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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Applied Science (Double Award) 3861

3860/2H Science for the Needs of Society

Mark Scheme

2005 examination – June 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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

3860/2H

question	answers	extra information	marks
1(a)(i)	carry oxygen	ignore CO_2	1
(ii)	help form a clot at the site of a wound	accept clot the blood / heal wound / seal wound / produce scab / stop bleeding	1
(iii)	any **one** from: • fight disease / prevent illness / fight bacteria • produce antibodies / protect against infection / immune system • remove microbes / dead tissue / toxins		1
(b)(i)	plasma		1
(ii)	any **two** from: • food / sugar / amino acids / vitamins / nutrients / minerals • salt • carbon dioxide • hormones • waste / urea	ignore nitrogen / oxygen etc accept protein / carbohydrate / fat	2

question	answers	extra information	marks
(c)(i)	any **two** from: • thickness (of wall) / muscle • direction of blood flow (to or from heart) • pressure / speed of blood flow • valves • vessel nearer skin surface	 ignore bigger / larger accept reference to muscle ignore oxygenated / deoxygenated accept reference to pulse	2
(ii)	diffusion		1
(d)(i)	any **two** from: • dead / attenuated / weak form / part • of bacteria / virus / germ • that initiates an immune response / production of antibodies	 do **not** accept small amount do **not** accept microorganisms / disease / infection	2

question	answers	extra information	marks
(ii)	any **three** from: • same organism • recognised / recognition implied • white blood cells – must be in context • antibodies (produced) – must be in context • antibodies remain in blood / produced quickly • bacteria / virus destroyed / killed	do **not** accept disease do **not** accept destroy infection / disease	3
Total			**14**

question	answers	extra information	marks
2(a)(i)	convection		1
	radiation		1
	conduction		1
(ii)	any **two** from: • loft insulation • cavity wall insulation / thick walls • double glazing / smaller windows • draught proofing • curtains • carpets / underlay • silver foil behind radiator	insulation = 1 mark ignore close windows	2
(b)(i)	any **two** from: • lid on beaker • bulb under / closer to / in beaker • reflective surface behind bulb • metal beaker • remove gauze • insulation on sides / shielding • stir the water • digital thermometer	ignore time / volume measurements or repeat experiment	2

question	answers	extra information	marks
(ii)	any **four** from: • temperature at start • temperature at end • fix any other variable • repeat with second bulb / comparison of results	any temperature measurement = 1 mark temperature rise = 2 marks compare temperature rise = 3 marks compare time taken for fixed temperature rise = 4 marks	4
(c)(i)	2/20 = 0.1 = 100 (watts)	accept ecf for conversion of kW to W	1 1 1
(ii)	current = power / voltage = 100 / 240 = 0.42 (amps)	allow p = c x v (correct answer scores 3 marks)	1 1 1
(d)	any **three** from: • last longer • waste less energy / gives off less heat / more efficient • use less electricity • cheaper over long time period / cheaper to run / cheaper bill	do **not** accept energy	3
Total			**20**

question	answers	extra information	marks
3(a)	energy / respiration / movement		1
(b)(i)	pesticides / insecticide kills / poisons aphids		1 1
(ii)	predator / ladybirds eat aphids **or** attraction crops / marigolds attract aphids **or** insect trap / pheromones traps aphids	accept definition of predator second mark must be linked to method	1 1
(c)(i)	cell wall chloroplast	ignore cellulose ignore chlorophyll	1 1
(ii)	any **two** from: • (cell) membrane • nucleus • cytoplasm		2
Total			**9**

question	answers	extra information	marks
4(a)(i)	any **one** from: • no new oil being formed / takes time to be formed • supplies being used up	do **not** accept can not be reused / replaced (need to explain)	1
(ii)	any **two** from: • (natural) gas • coal • nuclear / uranium / radioactive material	do **not** accept fossil fuel	2
(b)(i)	fractional distillation	fractionation = 2 marks	1 1
(ii)	any **one** from: • boiling point • size of molecules		1
(c)(i)	carbon hydrogen		1 1
(ii)	contains carbon comes from living things	ignore hydrogen	1 1
(iii)	covalent		1

question	answers	extra information	marks
(iv)	carbon dioxide water	 accept hydrogen oxide do **not** accept hydroxide	1 1
(v)	any **two** from: • carbon dioxide released • global warming / greenhouse effect • flooding / changes to climate / damage to coral	 ignore acid rain and other gaseous pollutants for ozone layer apply list principle	2
Total			**15**

question	answers	extra information	marks
5(a)	any **four** from: • burn coal • releases heat • produces steam (from water) • drives turbine – not fan • drives generator	steps linked and in correct order	4
(b)(i)	(67.4/2.3) = 29.3 million kilojoules (per tonne)		1 1
(ii)	efficiency = energy output / energy input = 12.6/29.3 = 0.43 (43%)	 accept ecf from (b)(i) 	1 1 1
(c)	loss of heat	ignore light	1
Total			**10**

question	answers	extra information	marks
6(a)(i)	e.g. copper	chosen material must be a metal	
(ii)	any **two** from: e.g. • good heat conductor • good electrical conductor • high melting point • malleable / easily shaped • high density – lead • waterproof • strong • hard / durable • shiny / attractive – silver	answer must be linked to metal in (a)(i)	2
(iii)	e.g. electrical wiring	answer must be linked to property in (a)(ii)	1
(b)(i)	e.g. polyethene	accept natural polymers must be a polymer	
(ii)	any **two** from: e.g. • flexible • waterproof • softens on heating / low melting point • low density / light weight • strong • easily moulded • does not conduct heat • does not conduct electricity • transparent – polythene • does not decompose – PVC	answer must be linked to polymer in (b)(i) ignore light	2

question	answers	extra information	marks
(iii)	e.g. plastic bags	answer must be linked to property in (b)(ii)	1
(c)(i)	e.g. reinforced concrete / plywood / fibreglass / MDF	do **not** accept concrete must be a composite	
(ii)	e.g. strong under compression – concrete e.g. high tensile strength – steel	answers must be linked to composite in (c)(i)	2
(iii)	e.g. building	answer must be linked to composite in (c)(i)	1
(d)	any **three** from: • control of variables e.g. equal sized pieces of material • suitable device with quantitative measurements • variation of load • repeat for 3 materials • repeat experiments and take average	max 2 marks if experiment is not suitable	3
Total			**12**

question	answers	extra information	marks
7(a)(i)	SPRQ		1
(ii)	mitosis (must be spelt correctly)		1
(b)	4		1
(c)	monohybrid		1
(d)(i)	parents: Bb × Bb gametes: Bb and Bb (correct from parent genotype) offspring: Bb Bb BB bb (correct from parent geneotype) bb is white	accept bb correctly indicated e.g. circled indication that b gene was passed on from both parents = 1 mark B b B BB Bb b Bb bb = 2 marks B b B BB Bb b Bb (bb) = 3 marks B b B BB Bb b Bb (bb) and parents Bb × Bb = 4 marks	1 1 1 1

question	answers	extra information	marks
(ii)	any **two** from: • breed all brown rabbits • select white rabbits for breeding • breed together over several generations		2
Total			**10**
			Overall marks = 90