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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science: Double Award (Modular) 3468/2H

Specification A

Mark Scheme

2006 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.

Science: Double Award (Modular)

Summer 2006 3468/2H

3468/2H Q1

question	answers	extra information	mark
(a)	phytoplankton	accept tiny plants	1
(b)	(decrease) • **more** cod • (cod) will eat sand eels (increase) • humans would take **more** herring/minke whale • (so) sand eels have **fewer** predators	 accept humans have less cod (humans) will take/eat more sand eels accept minke whale would have **more** cod to eat (so) would eat **fewer** sand eels	 1 1 1 1
total			5

3468/2H Q2

question	answers	extra information	mark
(a)	the numbers of any source		1
(b)	respiration	do **not** accept breathing	1
(c)	accept **two** correct comparisons related to information in the table e.g. walk instead of transport, ship instead of plane	if no marks gained from comparisons, award one mark for using **less** of any form of transport or **less** fuel or walk or use public transport references to alternative fuels neutral	2
(d)	any **one** from: • polar caps melt • climate change (storms) • sea levels rising (floods) • temperature increases	do **not** accept if ozone mentioned accept global warming	1
total			5

3468/2H Q3

question	Answers	extra information	mark
(a)	carbon dioxide produced	accept a gas produced	1
(b)(i)	any **two** from: • just after start rate is fast • reaction then slows • eventually the reaction stops	maximum 1 mark if they state that rate levels off/constant rate 'mass' is neutral description must be about the rate of reaction shown on the graph	2
(ii)	• just after start the concentration of acid is high/number of acid particles is high	explanation **must** be linked to the rate changes shown on the graph	1
	• so there are many collisions		1
	• the concentration of acid decreases/number of acid particles less	"less acid" is neutral accept the concentration of the acid is zero/no acid particles/no acid left	1
	• so there are fewer collisions	accept so there are no collisions	1
(c)	51.6 gains 3 marks else relative formula mass of copper carbonate = 124 gains 1 mark and $\frac{64}{124} \times 100$ gains 1 mark	accept 52 allow ecf from incorrect relative formula mass	3
total			10

3468/2H Q4

question	answers	extra information	mark
(a)(i)	remains at a steady/constant speed		1
(ii)	360 gains 2 marks else (distance =) speed × time or (distance =) 36 × 10 gains 1 mark	 accept suitable abbreviations	2
(iii)	decelerating/slowing down		1
(iv)	1.2 gains 3 marks correct unit gains 1 mark i.e. $m/s^2/ms^{-2}$ else (acceleration =) $\frac{\text{change in velocity}}{\text{time (taken)}}$ gains 1 mark and (acceleration =) $\frac{12}{10}$ gains 1 mark	 accept m/s/s or metres per second per second do **not** accept mps^2 accept suitable abbreviations	3 1
(b)	any **two** points shown on the graph from: • steeper line starting at zero • reaches a greater speed • stops in less time		2
total			10

3468/2H Q5

question	answers	extra information	mark
(a)(i)	variable resistor	accept rheostat	1
(ii)	voltmeter connected correctly across to the left hand side of the electromagnet		1
(iii)	12 gains 3 marks else (potential difference =) current × resistance gains 1 mark and (potential difference =) 0.5 × 24 gains 1 mark	accept suitable abbreviations	3
(b)	*Quality of written communication* *1 mark for the correct sequence* *high current flow → electromagnet is stronger → switch is attracted (down)* • high current flows • electromagnet is stronger • switch is attracted (down) • circuit is broken/current cannot flow		1 1 1 1 1
total			10

3468/2H Q6

question	answers	extra information	mark
(a)	any **three** explanations from: • 'lost' as waste/excretion • used in respiration • used for movement • energy lost as heat • energy lost to environment	accept an example	3
(b)(i)	2.36 gains 2 marks else 0.36 gains 1 mark		2
(ii)	there is less food available for each fish	accept more competition for food	1
total			6

