) B. Neutron (1)	Any correctly labelled neutron or electron.		2
4(b)(ii)	7 (1)			1
			total	6

Question Number	Correct Answer	Additional guidance	Reject	Mark
5(a)(i)	Rinse skin with water	allow wash it off		1
5(a)(ii)	A- HCl			1
5(b)	Second mark is dependent on first. Test- (bubble through) limewater(1) Result - (limewater) goes cloudy/white precipitate/milky (1)			2
5(c)	LHS hydrochloric acid + copper carbonate (1) RHS copper chloride + water (1)	allow correct symbol equation if all formula are fully correct with correct capitals and subscripts		2
			Total	6 marks

Question Number	Correct Answer	Additional guidance	Reject	Mark
6	Chlorine has isotopes(1) Isotopes have the same number of protons (1) Isotopes have different numbers of neutrons (1) This means each isotope has a different mass number(1) The relative atomic mass is calculated from the average mass of all the different isotopes (1) According to the proportion of each isotope (in a natural mix) (1)	allow there is more than one type of chlorine allow chlorine 35 and chlorine 37		6
			Total	6 marks

Question Number	Correct Answer	Additional guidance	Reject	Mark
7(a)(i)	Kinetic (1)	allow elastic potential		1
7(a)(ii)	Chemical (1)			1
7(b)	B by radiation (1)			1
7(c)	Sound(1)			1
			Total	4 marks

Question Number	Correct Answer	Additional guidance	Reject	Mark
8(a)(i)	Electromagnetic (spectrum) (1)	allow E-M/EM/em (spectrum)		1
8(a)(ii)	Broadcasting/ satellite transmissions/ transmitting signals/ transmitting frequencies/ transmitting information (1)	allow TV broadcasting/ radio transmissions/ communication/mobile phones/radio telescope	ignore radio/TV alone ignore watching TV/listening to the radio	1
8(b)	Microwaves - internal heating of body cells (1) Infrared – skin burns (1)	allow harm/damage/kill/ destroy cells ignore any reference to hot food ignore cancer ignore burning ignore cancer		2
8(c)(i)	6×10^4 (2) Or 1000 x 60 (1)	60000 allow ECF for incorrect answer correctly converted into standard form, with working shown (1)		2
8(c)(ii)	2.5(m) (2) or 2500/1000 (2) or Wavelength = wave speed/ frequency (1) or 2500 = (wavelength) x 1000 (1)			2
			Total	8 marks

Question Number	Indicative content
9	**Why it is important to conserve crude oil** • crude oil is non-renewable/takes a long time to form • crude oil is used to produce fuels/is the raw material for fuels • crude oil is the raw material used to make plastics • we need to conserve/store crude oil to be used in future • fuels from crude oil used for cars/planes/trains/heating/generating electricity etc **Methods to conserve crude oil** • efficient use of crude oil/use less/blended fuels • renewable energy sources can be used • solar, wind, biofuels, hydroelectric, wave , tidal, geothermal • driving electric/hybrid vehicles • recycling of products from crude oil • other named energy sources can be used eg. nuclear **The disadvantages of using alternative methods** • renewable energy sources are not always reliable/available • other sources are not as easy to store • noisy, unsightly • land usage, damage to habitats
	Total 6 marks

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. Eg. Crude oil is needed for cars, but it is non-renewable
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. Maybe some inaccurate science. Eg. We need to conserve crude oil for use in the future. We should use renewable sources such as solar power to produce energy
Distinction	5-6	The majority of points made will be relevant and there will be some clear link to the situation in question. All three areas will be discussed. A view is given and fully justified. Eg. Crude oil takes years to form. We should use renewable resources instead to conserve the fuel, such as wind power. However, wind power is problematic as it is unsightly and only works when it is windy.

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