UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

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 must be read in conjunction with the question papers and the report on the examination.

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1	**(a)**	biomass grows <u>at same rate as burning</u> to replace that burnt	[1]	allow implication that it grows faster, but not slower, than it is burnt
	(b) (i)	400 – 60 – 200 (MJ) = 140 (MJ)	[1]	any clear indication of process e.g. 'It's the input take away the steam and the waste'
	(ii)	140 × 100/400 (1) = 35% (1)	[2]	full marks for correct answer without working
	(iii)	useful output is actually 200 + 140 MJ <u>and</u> 340 × 100%/400 = 85%	[1]	need not evaluate the calculation but needs to say what it is
	(c)	for same efficiency, biomass emits less CO_2 than coal (1); more efficient power stations have reduced CO_2 emissions and this difference is less significant at higher efficiencies/new power stations than at lower efficiencies/older power stations (1)	[2]	first mark is for relating the relative positions of the two lines second mark is for noting the downward trend and the fact that it is non-linear
		Total	**[7]**	
2	**(a) (i)**	microwave, infrared, ultraviolet, X-rays in that order	[2]	all correct = 2 2 or 3 correct = 1
	(ii)	ticks in at least two of the three right-hand end boxes	[1]	any two of these and no tick for a non-ionising radiation for the mark. accept any clear indication of choices
	(b)	explaining precautionary principle – probability unknown but consequence could be serious (1); should not take any risk with children, no matter how remote the risk may be (1)	[2]	accept 'better safe than sorry' accept any reason based on children's possible susceptibility, e.g. thin skulls, rapidly developing brains
	(c)	<u>metal</u> walls/door screen <u>reflect</u> microwaves back into cavity	[1]	both metal and reflect (or block) needed
		Total	**[6]**	

3	**(a)**	no detectable movement (1); previous (static) theories worked well (1); reluctant to change their ideas (1); suspicious of Wegener as an outsider (1)	[1]	any **two** separate reasons for the mark
	(b)	magnetic patterns (stripes) on seafloor) (1); symmetrical about mid-ocean ridge (1); evidence of seafloor spreading (1); provides mechanism for drift (1)	[2]	any **two**
	(c) (i)	A and E	[1]	need both and no others
	(ii)	B, C and F	[1]	any **two**: must include F and exclude A, E and D
	(iii)	adjacent/touching plates push against each other (sideways) (1); stresses build up (1); plates suddenly slip (1)	[2]	any **two**
		Total	**[7]**	
4	**(a) (i)**	pick off by hand/crop rotation/natural predators	[1]	
	(ii)	reduced yield	[1]	
	(b)	balance of risk and benefit (1); residues are very small/pose little risk but increase in yield is high (1)	[2]	
		Total	**[4]**	
5	**(a)**	4 4 4 4	[1]	all correct for one mark
	(b)	(1) 2 1 2	[3]	one mark for each correct number
	(c)	carbon/carbon monoxide	[1]	
		Total	**[5]**	

6	**(a)**	ticks in boxes 1, 2, 3 and 5	[3]	all 4 correct boxes ticked = 3 marks 3 boxes = two marks 2 boxes = one mark 5 boxes ticked max 1 all 6 boxes ticked = 0
	(b)	more energy used to produce paint (1); more environmental pollution caused by production of paint (1)	[2]	
	(c)	longer chains have more contact with each other (1); forces of attraction between longer chains are higher (1); more energy is needed to pull longer chains apart (1)	[2]	any **two**
	(d) (i)	$S + O_2 \rightarrow SO_2$	[1]	
	(ii)	reacts with oxygen in the air (1); reacts with water in the air (1)	[2]	
	(iii)	corrodes statues etc./acidifies lakes/kills fish/kills trees	[1]	
		Total	**[11]**	
7	**(a)**	'flu caused by a virus (1); antibiotics only effective against bacteria (or fungi) (1)	[2]	
	(b) (i)	'flu virus changes/mutates very quickly	[1]	
	(ii)	cause body to produce antibodies (1); before infection (1)	[2]	
	(c)	BC AE D	[2]	all 5 correct = 2 3 or 4 correct = 1
		Total	**[7]**	

8	**(a)**	unspecialised cells that can develop into any type of cell	[1]	
	(b) (i)	(stem cells) can be used to: cure/treat diseases which will save lots of lives	[1]	
	(ii)	unnatural/'playing God' idea	[1]	
	(c) (i)	B C F	[1]	
	(ii)	D E G	[1]	
	(d)	*natural* identical twins (1); when cells of embryo separate (1); *artificial* when nucleus from adult body cell (1); transferred to empty unfertilised egg cell (1)	[3]	any **3** points
		Total	**[8]**	
9	**(a)**	maintaining a constant internal environment	[1]	
	(b) (i)	D	[1]	
	(ii)	B	[1]	
	(c)	correct example plus any **two** of: slower (1); travel in the blood (1); longer-lasting (1); has target organ (1)	[2]	no marks for example alone example plus one factor gains 1 mark
		Total	**[5]**	