UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0608 TWENTY FIRST CENTURY SCIENCE

0608/05   Paper 1 (Analysis and Interpretation), 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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Question	Expected Answers	Mks	Additional Guidance
1 (a) (i)	384	[1]	
(ii)	388	[1]	**allow** ± 2
(iii)	factors affecting output of carbon dioxide may change/plot shows some variation	[1]	**allow** correct example of a factor that may change
(iv)	As the number of cars rises (1); concentration of carbon dioxide rises (1)	[2]	**allow** … falls … falls **allow** alternative words **allow** positive correlation if variables named
(b) (i)	(fuel) reacts with oxygen (1); oxygen/air supply is restricted (1); incomplete combustion takes place (1)	[2]	Any two
(ii)	carbon monoxide is poisonous (1); particulates bad for asthmatics/ particulates irritate lungs (1)	[2]	
(c) (i)	nitrogen + oxygen → nitrogen monoxide	[1]	
(ii)	$2NO + O_2 \rightarrow 2NO_2$ correct three formulae (1); correct balancing (1)	[2]	**reject** O^2, NO^2 $NO + O \rightarrow NO_2$ scores (1) for balancing
(d) (i)	directly: sulfur dioxide irritates lungs/eyes (1); indirectly: produces acid rain that kills plants/animals that humans use e.g. for food (1)	[2]	needs specific effect, not just 'makes them ill' needs effect on humans not just 'causes acid rain'
(ii)	risks: people do not know/do not care that driving cars is harmful (1); people underestimate the harm they are doing (1); people disagree that these gases are doing harm (1); people are willing to accept the problems they cause (1) benefits: people find cars convenient/useful (1); public transport is less convenient than cars/does not run from door to door (1); public transport can be more expensive (1)	[4]	Any four At least one from each area (risk and benefit)

Question	Expected Answers	Mks	Additional Guidance
1 (e) (i)	wind blocked by buildings (1); high traffic density (1); many people there to be affected (1)	[2]	any two
(ii)	traffic free zones (1); do not allow cars to enter city centre (1); cars charged to enter city centre (1); so fewer cars drive into centre (1)	[2]	Any two **allow** pollution checks on cars, car-free days
(iii)	powered by electric motors/batteries (1); that do not give off exhaust gases (1)	[2]	**allow** 'do not produce pollution'
(iv)	electricity used to charge them (1); most electricity generated in power stations that burn fossil fuels (1)	[2]	need burning fossil fuels for 2nd mark
(f)	electric cars are more suited to short distances that people travel in cities (1); cars don't need to travel so fast in cities (1); cities have charging points (1); more people live in cities (1)	[2]	Any two
(g)	any two valid methods from e.g. wind, solar, waves, biomass, nuclear	[2]	
	Total	**[30]**	

Question	Expected Answers	Mks	Additional Guidance
2 (a)	using different sized discs would affect the outcome/change the results (1); so that the experiment would show the effect of different concentrations of antibiotic / to allow comparison to be made between antibiotic concentrations (1)	[2]	e.g. 'would have too much/ too little antibiotic' unqualified idea of control gets (1)
(b)	takes time (1); for antibiotic to diffuse into the jelly / for antibiotic to kill bacteria (1)	[2]	**NOT** 'for bacteria to grow'
(c) (i)	ruler	[1]	**allow** rule, measuring tape, etc.
(ii)	8	[1]	
(d)	as antibiotic concentration increases (1); distance d increases (1); so more bacteria are killed (1)	[2]	Any two **accept** positive correlation between concentration and amount of bacteria killed for (2), but **ignore** less specific reference to correlation **allow** description
(e)	using water acts as a control / allows comparison to be made (1); so that we can be certain the results are due to the action of the antibiotic (1)	[2]	Needs more specific answer than (a)
	Total	**[10]**	

Question	Expected Answers	Mks	Additional Guidance
3 (a)	stop watch	[1]	
(b)	handle with tongs/wear gloves/don't point at self or others/keep in secure box when not using (1); to reduce dose to person involved (1)	[2]	suggestion (1) justification (1)
(c) (i)	480	[1]	
(ii)	48	[1]	**allow** ecf from **(i)**
(d)	there is a negative correlation between number of sheets and number of counts/as the number of sheets rises the number of counts goes down (1); drop is not the same each time sheet is added (1); sudden drop after one sheet (1); fairly constant drop 2–3–4 (1)	[2]	Any two
(e)	radioactivity is a random process/ allows mean/best estimate to be found/ will improve reliability/can identify (and discard) outliers	[1]	
(f)	need to subtract background (1); all counts per second will be 120/60 (= 2) smaller (1)	[2]	
	Total	**[10]**	

Question	Expected Answers	Mks	Additional Guidance
4 (a)	mean/average = (42 +40+ 48 + 44 + 46)/5 (1); = 44 (1)	[2]	
(b) (i)	appropriate uniform scale inserted (1); axis labelled with units (1)	[2]	allow 1 large square = 2, 4 or 5 m only
(ii)	all points plotted to within half of one 2 mm square (2); one or two errors only (1)	[2]	should include 44 or ecf from **(a)**
(iii)	best-fit straight line	[1]	judge by eye
(c)	read from candidate's graph, within half of a small square (expect between 78 and 82)	[1]	
(d)	line that continues from original line and meets or crosses axis (1); read from candidate's graph, within half of a small square (1)	[2]	No marks unless candidate's graph is extended to y-axis
	Total	**[10]**	