3468/2H Q7

question	answers	extra information	mark
(a)	• microorganisms/microbes/bacteria/ fungi • feed/breakdown/decompose/ putrefy/decay	do **not** accept nitrifying bacteria	1 1
(b)	*Quality of written communication* *1 mark for the correct sequence of any* ***three*** *of:* *increased plant growth, plants die, microbial action* any **four** of: • increased plant growth • competition for light • plants die • microorganisms/microbes/bacteria/ fungi feed/decay/breakdown (dead plants) • increase in number • use oxygen • for respiration	plants use oxygen is neutral allow 1 mark for eutrophication if no other marks awarded for part (b)	1 4
total			7

3468/2H Q8

question	answers	extra information	mark
(a)(i)	the rate of forward reaction is equal to the rate of the reverse reaction	accept the reactants are forming products at the same rate as the products are forming reactants	1
(ii)	• lowers activation energy • increase the rate of reaction **but** increase the speed at which equilibrium is achieved gains two marks	accept to speed up the reaction to increase the rate of both the forward and the reverse action do **not** accept to change the position of the equilibrium/to produce more product	2
(b)	(high pressures are not used because:) • increase cost of the equipment • increase energy costs (low temperatures are not used because:) • slows down the rate of reaction • longer time to produce ammonia	 do **not** accept because the unreacted gases are recycled	 1 1 1 1
total			7

3468/2H Q9

question	answers	extra information	mark
(a)(i)	energy of activation	accept Ea accept amount of energy needed to react	1
(ii)	line drawn that only shows a lower energy of activation	**must** start at original energy level and finish at final energy level	1
(b)	• (energy needed to break the bonds of the reactants = 4 × C – H (1652 kJ) 2 × O = O (996 kJ)) 2648 (kJ)		1
	• (energy released when the bonds of the products are formed = 2 × C = O (1610 kJ) 4 × O – H (1856 kJ)) 3466 (kJ)		1
	• evidence of energy in (2648) – energy out (3466)		1
	• (energy released =) 818 (kJ)	allow ecf for this mark only ignore sign	1
total			6

3468/2H Q10

question	answers	extra information	mark
(a)	• increase the mass of the pile driver	allow weight	1
	• lift the pile driver higher	allow increased speed/velocity	1
(b)	12 gains 3 marks		3
	m/s or ms^{-1} or metres per second or m per s gains 1 mark	do **not** allow mps or sec anywhere	1
	else correct equation (ke = $\frac{1}{2}mv^2$) or substitution gains 1 mark **but** correct rearrangements in words or figures gains 2 marks		
total			6

3468/2H Q11

	answers	extra information	mark
(a)	any **two** from: • Universe started • at a very small point/one place • there was a (huge) explosion • Universe expanding		2
(b)(i)	any **three** from: • dust and gas/matter drawn together • by gravity • heat produced • as mass of star increases	accept gets hot	3
(ii)	any two from: • fusion • of nuclei • of hydrogen/helium		2
total			7

3468/2H Q12

question	answers	extra information	mark
(a)	cracking	accept thermal decomposition	1
(b)	any **two** from: • decane is a larger/longer molecule • more carbons/hydrogens in the decane molecule • only single (covalent) bonds in the decane molecule/saturated		2
(c)	any **two** from: • many ethenes • double bond in ethene opens • bond to form poly(ethene)	 accept on diagram accept on diagram accept join together	2
total			5

3468/2H Q13

question	answers	extra information	mark
(a)	any **two** from: • noise pollution • visual pollution • larger area required • wind unreliable		2
(b)	• 5000 m/5 km or deeper • water needs to reach 100 °C to form steam/to boil		1 1
(c)	any **two** from: • reliable/plentiful supply • start up quickly on demand • concentrated energy source/produce large amounts of power • non-renewable power stations already built	accept geothermal limited to few areas	2
total			6