CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0608 TWENTY FIRST CENTURY SCIENCE

0608/04   Paper 4 (Extended Written), maximum raw mark 60

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

	Question		Expected Answers	Mks	Additional Gui...
1	(a)	(i)	excludes outlier in calculation of mean (1) (5.7 + 5.6 + 5.5 + 5.8 + 5.4)/5 (1)	[2]	allow inclusion of outli... / 32.7/6 for one mark only allow 28/5 for 2nd mark
		(ii)	the mean of A does not lie within the range for B / the mean of B does not lie within the range for A	[1]	do not allow the ranges do not overlap
	(b)	(i)	when coal burns it forms sulfur dioxide (1) sulfur dioxide reacts with water (and oxygen) to form acid rain/sulfuric acid (1)	[2]	
		(ii)	acid rain damages crops/kills fish (1) reducing food supply (1)	[2]	
			Total	**[7]**	
2	(a)		 one mark for two carbon atoms and three/four hydrogen atoms (1) one mark for inclusion of CH_3 (1) one mark for C=C double bond (1)	[3]	
	(b)	(i)	shorter chains have lower forces of attraction between them (1) so polymer chains move apart more easily/with less energy input (1)	[2]	
		(ii)	more crystallisation results in higher mp / higher density / harder (1) polymer chains closer together so more force/energy needed to separate them (1)	[2]	ora
			Total	**[7]**	

3	(a)		crop takes in nitrogen/nutrients (1) when crop is harvested these are taken away / these are not returned to soil (1)	[2]	allow removal of phosphorus/potassium minerals
	(b)	(i)	they are expensive / they cannot afford them (1) they have to be imported / they are not made locally (1)	[2]	allow they are concerned about pollution from synthetic fertilisers
		(ii)	animal waste is used as a fertiliser (1) crops can be rotated (1) legumes can be grown (1)	[2]	any two allow named legume
			Total	**[6]**	
4	(a)		velocity increases with distance / the further away the faster it is travelling (1) in (direct) proportion (1)	[2]	accept positive correlation for first point accept linear owwte for second point
	(b)		gradient 750/5 = 150 km/s per Mly / gradient 500/3.2 = 156 (1) which is about 7 × 22 (= 154) (1)	[2]	allow ± 20
	(c)		gradient is too big so either y too big or x too small (1) his values of distance were too small (1)	[2]	no mark for saying too small without explanation allow calc of true distance of any galaxy (1) plus comparison with graph (1)
			Total	**[6]**	

5	(a)		carbon dioxide, methane, water (vapour) (any two) (1) idea that gases transmit radiation from the Sun (1) idea that gases absorb radiation from the Earth (1) gases absorb ir radiation (1) Earth's radiation is lower energy (1)	[3]	one mark for two gases any two further marks
	(b)	(i)	burning carbon/fossil fuels / deforestation (1)	[1]	
		(ii)	climate change/food shortage/extreme weather conditions/flooding/sea level rise	[1]	
	(c)		UV splits up O_3 molecules (1) which then recombine (1)	[2]	accept 'absorbed by' accept 'reversible changes'
			Total	**[7]**	
6	(a)		turbine generator reactor/boiler	[1]	accept either
	(b)		nuclei (of uranium) split up (1) into two (roughly equal) parts (1) plus neutrons (1) chain reaction (1)	[2]	any two for first marking point need nuclei, not atoms
	(c)	(i)	need to supply very much more coal / lot of coal to transport and burn / less nuclear fuel needed / nuclear fuel more hazardous (1)	[1]	
		(ii)	100 × 12/36 (1) = 33.3 % (1)	[2]	allow 33.3 or 33 % for both marks
	(d)		protective clothing to block radiation or prevent contamination (1) regular checks/monitor exposure to take off duty if dose excessive (1)	[1]	either one need suggestion and explanation for the mark
			Total	**[7]**	

7	(a)		to provide oxygen/glucose for respiration	[1]	
	(b)	(i)	as (mean) body mass (of the population) increased, the percentage (of people in the population) suffering from heart disease increased (1)	[1]	ignore idea that higher body mass means greater chance of heart disease
		(ii)	disagree because: correlation does not mean patient will definitely get heart disease (1) lots of other factors involved (1) patient is only one individual case / not all patients will be the same (1) agree because: high body mass increases risk of getting heart disease (1) better to warn all even though not all will get heart disease (1) heart disease uses up medical resources (1)	[2]	any two answer must relate to use of data
		(iii)	heart disease more common in UK/USA than non-industrialised countries because: diets higher in saturated fat / more fast food / higher salt intake (1) less exercise / lifestyle less active (1)	[2]	look for one diet related idea and one exercise related idea
			Total	**[6]**	
8	(a)		alternative views of creation (by God) were very established (1) contravened an established model of creation (1) required the Earth to be much older than was thought possible (1) could not show evolution taking place (1) not enough evidence (1) mechanism (genes) not then known (1)	[2]	any two
	(b)		changes in genes/DNA (1) occured in sex cells (1) passed on to offspring (1) produced resistance (1) only resistant worms survived to breed (1)	[3]	any three allow description of natural selection for max 2 marks

(c)	two organisms with desirable characteristics selected (1) bred together by humans (1) to produce offspring with the desirable characteristics (1) trait established over many generations (1)	**[2]**	any two	
	Total	**[7]**		
9 **(a)**	employer: may lose her job (1) may not be promoted (1) may not be able to get another job (1) insurance company: premiums may go up (1) may not get insurance / insurance may be cancelled (1)	**[4]**	2 max for employer and 2 max for insurance company	
(b)	to see if he has the disease / to see if he is a carrier for the disease / to make decisions about whether he has children (1)	**[1]**		
(c)	caused by alleles of a single gene (1) inherits two recessive alleles (1)	**[2]**		
	Total	**[7]**		