



Mark Scheme

June 2015 (1506)

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	Mark
1(a)(i)	electrical	allow electric/electricity	1
1(a)(ii)	heat/thermal	allow light	1
1(a)(iii)	sound/heat/thermal	ignore steam ignore noise	1
1(b)	convection/radiation	Ignore heat	1
		Total	4 marks

Question Number	Correct Answer	Additional guidance	Mark
2(a)(i)	solar/wind/biofuel/wave/tidal/geothermal	allow named biofuel/bioethanol allow solar panels/wind turbines etc.	1
2(a)(ii)	(gravitational) potential/ GPE/ PE		1
2(b)(i)	<p>4.5 (2)</p> <p>or</p> <p>$\frac{2700}{600}$ (2)</p> <p>or</p> <p>10 x 60 (1)</p> <p>or</p> <p>$\frac{2700}{10}$ (1)</p>	<p>600</p> <p>270</p> <p>4.5 to any power scores 1 mark max</p>	2

2(b)(ii)	<p>2430 (2)</p> <p>or</p> $\frac{90 \times 2700}{100} \quad (2)$ <p>or</p> $90\% = \frac{(\text{useful energy})}{2700} \times 100 \quad (1)$ <p>or</p> $\frac{\text{Efficiency} \times \text{total energy}}{100} \quad (1)$ <p>or</p> $90 \times 2700 \quad (1)$	243 000	2
		Total	6 marks

Question Number	Correct Answer	Additional guidance	Mark
3(a)	D arrow D		1
3(b)	Hz/Hertz	allow phonetic spellings of hertz	1
3(c)	wave drawn at same height as in box 1(1) more waves drawn per unit (1)		2
3(d)	Radio waves have long wavelength, gamma have short wavelength (1) Radio waves have a low frequency, gamma have high frequency (1) Radio waves are {less dangerous / not as harmful to the human body} / Gamma rays transfer more energy / Gamma rays can {kill/mutate/damage} healthy living cells and radio do not /gamma rays can cause cancer radio do not/ gamma more penetrating (1) Radio waves are used for {broadcasting/communication} and Gamma rays used for {detection and treatment of cancer/sterilising (medical equipment)} /other suitable use for either wave (1)	allow radio waves have a longer wavelength ORA allow radio waves have a lower frequency ORA must be a comparison must have uses for both for 1 mark	4
Total			8 marks

Question Number	Correct Answer	Additional guidance	Mark
4(a)(i)	bubbles/effervescence/fizzing	allow sodium carbonate/ solid disappearing ignore smoke ignore gas produced	1
4(a)(ii)	1 line from carbon dioxide to turns limewater milky (1) 1 line from hydrogen to lit splint burns with a squeaky pop (1)	reject more than one line from each box	2
4(a)(iii)	CO ₂	C and O must be capitals Reject Co 2 must be subscript	1
4(a)(iv)	H ₂	H must be a capital 2 must be subscript	1
4(b)	any number between >7 and 14	allow a range e.g 9-11	1
Total			6

Question Number	Correct Answer	Additional guidance	Mark
5(a)(i)	D		1
5(a)(ii)	B		1
5(a)(iii)	C		1
5(b)(i)	neutralisation		1
5(b)(ii)	sodium hydroxide + hydrochloric acid (1) sodium chloride + water (1) LHS = 1 mark RHS = 1 mark	Allow correct formula. If a mixture of word and formula used then max 1 mark	2
Total			6 marks

Question Number	Correct Answer	Additional guidance	Mark
6	<p>Any three of the following linked pairs In each pair, the second mark is dependent on first.</p> <p>both are non-metals (1) so both on right hand side of table (1)</p> <p>or</p> <p>Fluorine has 9 electrons/2.7/ 9 protons(1) so it has an atomic number of 9/is the 9th element in the periodic table (1).</p> <p>or</p> <p>Chlorine has 17 electrons/2.8.7/ 17 protons (1) so it has an atomic number of 17/is the 17th element in the periodic table (1).</p> <p>or</p> <p>both elements have {7/same amount of} electrons in their outer shell (1) so are in same group/are in group 7 (1).</p> <p>or</p> <p>fluorine has 2 shells of electrons and chlorine has 3 (1) so fluorine is in period 2 and chlorine is in period 3 (1).</p> <p>or</p> <p>Both need to gain one electron to get a full shell (1) so react in similar ways (1).</p>	<p>allow specific correct reaction</p>	6
		Total	4 marks

Question Number	Correct Answer	Additional guidance	Mark
7(a)	kicking a ball/eating	allow any sensible response reject involuntary responses	1
7(b)(i)	shivering/blood vessels constricting/hairs stand up/vasoconstriction	allow goosebumps	1
7(b)(ii)	sweating/blood vessels dilate /hairs lie flat/vasodilation		1
7(c)	<p>the endocrine system releases hormones (carried in blood) / in the nervous system, nerves carry electrical impulses (1)</p> <p>or</p> <p>hormones <u>longer</u> lasting / nerve impulses last a <u>shorter</u> time (1)</p> <p>or</p> <p>hormonal system send chemical messages/nervous system send electrical messages. (1)</p>	allow the nervous system works <u>quicker</u>	1
		Total	4 marks

Question Number	Correct Answer	Additional guidance	Mark
8(a)	photosynthesis/transpiration	allow absorbs sunlight/gas exchange	1
8(b)(i)	single line to nucleus		1
8(b)(ii)	(cell) membrane	reject cell wall	1
8(c)	large surface area		1
8(d)	<p>Max. two marks from each list</p> <p>xylem carries water/ minerals (from soil) (1) no cell walls between cells (so water can move up)/hollow (so water can flow) (1)</p> <p>or</p> <p>to give support/prevent collapse (1) strong cell wall/ cell wall contains lignin (1)</p> <p>phloem moves sugars (up and down the stem)/ moves hormones (for cell division) (1) sieve plates in between cells (to allow sugars to move) (1)</p>	<p>reject reference to sugars/named sugars</p> <p>allow any named sugar</p>	4
		Total	8 marks

Question Number	Indicative content	
9	<p>General comments</p> <ul style="list-style-type: none"> • Mrs Williams has a recessive blue allele • Mrs Williams has a dominant brown allele • Mr Williams has two recessive blue alleles • Blue alleles are recessive • Brown alleles are dominant • Both children have a 50:50 chance of having either blue or brown eyes <p>Hannah</p> <ul style="list-style-type: none"> • Hannah inherited two eye colour alleles • One recessive blue allele from Mr Williams as it was the only allele type he had • And one dominant brown allele (from Mrs Williams) • Hannah has the genotype Bb • Hannah has brown eyes because of the dominant brown alleles present <p>Sam</p> <ul style="list-style-type: none"> • Sam inherited two eye colour alleles • One recessive blue allele from Mr Williams as it was the only allele type he had • And one recessive blue allele from Mrs Williams • Both genes were the recessive blue eye allele • Sam has the genotype bb • (Sam has blue eyes) because there was no dominant brown eye allele present 	ignore blue eyes are recessive
		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. Mr Williams has two recessive alleles, Mrs Williams has a dominant and a recessive allele
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. <i>Explains why Hannah or Sam has their colour eyes or talks about dominant and recessive alleles and the children having 50:50 chance.</i>
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. <i>Explains about dominant and recessive alleles and explains in terms of inheritance why Hannah and Sam have their colour eyes.</i>

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