



General Certificate of Secondary Education

Science: Double Award (Modular)

3468/2H

Specification A

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.

3468/2H Q1

question	answers	extra information	mark
(a)	all bars correct for greenfly, ladybird (± one square) and blackbird (less than one square)		1
	bars are centred	do not accept pyramid shape if all to left or right of centre	1
	bars are labelled (in correct sequence)		1
(b)	$\frac{1}{12}$ or 8.3% or 1:12	if answer is incorrect accept correct working out (eg $\frac{50}{600}$) for 1 mark accept 12 or 12:1 for one mark accept 8.3 for one mark (without %)	2
total			5

3468/2H Q2

question	answers	extra information	mark
(a)(i)	photosynthesis		1
(ii)	respiration	'anaerobic' is neutral	1
(iii)	microorganisms	accept microbes, bacteria, fungi, decomposers or any named microorganism	1
(b)	indication that carbon dioxide emissions contribute to global warming	accept 'greenhouse effect' for global warming	1
	argument for: in terms of decreases carbon dioxide emissions because less (fuel / energy used for) transport / imports		1
	argument against: in terms of increases carbon dioxide emissions because of (fuel / energy used for) heating and lighting greenhouses		1
total			6

3468/2H Q3

question	answers	extra information	mark
(a)	ammonium nitrate	accept NH_4NO_3 do not accept ammonia nitrate	1
(b)	different reactions need different catalysts		1
(c)	they are used over and over again	accept they are reused accept they are not used up accept they are not changed recycling is neutral	1
(d)	any two from they speed up reactions they reduce energy requirements they reduce costs	accept allow reactions to take place at a lower temperature accept make process more economic	2
(e)	(high pressure) increases the frequency of collisions	accept more collisions move faster is neutral	1
	this increases the rate of reaction	accept 'more successful collisions' for 2 marks	1
total			7

3468/2H Q4

question	answers	extra information	mark
	use less nitrate / fertiliser	accept use none	1
	any two from: explanation that with less or none the crops still grow make more land available to grow more crops monitoring of water legislation organic farming / manure genetically modified crops give babies bottled water	use a different fertiliser is neutral prevent nitrate fertiliser run off is neutral	2
total			3

3468/2H Q5

question	answers	extra information	mark
	use of any four as evidence from water oxygen soil experiment meteorite Earth's early atmosphere was similar to Mars' present atmosphere	accept argument for and / or against life on Mars	4
total			4

3468/2H Q6

	answers	extra information	mark
(a)(i)	acceleration / speeding up	do not accept acceleration increases	1
(ii)	constant / steady velocity	accept constant / steady speed	1
(b)	10 m/s ² or ms ⁻²	reject ms ² if answer not correct then allow 1 mark for acceleration = $\frac{\text{change in velocity}}{\text{time taken for change}}$ and allow 1 mark for $\frac{40(\text{m/s})}{4(\text{s})}$	3 1
total			6

3468/2H Q7

question	answers	extra information	mark
(a)	variable resistor	accept rheostat	1
(b)	voltmeter		1
(c)	straight line correct between 0.2 and 0.8	if line incorrect, or no line and correct plots 0.2 to 0.8, award 1 mark	2
(d)	diode / rectifier		1
total			5

3468/2H Q8

question	answers	extra information	mark
	<p>Quality of written communication: 1 mark for correct sequencing</p> <p>magnet in produces voltage / current → magnet out produces voltage / current → in opposite direction</p> <p>any three from:</p> <p>magnet moved to coil / coil moved to magnet</p> <p>produces a current / voltage</p> <p>correct reference to induction</p> <p>magnet moved from coil / coil moved from magnet</p> <p>produces current / voltage</p> <p>correct reference to reversal of current / voltage</p>		<p>1</p> <p>3</p>
total			4

