



Mark Scheme

November 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	Additional Guidance		Mark
1 (a)(i)	B it causes a squeaky pop (1)			1
1 (a)(ii)	B limewater (1)			1
1 (b)(i)	Universal indicator (paper) (1)	Allow Litmus (paper) Ignore pH paper		1
1(b)(ii)	Acid (1)	Allow named acid Allow acidic		1
			Total	4

Question Number	Correct Answer	Additional Guidance		Mark
2(a)	Metal (1)		Reject named element	1
2(b)	Irritant/harmful (1)	Allow moderate hazard/specific hazards eg. allergic skin reaction		1
2(c)	B H ₂ (1)			1
2(d)	Salt (1)			1
2(e)	LHS aluminium + sulfuric acid (1) RHS aluminium sulfate + hydrogen (1)	Allow correct symbol equation if all formula are fully correct with correct capitals and subscripts		2
			Total	6

Question Number	Correct Answer	Additional Guidance		Mark
3(a)(i)	19 (1)			1
3(a)(ii)	19(1)			1
3(b)	(Both have) similar properties/ react in similar /same way (1) (Because both have) one outer electron (1)	Examples of specific properties/ reactions, e.g. (both) react vigorously with water (1) One / Same number of electrons on outer shell (1)	Reject same amount of electrons	2

3(c)	An explanation linking four of the following Relative atomic mass is 35.5 / Mass number is 35.5 (1) (Relative atomic mass) is a decimal / is not a whole number (1) There is a mixture of different chlorine atoms / 2 different isotopes of chlorine (1) (Different isotopes of chlorine will) have a different number of neutrons (1)	(A mix of) chlorine-35 and chlorine-37 (1) Isotopes have different numbers of neutrons/different mass numbers/ 20 and 18 neutrons (1)		4
			Total	8

Question Number	Correct Answer	Additional Guidance		Mark
4(a)	C geothermal (1) E wind (1)			2
4(b)	Sun (1)	Allow sunlight		1
4(c)	Light (1)	Allow sunlight		1
4 (d)(i)	Chemical (1)			1
4 (d)(ii)	Sound (1)	Allow light		1
4 (d)(iii)	Heat (1)	Allow thermal		1
			Total	7

Question Number	Correct Answer	Additional Guidance		Mark
5(a)	Electrical (1)	Allow electricity/ electric		1
5(b)(i)	Infrared (1)			1
5(b)(ii)	(Visible) Light (1)			1
5(c)	80(Watts)/ <u>0.08kW</u> with no working (2) Or $\frac{48000}{600} =$ (2) Or $\frac{48000}{(10 \times 60)} =$ (2) Or $\frac{48000}{\text{time}} =$ (1) Or $\frac{48000}{10} =$ (1) Or 10 x 60 = (1)	0.08 with no units (1) 4800 (1) 600 (1)		2
			Total	5

<p>6</p>	<p>An answer including three linked benefits and harmful effects.</p> <p>Allow a maximum of 2 linked benefits and harmful effects from any part of the electromagnetic spectrum.</p> <p>A maximum of three marks if no links.</p> <p>X-rays Benefits</p> <ul style="list-style-type: none"> • To diagnose internal damage / broken bones (1) • Used during operations to see inside the body (1) • To treat cancer (1) <p>Harmful effects</p> <ul style="list-style-type: none"> • May cause cancer / mutation of cells (1) • Damage to unborn babies (1) <p>Gamma Rays Benefits</p> <ul style="list-style-type: none"> • To detect cancer (1) • Treat cancer (1) • Sterilise medical equipment (1) <p>Harmful effects</p> <ul style="list-style-type: none"> • Gamma rays may cause cancer / mutations of cells (1) • Radiation sickness (1) <p>Infrared Benefits</p> <ul style="list-style-type: none"> • Infrared used for thermal imaging (of internal damage) (1) • Heat treatment of muscles (1) <p>Harmful effects</p> <ul style="list-style-type: none"> • Infrared can cause skin burns (1) <p>Ultraviolet Benefits</p> <ul style="list-style-type: none"> • Ultraviolet used to sterilise medical instruments/kills viruses and bacteria (1) <p>Harmful effects</p> <ul style="list-style-type: none"> • Ultraviolet causes damage to eyes (1) • Causes cancer / skin burns (1) <p>Only credit a harmful effect once for each section of the electromagnetic spectrum. Allow other specific uses and linked harmful effects.</p>	
	<p>Total</p>	<p>6</p>

Question Number	Correct Answer	Additional Guidance		Mark
7 (a)	B cell wall (1)			1
7(b)	Root hair cell (1)	Allow root hair		1
7(c)(i)	A leaf (1)			1
7(c)(ii)	(contain) chloroplasts (1)	Allow (contain) chlorophyll (1)		1
			Total	4

Question Number	Correct Answer	Additional Guidance		Mark
8(a)(i)	To warm up/raise body temperature (1)	Allow to generate heat		1
8(a)(ii)	Hair raising / vasoconstriction (1)	Allow goosebumps/ blood vessels narrow (1)		1
8(b)(i)	Insulin (1)			1
8(b)(ii)	<u>Glucagon</u> (1)	Allow fully correct spelling only	Reject glycogen	1

<p>8(c)</p>	<p>Any 4 from</p> <p>Receptors detect heat/ pain (1)</p> <p>(Nerve) impulse /signal (1)</p> <p>Travels along sensory neurone (from the receptors) (1)</p> <p>Crosses synapse / spinal cord (from the sensory neurone to the motor neurone) (1)</p> <p>(Using) chemical transmission/ neurotransmitter (1)</p> <p>Relay neurone (1)</p> <p>Travels along motor neurone / electrical transmission (to muscles in the hand/ effector) (1)</p>	<p>Allow receptors are stimulated</p> <p>Allow intermediate neurone</p>	<p>4</p>	<p>8</p>
			<p>Total</p>	<p>8</p>

Question Number	Indicative content										
9	<p>Size is a characteristic Characteristics are controlled by genes Genes come in more than one form/alleles Cell nucleus contains two alleles for size. Dominant characteristic is present if at least one allele is dominant Allele for small strawberry is recessive Small strawberries must be homozygous Big strawberries can be homozygous or heterozygous Big strawberry parent plant must be heterozygous If one recessive allele is passed to the offspring, the characteristic will not show/two recessive alleles have to be present for the characteristic to show (in the phenotype).</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">\</td> <td style="text-align: center;">B</td> <td style="text-align: center;">b</td> </tr> <tr> <td style="text-align: center;">b</td> <td style="text-align: center;">Bb</td> <td style="text-align: center;">bb</td> </tr> <tr> <td style="text-align: center;">b</td> <td style="text-align: center;">Bb</td> <td style="text-align: center;">bb</td> </tr> </table>		\	B	b	b	Bb	bb	b	Bb	bb
\	B	b									
b	Bb	bb									
b	Bb	bb									
Level	Mark	Descriptor									
	0	No rewardable material									
Pass	1-2	Learners show some understanding of dominant / recessive characteristics. They may attempt a Punnett square, but it may not be correct. 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.									
Merit	3-4	Learners show an understanding of dominant / recessive alleles and how these are passed onto the offspring. At this level if a Punnett square is drawn it should be drawn correctly. Some points described, or a few key points explained. Most points made will be relevant to the situation in question, but the link will not always be clear.									
Distinction	5-6	Punnett squares, if drawn, are used correctly, there is an explanation of the 50/50 offspring ratio. The answer is fully justified. A detailed discussion of each size. The majority of points made will be relevant and there will be some clear link to the situation in question.									
		Total 6									

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