

Mark Scheme (Results)

November 2013

NQF BTEC Level 1/Level 2 Firsts in
Applied Science

Unit 1: Principles of Science (20460E)

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Question Number	Correct Answer	Acceptable Answers	Reject	Mark
1(a)	Red blood (cell) A (1) Sperm (cell) B (1) Nerve (cell) D (1)	Blood (cell) A (1) (Motor) neurone D Any mention of nerve (1)	White blood (cell) A	3
1(b)	Large surface area	Long /narrow (tail/hair/tube) Thin wall		1
			Total mark	4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2(a1)	Flower (top)	Petal (top)	Flower labelled as leaf	1
2(a2)	Root (bottom)			1
2(bi)	Second marking point is independent of first A = Phloem (1) Transport glucose (1)	Transport Food/nutrients/minerals/sugars (1) Ignore storage	Xylem Phylem Water	2
2(bii)	(Vacuoles are) filled with water/cell sap (1) become turgid (1) owtte	The cell membrane pushes up against the cell wall (1) owtte		2
			Total mark	6


Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3(a)	Brain: determines/initiates the body's response/processing information (1) Spinal cord: transmits the responses to/from the brain to/from the body (1)	Thinking/decides the body's response Allow sends messages for one mark for either brain or spinal cord	Do not accept any answers that are not linked to central nervous system	2
3(b)	Either (Releases) insulin (1) (which) lowers blood glucose (levels) (1) Or Stops producing glucagon (1) as it increases blood glucose concentration (1)			2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
3(c)	<p>An explanation linking each of the following:</p> <p>Explanation mark is dependent on reason mark</p> <p>Reason 1 Electrical impulses (1) Explanation 1 are fast (1)</p> <p>Reason 2 Chemical signals (1) Explanation 2 are slow but distance is short (1)</p>			4
			Total mark	8

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4(a)	<p>Electricity/electrical/electric (lhs) (1)</p> <p>Heat / thermal (rhs) (1)</p> <p>Light (rhs)(1)</p>	Heat and light can be on either label on (rhs)		3
4(b)	Radiation			1
4(ci)	Amplitude			1
4(cii)	3			1
			Total mark	6

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
5 (a)	Waves 1: Infrared (1) Waves 2: Gamma (rays) (1)			2
5(bi)	Satellite transmissions/ Communications /weather forecasting (1)	Mobile/phones/TV (1) ignore microwave oven		1
5(bii)	Internal heating of body cells (1)	Harm/damage/kill/destroy cells (1) Ignore any reference to hot food Ignore cancer Ignore burning		1
5(c)	4.0 x 10 ⁶ or 4000000 (2) Or $\frac{3.0 \times 10^8}{75}$ (2) Or Frequency = wave speed/wavelength (1) $\frac{3.0}{75}$ (1) Or 3.0 x 10 ⁸ = 75 x frequency (1)	$\frac{3.0}{75}$ (1) If no other mark Allow 4 to any power of 10 for 1 mark eg 0.4, 4, 400		2
			Total mark	6

Question Number	Acceptable Answers	Additional Guidance	Reject	Mark
6	<p>Award 1 mark for any valid point up to a maximum of 3 marks and 1 mark for each relevant extension or application.</p> <p>Advantages</p> <p>Wind farms do not produce Carbon Dioxide/Sulphur Dioxide (1) and therefore do not contribute to global warming/acid rain (1)</p> <p>Or</p> <p>Wind farms do not use fossil fuels (1) these fuels are preserved for other purposes (1)</p> <p>Disadvantages</p> <p>Wind farms rely on specific weather conditions (1) and therefore the supply cannot be guaranteed (1)</p> <p>Wind farms are not efficient/ do not efficiently convert (kinetic) energy of wind into electrical energy/wind turbines do not produce a large amount of energy (1) and therefore many turbines are needed (1)</p> <p style="text-align: right;">3x2</p>	<p>Ignore aesthetics</p> <p>Ignore noise and cost</p> <p>Ignore destruction of habitat unless a scientific justification given</p>		6
			Total mark	6

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
7(a)	C Irritant 			1
7(b)	pH 0-6	Any tick in this range. More than one tick is acceptable if they are in this range		1
7(ci)	Test - lit splint (1)		Reject glowing splint	1
7(cii)	Result - squeaky pop (1)			1
			Total mark	4

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8(a)	24			1
8(b)	11			1
8(c)	12			1
8(d)	2,8,2	Accept other punctuation		1
8(e)	<p>Chlorine Molecule</p> <p>Hydrogen Chloride</p> <p>reject more than one line from each box</p>			2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8(f)	35.5 (2) Or $\frac{(75 \times 35) + (25 \times 37)}{100}$ (2) Or $(2625 + 925)/100$ (2) Or $3550/100$ (2) Or $(75 \times 35) + (25 \times 37)$ (1) Or $\frac{(75 \times 35)}{100}$ (1) Or $\frac{(25 \times 37)}{100}$ (1)	26.25 + 9.25 (2) 3550 (1) or 26.25 (1) or 9.25 (1)		2
			Total mark	8

Question Number	Indicative content	
9	<p>Problems: Fish and plants in lakes die as they cannot survive in acidic conditions. Destroys food chains and webs as other animals that live on fish and plants will not have food to eat. Damage to equipment that may need to be replaced more often.</p> <p>Reducing problems: Alkali (soluble base) can be added to lakes. This neutralises the acid. Acid + base → salt + water Liming lakes/adding limestone/calcium carbonate will act as a base.</p> <p>Use of suitable equations, e.g. Sulfuric acid + calcium carbonate → calcium sulfate + carbon dioxide + water</p> <p>reject cover up the lake/remove the fish</p>	
Level	Mark	Descriptor
	0	No rewardable material
1	1-2	Uses basic science to address to the question simply. e.g. add an alkali to neutralise the acid.
2	3-4	More detailed scientific descriptions are used. e.g. acid rain can kill fish and disrupt food webs/chains as other animals have no fish to eat Most points made will be relevant to the situation in Question, but the link will not always be clear.
3	5-6	Both aspects of the questions are discussed with detailed explanations. e.g. acid rain can kill fish and disrupt food webs/chains as other animals have no fish to eat, add an alkali such as lime to neutralise the acid. Answer shows a good understanding of the chemistry. The majority of points made will be relevant and there will be a clear link to the situation in question. Uses chemistry to explain how adding lime can reduce acidity. May give a simple word equation.
		Total mark 6

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