3468/2H Q9

question	answers	extra information	mark
(a)(i)	X = putrefying bacteria	accept decay bacteria accept saprophytic bacteria accept fungi	1
(ii)	Y = ammonium (compounds)	accept ammonia	1
(iii)	Z = nitrifying bacteria		1
(b)	any five from fertilisers / nitrates make water plants grow (rapidly) death of these plants microorganisms will increase in number as they feed on / decay these dead plants use of oxygen (by these microorganisms) for respiration this depletion of oxygen results in the death of fish / aquatic animals	use of oxygen by plants is neutral accept suffocate	5
total			8

3468/2H Q10

question	answers	extra information	mark
(a)	115		1
(b)	any four from less energy lost / used as heat lost to the atmosphere since warm indoors (less energy lost) in movement since movement restricted more growth / eggs	accept temperature controlled accept prevents loss of body mass or gets fatter / weight gain	4
total			5

3468/2H Q11

question	answers	extra information	mark
(a)	any two from (enzymes) are protein molecules need a particular shape to work high temperatures would damage them	accept denature / destroy for damage reject 'kill'	2
(b)	any three from immobilise the enzyme e.g by trapping it in an inert solid or polymer beads to stabilise the enzyme to keep it functioning for long periods continually add starch continually remove glucose / waste		3
total			5

3468/2H Q12

question	answers	extra information	mark
(a)(i)	X activation energy / Ea		1
	energy needed to start a reaction	accept energy needed for bonds (of reactants) to break	1
(ii)	Y exothermic reaction	accept energy is released	1
	nett energy transfer / energy change / ΔH	accept since energy released during bond formation is greater than energy needed to break bonds for 2 marks accept ΔH is negative = 2 marks	1
(b)(i)	2 (two)		1
(ii)	73 (seventy three)	if answer is incorrect allow 1 mark for the correct proportion that $H_2:HCl$ is 1:2 and 1 mark for 36.5	3
total			8

3468/2H Q13

question	answers	extra information	mark
	1050		4
	kg	if answer incorrect then kinetic energy = $\frac{1}{2} mv^2$ or accept indication by correct substitution for 1 mark accept 900 for 1 mark accept $m = \frac{2KE}{v^2}$ or indication by correct substitution for 1 mark	1
total			5

3468/2H Q14

question	answers	extra information	mark
(a)(i)	galaxy and Universe		1
(ii)	materials produced when earlier stars exploded	accept the Sun is a second generation star accept formed from nebulae	1
	Quality of written communication: 1 mark for correct sequencing balanced forces → expansion → contraction / explosion		1
	any five from		5
	gravity pulling matter together	accept idea that a star is very massive so its force of gravity is very strong	
	high temperatures that create expansion forces	nuclear fusion releases energy that causes the very high temperatures	
	these forces balance		
	star expands greatly		
	since expansion is greater than gravity	accept fuel runs out	
	forms a red giant	give no further marks if red giant → white dwarf, red dwarf etc	
	collapses inwards and explodes outwards		
	called a supernova		
	neutron star may form		
	leaves a small, dense object (a black hole)	accept nothing can escape from it	
total			8

3468/2H Q15

question	answers	extra information	mark
(a)	any two 1 mark each burning / combustion fossil fuels or (locked up) carbon oxygen used	accept fuel / named fuel	2
(b)	any three from produces (calcium) carbonate which is insoluble produces (calcium) hydrogencarbonate which is soluble photosynthesis releases oxygen		3
total			5

3468/2H Q16

question	answers	extra information	mark
(a)	any two from reliable can be used as storage for surplus electricity generates more electricity no noise pollution	accept it is not always windy accept would need hundreds of wind turbines to generate this electricity takes less space is neutral do not accept can be started up quickly	2
(b)	advantage : does not produce greenhouse gases / carbon dioxide / water or acid rain / sulphur dioxide disadvantage : danger from radioactive materials if accidents or waste radioactive materials	accept slower start-up time	1 1
(c)	any one situation with a suitable explanation satellite weigh less or work for many years or remote remote places on Earth pump water or operate phones or road signs / lights or weather stations or too expensive / impractical calculators / watches small amount of electricity needed		2
total			6