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BTEC

Mark Scheme (Results)

June 2019

BTEC Level 1/Level 2 First Award in Principles of Applied Science

Unit 1: Principles of Science (20460E)

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June 2019
Publications Code 20460E_1906_MS

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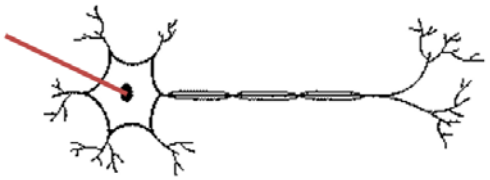
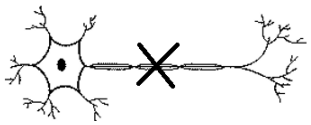
General Marking Guidance

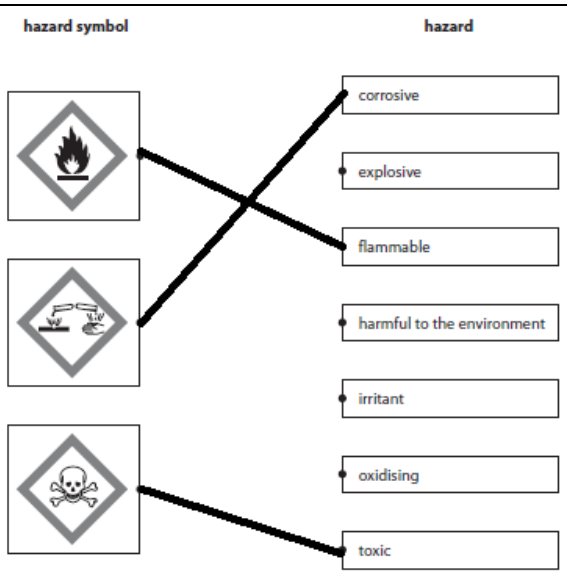
- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should 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.

Type A. **Point Mark Scheme with an accept and reject column**

Question Number	Correct Answer	Additional Guidance	Mark
1 (a)(i)	shivering	hairs rise on skin / vasoconstriction / allow goosebumps	1
1 (a)(ii)	any two from: sweating (1) hairs lie flat on skin / erector muscles relax (1) vasodilation (1)		2
1 (b)	(a response where) no thought is required /do not need to decide (about the mechanism)	allow it is a reflex / automatic process	1
		Total	4

2 (a)(i)	single line to nucleus 		1
2 (a)(ii)	controls (the activities of) the cell	allow contains {genetic material/DNA} ignore is the brain of the cell.	1
2 (a)(iii)		allow a cross anywhere on the axon	1
2 (a)(iv)	nervous	allow central nervous system/ peripheral nervous system/ CNS / PNS	1
2 (b)	neurotransmitters / chemical signals (1) synapse (1)		2
		Total	6

3 (a)	(a genotype that) contains (two) different alleles	allow {examples/ (two) different forms} of the same gene	1
3 (b)	physical appearance / trait (of organism)	allow description including given characteristic	1
3 (c)	any two from: black moths are camouflaged (on sooty tree) (1) (so) are not eaten by predators (1) (therefore) survive to reproduce (1)	allow ORA throughout allow blends in for camouflage	2
3 (d)	yellow pea plant can only pass down the {dominant/Y} allele (1) green pea plant can only pass down the {recessive/y} allele (1) all offspring will have the genotype Yy (1) dominant phenotype is expressed preferentially over the recessive phenotype / only need one Y to show yellow (1)	allow correctly completed Punnett square to show first 3 marking points allow every plant carries a dominant allele	4
		Total	8

4 (a)		do not allow multiple lines	3
4 (b)(i)	D – substance Z		1
4 (b)(ii)	B **-** substance X		1
4 (b)(iii)	O_2	do not allow O^2, o2, O2 ignore 'oxygen'	1
		Total	6

5 (a)(i)	magnesium + hydrochloric acid → magnesium chloride + hydrogen	allow reactants in either order allow products in either order allow symbol equation if all symbols and balancing are fully correct.	1
5 (a)(ii)	A – HCl		1

5 (a)(iii)	effervescence / bubbles / fizzing / magnesium disappears /magnesium floats	allow magnesium gets smaller ignore gas/hydrogen	1
5 (a)(iv)	(squeaky) pop		1
5 (b)	79 x 24 + 10 x 25 + 11 x 26 = (2432) (1) OR $\frac{2432}{100}$ = (24.32) (2)	allow correct calculation using two of the isotopes for 1 mark ecf	2
		Total	6

6	any **six** from: atomic number is the number of protons (1) number of protons is equal to number of electrons (1) mass number is the number of protons and neutrons together (1) 13 protons (1) 13 electrons (1) 14 neutrons (1) protons and neutrons in nucleus (1) electrons found in {shells / orbits / energy levels} (1) electrons arranged 2.8.3 / 3 shells of electrons / 3 electrons in outer shell (1) allow diagram for last six marking points	6 expert
	Total	6

7(a)(i)	10/ten (cm)		1 clerical
7 (a)(ii)	2/two (m)		1 clerical
7 (a)(iii)	wave drawn that has more than 2 waves in 2 seconds	ignore changes in amplitude	1 expert
7 (b)	3 x 10 = (30) (m/s)		1 clerical
		Total	4

8 (a)(i)	light/sound		1 clerical
8 (a)(ii)	thermal	allow heat	1 clerical
8 (b)	70 + 10 = 80 (1) 70 x 100 = (87.5%) (1) 80	allow 80 with no working for 2 marks	2 grad
8 (c)	Any four from : air in between windows is a {poor conductor / good insulator} (1) (because) air is a gas and therefore particles do not pass on energy by hitting each other when vibrating (1) so little thermal / heat (energy) transferred by conduction (1) the gap between the inside and outside windows is narrow (1) (therefore) it is hard for convection currents to form (1) convection currents in the room cannot get through the glass as it is a solid (1) heat loss by radiation reduced as glass is a reflective surface (1)	allow 1 mark for heat is trapped (between glass)	4 expert
		Total	8

Question Number	Indicative Content
9	An answer that discusses two of the following: <u>radio waves</u> uses : broadcasting satellite transmissions long wavelength and low frequency so can travel long distances no harmful effects <u>microwaves</u> uses : satellite transmissions cooking communication internal heating of body cells <u>infrared</u> uses : cooking thermal imaging remote controls optical fibres / communication security systems/ night vision goggles can cause skin burns <u>visible light</u> uses : lights photographs illumination can blind with excessive exposure <u>ultraviolet</u> uses: fluorescent lamps detecting forged bank notes disinfecting forensic work high frequency / ionising can cause damage to surface cells and eyes can cause skin cancer <u>X-rays</u> uses : observing internal structure of objects astronomy high frequency / ionising can cause mutation damage to cells / cancer <u>Gamma rays</u> uses : sterilising food / medical equipment detection of cancer treatment of cancer high frequency and low wavelength can transfer more energy so can cause mutation damage to cells / cancer allow other correct responses

Level	Mark	Descriptor
	0	No rewardable material.
Pass	1-2	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	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	A detailed discussion of each wave. 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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