

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Ordinary Level

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

**5131 TWENTY FIRST CENTURY SCIENCE**

5131/03

Paper 3, 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)	(i)	poor diet; stress; cigarette smoking; (excessive) alcohol consumption; lack of exercise; high salt in diet;	[1]	Can be an example e.g. junk food, for this one mark Reject high blood pressure Any two NB avoid giving a mark for only one correct Do not use list principle i.e. if 3 given and 2 correct, give the mark
		(ii)	genetic factors	[1]	E.g. 'inherited', 'genes'
	(b)	(i)	fat(ty deposits)/cholesterol; block; artery supplying heart/coronary arteries; no/reduced blood flow; no/reduced oxygen reaches the heart (muscle); high blood pressure damages arteries; heart cells/tissue die	[4]	Any four Annotate with ticks Accept 'blood vessels' but reject 'veins'
		(ii)	other scientists can evaluate/discuss findings/opinions/conclusions; may suggest improvements;	[1]	E.g. 'check it looks OK'
	(c)	(i)	checks <u>results</u> are correct; gives confidence in findings;	[2]	E.g. results may be wrong E.g. findings are more reliable;
		(ii)	24 / 100 x 1568; = 376.32 so should be 376 or 377;	[2]	Correct answer = 2 marks Accept 376.32
	(d)	(i)	dark chocolate contains more flavanols (than milk chocolate); flavanols lower blood pressure; high blood pressure damages arteries/blood vessels;	[3]	Accept ora for 1 <sup>st</sup> & 3 <sup>rd</sup> points Annotate with ticks
		(ii)	as the amount of chocolate eaten increases, the risk of suffering from cardiovascular decreases	[1]	Needs the direction and the change in each variable
	(e)	(i)	diagonal line from top left to bottom right	[1]	Any downward trend, even 2 points. Allow ecf from (e)(i)

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	<b>(f)</b>	<b>(i)</b>	(involves humans, so) it's very difficult to control factors such as exercise, diet, mass, age, sex etc.	[1]	Any mention of a factor which is hard to control
		<b>(ii)</b>	free from CVD at start of trial; not taking any drugs for blood pressure; daily diet; exercise routine; smoker/non-smoker; alcohol intake; gender; age;	[1]	
	<b>(g)</b>	<b>(i)</b>	more people; longer time; more data;	[2]	Any two
		<b>(ii)</b>	enables conditions to be controlled more easily; can monitor more closely; get results quicker;	[2]	Any two
	<b>(h)</b>	<b>(i)</b>	appears the same as the test substance but does not contain any test substance	[1]	Needs to imply comparison with true drug/vaccine
		<b>(ii)</b>	two groups; groups are matched/similar; one given flavanols and the other the placebo; (double) blind; monitor effects on blood pressure (or another factor);	[3]	Any 3 Annotate with ticks
	<b>(i)</b>	tastes nice; don't consider the risk to be very high; makes you feel good/are addicted to it/combat stress; to get energy (quickly); reduces risk of/prevents CVD;	[2]	Any 2 Benefit outweighs risk  Lowers blood pressure	
	<b>(j)</b>	protein; vitamins; minerals; water; fibre/roughage	[2]	Four = 2 marks Two/three = 1 mark Allow a named vitamin or a named mineral but not more than one of each Do not annotate with ticks, but use ^, X or Rep for errors Do not use list principle Mark first 4 answers only when 5 or more given	
			<b>[Total]</b>	<b>[30]</b>	

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<b>2</b>	<b>(a)</b>		heavy weight/mass	[1]	Not hammer	
	<b>(b)</b>	<b>(i)</b>	size of force /drop weight from same height; thickness of polymer; temperature; Same pin/same orientation of pin & polymer;	[2]	Any two If 'hammer' in <b>(a)</b> , then 'hit with same force' gets the 1 <sup>st</sup> marking point	
		<b>(ii)</b>	(uncontrolled factors) may make results variable/inconsistent/invalid/not reliable; so that only the factor being investigated can affect the outcome;	[2]	May mention a relevant factor in either part	
	<b>(c)</b>		3.0 mm; 1.5 mm	[2]	Allow tolerance of $\pm 0.2$ mm on each	
	<b>(d)</b>	<b>(i)</b>		polymer B is harder than polymer A	[1]	Allow stronger/stiffer/tougher/more durable
		<b>(ii)</b>		there is a real difference between diameter data for polymer A & polymer B; because the mean of the one does not lie within the range of the other/because the ranges do not overlap	[2]	Must be explicit about real difference  <b>Not</b> 'means are different'
			<b>[Total]</b>	<b>[10]</b>		

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3	(a)	use thermometer (1); read temperature at at different times (1); time/set oven timer for time needed (1); repeat for different times (1); start with water at same temperature each time (1)	[2]	Any two points. Last 2 marking points could be stop oven at regular intervals (1); read $T$ rapidly to avoid cooling (1)
	(b)	(i) may be hotter in some parts (top) so need to mix	[1]	
		(ii) 20 °C and 24 °C	[1]	
	(c)	(i) points correct (2); (put ticks on RH edge)	[3]	4 correct = 2 marks; 2 or 3 correct = 1 mark Scoris overlay for tolerance of points.
		best fit line through all data (1) (put tick near line at bottom)		Good straight line with points each side.
		(ii) 15 ± 1 °C (1); starting temperature of the water (1)	[2]	ecf own line ±1 °C
		(iii) 6 ± 0.5 °C/minute	[1]	ecf own line Accept use of 2 data points. Accept 6 ± 0.5 °C/minute if no working is shown
	<b>[Total]</b>	<b>[10]</b>		
4	(a)	touch arm in same place; touch arm with same pressure; same positions with respect to the apparatus and each other; same time of day; same diet/drinks before; same clock/buttons	[2]	Any two
	(b)	(i) more reliable; allows outliers to be identified; mean to be taken	[2]	Any two
		(ii) 0.44 + 0.38 + 0.36 + 0.30/4 ; = 0.37;	[2]	Correct answer = 2 marks 0.62 = 1 mark
	(c)	poor accuracy; because large ranges/data vary a lot;	[2]	
	(d)	use a bell/buzzer as stimulus; make a noise with it when button A is pressed; press button B when sound is heard	[2]	Any two Accept any source of sound
	<b>[Total]</b>	<b>[10]</b>		