

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

5131 TWENTY FIRST CENTURY SCIENCE

5131/02

Paper 2, 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.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	5131	02

1	(a)		1 4 4	[1]	
	(b)		(1) 2 1 2	[3]	One mark for each correct number
	(c)		carbon/carbon monoxide	[1]	Allow particulates
			[Total]	[5]	
2	(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)		energy used to produce paint (1) environmental pollution caused by production of paint (1) paint made from crude oil so not sustainable/is finite (1)	[2]	Any two
	(c)		window frame would be soft/floppy/flexible/ it would not be hard (1) glass may fall out/glass not supported (1)	[2]	Ignore references to breaking easily
	(d)	(i)	reacts with water (1) reacts with oxygen (1)	[2]	Do not allow mixing
		(ii)	corrodes/damages statues/buildings/ acidifies lakes/harms/kills fish/harms/kills trees	[1]	
			[Total]	[10]	
3	(a)	(i)	too expensive/not available/cannot make them/don't have technology	[1]	Ignore reference to organic farming methods/pollution
		(ii)	pick off by hand/crop rotation/natural predators/natural pesticides/using insect-repellent plants	[1]	Ignore greenhouses/covers
		(iii)	reduced yield/crops damaged	[1]	
	(b)		risk is small because residues are very small/can be washed off (1) increase in yield/better crops/crops not damaged/more money made/more people fed (1) benefit is greater than risk (1)	[2]	Any two
			[Total]	[5]	

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	5131	02

4	(a)		mantle (1)	[1]	
	(b)		no detectable movement/no proof/no evidence (1) previous (static) theories worked well (1) reluctant to change their ideas (1) Wegener an outsider/not a geologist (1)	[2]	Any two
	(c)	(i)	A and E	[1]	Need both and no others
		(ii)	Any two from F, B and C	[1]	No mark if others given
		(iii)	(tectonic) plates push/slide against each other (1) stresses/forces build up (1) plates suddenly slip/move (1)	[2]	Any two Accept plates collide Ignore simple reference to plates moving
			[Total]	[7]	
5	(a)	(i)	microwave, ultraviolet/uv , X-rays	[2]	All correct = 2 2 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. Mark is independent of (a)(i)
	(b)		do not know if they are harmful or not (1) should not take any risk with children/better to avoid until sure they are safe (1) any reason based on children's possible susceptibility, e.g. thin skulls, rapidly developing brains (1)	[2]	Any two Accept 'better safe than sorry' for one mark
	(c)		<u>metal</u> walls/door screen reflects microwaves back into cavity/does not allow microwaves to escape	[1]	
			[Total]	[6]	

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	5131	02

6	(a)	(i)	Wind/wave/hydroelectric/geothermal/tidal/solar	[1]	Any reasonable renewable source other than biomass
		(ii)	coal once used is gone for ever / cannot grow more coal/coal is finite/takes millions of years to form (1) more biomass grows to replace burned (1)	[2]	Do not allow 'coal is not reusable'
	(b)	(i)	$400 - 60 - 200 \text{ (MJ)} = 140 \text{ (MJ)}$	[1]	Any clear indication of process e.g. 'It's the input take away the steam and the waste' Do not credit $200 - 60 = 140$
		(ii)	$140 \times 100 / 400 = 35\%$	[2]	Full marks for correct answer without working
		(iii)	useful output is actually $200 + 140 \text{ MJ}$ /heat energy in steam/used in factory should be added to electrical energy produced/ efficiency is actually $340 \times 100 / 400 = 85\%$	[1]	
			[Total]	[7]	

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	GCE O LEVEL – October/November 2011	5131	02

7	(a)		stem (cells)	[1]	Allow reference to specific disease
	(b)	(i)	(stem cells) can be used to cure/treat diseases/injuries	[1]	
		(ii)	unnatural/playing God idea/ethical argument	[1]	
	(c)	(i)	A B C F	[1]	Any two, no other
		(ii)	D E G	[1]	Any two, no other
			[Total]	[5]	
8	(a)		'flu caused by a virus (1) antibiotics (only) effective against bacteria/fungi/antibiotics not effective against viruses (1)	[2]	All 5 correct = 2 3 or 4 correct = 1
	(b)	(i)	'flu virus changes/mutates	[1]	
		(ii)	cause body to produce antibodies/memory cells (1) which are already there when infection takes place/are present to destroy virus/microorganism when enters body (1)	[2]	
	(c)		to ensure it is safe/effective/has no side effects	[1]	
	(d)		BC AE D	[2]	
			[Total]	[8]	

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9	(a)		maintaining a constant internal environment	[1]	
	(b)	(i)	C	[1]	
		(ii)	A	[1]	
		(iii)	D	[1]	
		(iv)	B	[1]	
	(c)		correct example, e.g. lowering blood sugar levels after a meal/raising of heart beat when frightened		Allow named hormone as example No mark for example alone
			two of: hormonal is slower (1) hormones produced by glands (1) hormones travel in the blood (1) hormonal is chemical (1) hormonal has effect on target organs (1) effect of hormonal lasts longer (1) nervous more specific/only affect one area (1)	[2]	Allow any valid example, but if not valid max 1 mark ora for each
			[Total]	[7]	