



General Certificate of Secondary Education

**Applied Science (Double Award)
4861**

APSC/2H Science for the Needs of Society

Mark Scheme

2010 examination - January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Higher / 2H

question	answers	extra information	marks
1(a)(i) A	Any one from: Crisps / chocolate / sweets		1
1(a)(ii) E	fats / oils / sugar / salt	Answer must be linked to food Allow butter / sodium / harmful named additives	1
1(b)(i) A	Increases		1
1(b)(ii) A	Pancreas		1
1(b)(iii) G	Glycogen Liver		1 1
1(c) E	bloodstream / blood vessels (through the) blood / by the plasma	Not blood <u>cells</u>	1
1(d) E	<ul style="list-style-type: none"> • Sweat • Evaporation / removes heat or <ul style="list-style-type: none"> • Capillaries widen / vasodilation • More heat escapes or <ul style="list-style-type: none"> • Hairs lie flat • Warm air carried away 	Responses must be linked	1 1 or 1 1 or 1 1
Total			9

Higher / 2H

question	answers	extra information	marks
2(a) G	Composite		1
	Ceramic		1
2(b)(i) G	Metal		1
	High melting point		1
2(b)(ii) G	Polymer		1
	Low density / light		1
2(c)(i) G	(U)PVC / aluminium	Allow plastic / polymer	1
2(c)(ii) E	Does not rot / does not need painting / low maintenance	Ignore waterproof / rust / cost Allow lasts longer	1
2(c)(iii) E	Renewable / biodegradable / colour can be changed	Ignore cost / lasts longer	1
Total			9

Higher / 2H

question	answers	extra information	marks
3(a) G	Coal / oil / gas	Allow petrol, diesel, methane, natural gas	1
3(b)(i) E	Cancer / radiation sickness / cell damage/ death	Allow: Burns, mutation, damaged (named) organs	1
3(b)(ii) G	Lead	Allow Pb	1
3(b)(iii) E	Any two from: <ul style="list-style-type: none"> • tracers • radiotherapy / treatment for cancer • sterilising • medical imaging 		2
3(c)(i) E	Wave / tidal		1
3(c)(ii) E	Solar: not always sunny / needs a lot of cells Wind: not always windy / noisy / eyesore / needs a lot of wind turbines Hydroelectric: have to flood a big area of land / has to rain a lot / destruction of habitat / needs fast river or similar	Ignore Cost / "It's not reliable" Allow water has to be pumped back up	1 1 1
Total			9

Higher / 2H

question	answers	extra information	marks
4(a)(i) E	Correctly labelled cell wall, vacuole and cytoplasm		3
4(a)(ii) G	Any two from: Cell membrane Cytoplasm Nucleus		2
4(b) E	<ul style="list-style-type: none"> • Extended (cell) membrane / wall / larger surface area • Absorb <u>more</u> water <p>or</p> <ul style="list-style-type: none"> • <u>No</u> chloroplasts • <u>No</u> photosynthesis 		1 1 or 1 1
4(c)(i) E	<ul style="list-style-type: none"> • No nucleus • Carry more oxygen <p>or</p> <ul style="list-style-type: none"> • Biconcave shape • Larger surface area / carry more oxygen 		1 1 or 1 1

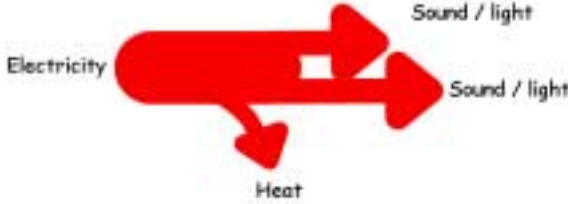
Higher / 2H

question	answers	extra information	marks
4(c)(ii) E	<ul style="list-style-type: none"> • Branched cell membrane / lots of nerve endings • Make connections with cells <p>or</p> <ul style="list-style-type: none"> • Myelinated / fatty outer layer • Insulates / messages don't get mixed / lost <p>or</p> <ul style="list-style-type: none"> • Elongated membrane / axon • Carry messages a long way 		<p>1</p> <p>1</p> <p>or</p> <p>1</p> <p>1</p> <p>or</p> <p>1</p> <p>1</p>
Total		11	

