

GCSE 2004

June Series



Mark Scheme

GCSE Applied Science (Double Award) *(3860/2H)*

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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Publications Department, Aldon House, 39, Heald Grove, Rusholme, Manchester, M14 4NA
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question	answers	extra information	marks
1(a)(i)	chlorophyll		1
(ii)	carbon dioxide obtained from air diffusion / into leaves / stomata	2 nd and 3 rd marks can be awarded even if wrong gas is given	1 1 1
(iii)	oxygen needed for respiration to release energy	can be given in explanation cannot give 2 nd or 3 rd mark if incorrect gas is named	1 1 1
(b)(i)	make protein / amino acids or for growth		1
(ii)	make chlorophyll or to make it green or for photosynthesis or absorb sunlight / light	not sun not making food	1
(iii)	Mg(NO ₃) ₂	allow (NO ₃) ₂ Mg Mg ²⁺ NO ₃ ⁻ NO ₃ ⁻ Mg ²⁺ MgNO ₃ NO ₃ Mg for 1 mark do not accept Mg ²⁺ + NO ₃ ⁻ etc.	2

question	answers	extra information	marks
(iv)	greenhouse / pesticide / herbicide etc. fungicide / manure / ploughing	allow sensible alternatives e.g. genetic modification / artificial pollination / increased light	1
	warmth / kill pests / kill weeds etc.	do not accept (artificial) fertilizer or organic farming or watering / irrigation	1
Total			13
2(a)(i)	any four from: <ul style="list-style-type: none"> • add water / dissolve / make a solution • grind / crush • stir / heat / mix • filter • evaporate (to dryness) (after filtering) or dry it (filtrate) out 	must be sequential if no mention of water max 1 mark for filtering	1 1 1 1
(ii)	any two from: <ul style="list-style-type: none"> • more than one element combined • no carbon • non-living source 		2
(b)(i)	reactants: 2,2 products: 2, 1,1		1 1
(ii)	any two from: <ul style="list-style-type: none"> • low melting point / boiling point or gas • does not conduct electricity or insulator • forms negatively charged ions • lower density • does not conduct heat 	allow not a solid	2
(c)(i)	$\text{Cl}_2 + \text{H}_2 \rightarrow 2\text{HCl}$	1 for correct product (HCl) 1 for formulae 1 for balancing	1 1

question	answers	extra information	marks
(ii)	covalent	correct spelling only	1
(iii)	weak forces of attraction between molecules / particles	not bonds not ions	1 1
Total			15
3(a)(i)	power = volts \times amps 230 \times 8 1840	Can be inferred by 230 \times 8 = 2 marks = 3 marks	1 1 1
(ii)	conversion of values to kW 1.84 / 1.8	ecf from part (i)	1
(b)	1.84 \times 0.1 0.184 / 0.18 / 0.2	ecf from figure in table unless blank, then use (a) (i) converted to kW	1 1
(c)	0.184 \times 7 1.288 / 1.3 / 1.28 / 1.29	ecf from figure in table, if blank (b) \times 7	1 1
(d)	colour television any two from: <ul style="list-style-type: none"> • although lowest power rating • but uses most energy • because switched on longest 	must be supported by dates in table	2

question	answers	extra information	marks
(e)	any two from: { less electricity used for the same output { minimum energy wastage through heat loss { less electricity used minimum energy wasted		2
Total			12
4(a)(i)	bacteria / lactobacillus		1
(ii)	so no (other) microorganisms are present or make ill or food poisoning or avoid contamination	allow germs	1
(iii)	high temperature will kill bacteria / microorganisms		1
(iv)	allow bacteria to grow / multiply or convert milk to yoghurt or convert sugar to lactic acid or allow chemical reaction to take place or allow lactic acid to form	allow because reaction is slow or to let it set not fermentation	1
(b)(i)	refrigerate / add preservative	allow freeze / cool place	1

question	answers	extra information	marks
(ii)	any five from: <ul style="list-style-type: none"> • container for yoghurt / pot • stated quantity of yoghurt or same amount in each / half full • at least 2 different conditions • allow time for changes or more than 8 hours / overnight • compare pH / taste / appearance • monitor temperature / temperature kept within limits 	accept taste	5
Total			10
5(a)	any two from: <ul style="list-style-type: none"> • strong / tough / durable • bendable / malleable / ductile • waterproof / holds water • not soluble • does not corrode / rust / rot 	do not allow flexible do not accept high melting point or cheap	2
(b)	any two from: <ul style="list-style-type: none"> • attractive appearance • different colours • easily cleaned or smooth • waterproof / holds water • does not scratch easily or durable / hard • does not corrode / rust / rot • rigid 	do not accept high melting point or cheap / strong	2
(c)	any two from: <ul style="list-style-type: none"> • flexible / bendable • waterproof / holds water • easy to cut • durable • does not corrode / rust / rot 	do not accept high melting point or cheap / strong	2

question	answers	extra information	marks
(d)(i)	long chains entangled change to cross linked	at least 3 lines entangled	1 1 1
(ii)	more rigid / hard / denser chains cannot move / closer together / strong bonds		1 1
Total			11
6(a)	no carbon dioxide /CO/C produced or no harmful products or only water produced		1
(b)	either diagram: shared pairs correct lone pairs correct or description: covalent bonds (1) sharing of electrons between atoms (1)		1 1
(c)(i)	2(436) + 498 1370		1 1
(c)(ii)	4(464) 1856		1 1
(c)(iii)	+ 1370 – 1856 = (–) 486 more energy given out <u>than taken in</u>	mark consequentially	1 1
Total			9
7(a)	any three from: <ul style="list-style-type: none"> • diffusion • from high concentration to low concentration • from blood capillary • through cell membrane or suitably labelled diagram		3

question	answers	extra information	marks
(b)	insulin is released in response to a change in glucose levels when blood glucose is high glucose converted into glycogen	independent mark	1 1 1
	or less insulin produced / glucagon released in response to change in glucose levels when blood glucose falls glycogen converted into glucose	independent mark	
(c)	any three from: <ul style="list-style-type: none"> • <u>gene</u> for insulin • inserted into bacteria / plasmid • using enzymes • bacteria grow / reproduce • insulin separated from growth medium / bacteria • bacteria reused 		3
Total			9
8(a)(i)	close packed structure positive ions sea of electrons		1 1 1
(ii)	movement / flow of electrons		1 1
(b)	atoms different sizes disrupts close packing / symmetry layers cannot slide		1 1
(c)(i)	larger atomic mass smaller atomic size / radius		2
(ii)	how (closely) the atoms pack together		1
Total			11
Overall marks = 90			