

MARK SCHEME for the May/June 2010 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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Expected Answers		Mks	Additional Guidance
1 (a) (i)	it gives a more reliable best estimate; it allows outliers to be found and ignored; one sample may be faulty; one experiment may be in error;	[2]	Any two
(ii)	$25+23+26+26/4$; $= 25$;	[2]	Allow one mark for 23
(b) (i)	the mean of metal B /66 is not within the range of metal A /the mean of metal A /25/23 is not within the range of metal B ;	[1]	
(ii)	depth of dent is smaller for metal A ; the harder the metal the less the depth of the dent;	[2]	
Total		[7]	

Expected Answers		Mks	Additional Guidance
2 (a) (i)	 one carbon dioxide for 1 mark;  two water for second mark; 	[2]	
(ii)	photosynthesis; dissolving in rain/seas;	[2]	
(b) (i)	$S + O_2 \rightarrow SO_2$;	[1]	
(ii)	sulfur dioxide reacts with water and oxygen in the air;	[1]	
Total		[6]	

Expected Answers		Mks	Additional Guidance
3 (a)	plants need nitrogen to make protein; crops take nitrogen from the soil; no fertiliser is added to put the nitrogen back;	[3]	
(b)	abandoned areas cannot be used again; eventually all of forest is used up;	[2]	
(c)	in developed countries pesticides are used; farmers in developing countries cannot afford pesticides/pesticides may not be available;	[2]	Climatic differences acceptable: factor (1) development (1)
Total		[7]	

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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Expected Answers		Mks	Additional Guidance															
4 (a)	one from mother and one from father;	[1]																
(b)	gene on Y chromosome;	[1]	Allow description of e.g. X + X = girl, X + Y = boy															
(c) (i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="2"></td> <td colspan="2" style="text-align: center;">MOTHER</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">x</td> <td style="text-align: center;">X</td> </tr> <tr> <td rowspan="2" style="text-align: center;">FATHER</td> <td style="text-align: center;">x</td> <td style="text-align: center;">xx</td> <td style="text-align: center;">xx</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">XY</td> <td style="text-align: center;">XY</td> </tr> </table>			MOTHER				x	X	FATHER	x	xx	xx	Y	XY	XY	[2]	One mark for parent genotypes One mark for correct outcomes
		MOTHER																
		x	X															
FATHER	x	xx	xx															
	Y	XY	XY															
(ii)	50%/0.5/½/1 in 2;	[1]																
(d) (i)	Ellen;	[1]																
(ii)	Chipso;	[1]																
(iii)	Amir;	[1]																
Total		[8]																

Expected Answers		Mks	Additional Guidance
5 (a)	chemicals; can kill bacteria/fungi;	[2]	
(b)	to prevent bacteria becoming <u>resistant</u> ;	[1]	
(c) (i)	increase in % of bacteria not affected; faster increase between 1940 and 1950/steadier increase now;	[2]	Must describe pattern of increase for second mark
(ii)	<u>mutation</u> in genes of bacteria; resistance passed onto next generation;	[2]	Allow explanation of sudden increase and then slower increase e.g. new antibiotic at start
Total		[7]	

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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Expected Answers		Mks	Additional Guidance
6 (a)	nervous is electrical whereas hormone is chemical; nervous is faster than hormonal/oral; nervous are shorter lived response/oral;	[2]	Any two
(b) (i)	B;	[1]	
(ii)	D and E;	[1]	
(iii)	C;	[1]	
Total		[5]	

Expected Answers		Mks	Additional Guidance
7 (a)	clouds of dust produced (1); blocked out Sun's radiation (for a long time) (1); cooled Earth below temperature at which they could survive (1); plants to feed (some of) them died due to darkness (1)	[2]	Any two points. Ignore any strictly local effects, e.g. blast
(b)	A, D and E	[1]	In any order. All 3 and no others for 1 mark.
(c)	data of extinctions not precise enough (1); fossil record not complete (1); may be other data not yet discovered (e.g. asteroid craters, lava flows) (1); other theories may be possible (1); scientists tend to stick with accepted theory (1);	[2]	First mark for clear indication of reason and second for explanation /clarification
Total		[5]	

Expected Answers		Mks	Additional Guidance
8 (a)	ionise/split up molecules (1); these ions/molecule fragments react chemically (1); consequent damage to cell can kill cell/cause cancer (1);	[2]	Any two points
(b)	ozone molecules absorb UV and are chemically changed (1); these changes are reversible and ozone is restored (1);	[2]	
(c) (i)	Carl;	[1]	
(ii)	Abby, Barry and Carl;	[1]	All three and NOT Dana for the mark.
(iii)	Abby and Barry;	[2]	One mark each. Subtract one mark for each extra tick.
Total		[8]	

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
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Expected Answers		Mks	Additional Guidance
9 (a)	coal, gas and oil;;	[2]	All three (in any order) for two marks. At least two for one mark. Deduct one mark for each other fuel in list.
(b)	410 EJ (allow 405 – 415 EJ);	[1]	
(c)	Total energy in range = above+30+30+3EJ = 473 EJ (Allow 470 – 480 EJ) (1); ¼ of this = 120 EJ while nuclear = 30 EJ so <u>claim is false</u> (1);	[2]	Ora e.g. nuclear = 30 GJ (1) so claim is false as gas/coal/oil alone > 3 × this (1)
(d)	Electrical energy = 56 - (17 + 9) = 30 MJ (1); efficiency = (30/56)×100 = 54% (1);	[2]	
	Total	[7]	
	Paper Total	[60]	