Higher / 2H

question	answers	extra information	marks
5(a)(i) E	Protons and neutrons in the centre		1
	Electrons on the outside		1
	Correct number of electrons		1
	Correct number of nuclear particles		1
5(a)(ii) G	A charged particle		1
5(a)(iii) E	Gains electrons for 1 mark		max 2
	Gains 3 electrons for 2 marks		
5(a)(iv) E	Covalent		1
5(b) E	$N_2 + 3 H_2 \rightarrow 2 NH_3$	In that order	1
5(c) E	Any two from: <ul style="list-style-type: none"> • (nitrate is used as) fertiliser • ammonium also provides available N • Essential nutrient • Needed to make protein • Needed for (cell) growth 		2
Total			11

Higher / 2H

question	answers	extra information	marks
6(a)(i) A	Bulb A		1
6(a)(ii) E	Bulb B has more useful energy than wasted / bulb A wastes more energy (than it uses for light)		1
6(b)(i) E		2 correct for 1 mark all 4 correct for 2 marks	max 2
6(b)(ii) E	$90 + 90 = 180$ $180 \div 250$ $0.72 / 72 \%$	Correct answer alone gains 3 marks	1 1 1
6(c)(i) E	Kettle It has more wasted energy than useful energy		1 1
6(c)(ii)	There was an error in the paper that made it possible to only give two marking points for this question. The marks for the question were awarded as follows: For 4 marks $= 30 \text{ (W)}$ or equation rearranged and $800 + 400 (=1200) = 4$ marks For 3 marks equation rearranged or $800 + 400 (=1200)$ or $800 \times 40 = 3$ marks For 2 marks no attempt or an attempt and not points made = 2 marks		
Total			13

Higher / 2H

question	answers	extra information	marks
7(a)(i) G	Liver / brain		1
7(a)(ii) E	Depressant /affects reactions / nervous system / makes you tired		1
7(a)(iii) E	Causes addiction		1
7(a)(iv) E	Reduces ability of blood to carry oxygen		1
7(b)(i) E	<u>More deaths</u>		1
7(b)(ii) E	More users so looks like more deaths		1
7(c)(i) E	Penicillin	allow any named antibiotic (eg ampicillin / amoxicillin)	1
7(c)(ii) E	<u>Cause</u> of pain not been treated		1
7(c)(iii) E	(antibiotics) don't work against viruses / only work against bacteria		1
7(c)(iv) E	Bacteria can become resistant		1
Total			10

Higher / 2H

question	answers	extra information	marks
8(a)(i) G	Chlorine	not chloride	1
	Carbon	Either order	1
8(a)(ii) E	Causes global warming	allow description of global warming	1
8(a)(iii) E	Extraction of metals from ores / producing slaked lime / burning in power stations / making electricity / combustion		1
8(b) E	Small liquid particles		1
	Mixed with a gas		1
8(c)(i) E	Waves (of energy)		1
8(c)(ii) E	Higher energy / higher frequency		1
Total			8

Higher / 2H

question	answers	extra information	marks
9(a)(i) G	Conduction		1
9(a)(ii) G	Convection		1
9(b) E	(Hot so becomes) <u>less dense</u> so rises (Colder so becomes) <u>more dense</u> so falls / replaced by cooler water from the sides		1 1
9(c)(i) E	Metal Conducts heat		1 1
9(c)(ii) E	Any two from: <ul style="list-style-type: none"> • Insulator • Waterproof • Lightweight • Cheap 		2
9(d)(i) E	Something shiny / mirror / metal		1
9(d)(ii) E	Reflects heat into pipe	not bounce	1
Total			10
			90