MARK SCHEME for the May/June 2013 series

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1	(a)	10 to 120	[1]	allow 120 to 10
	(b)	more cars driving in town at these times (1); people going to and from work (1)	[2]	both to and from needed
	(c) (i)	reaction of nitrogen with oxygen (1); nitrogen from air (1)	[2]	
	(ii)	nitrogen monoxide reacts with oxygen in air (1)	[1]	
		Total:	**[6]**	
2	(a)	Different diameters will stretch different amounts for same weight (1); Best estimate would be unreliable / cannot average different quantities (1)	[2]	Can give example, e.g. if it were thinner (1); it would stretch more (1)
	(b)	(13 + 11 + 13 + 14 + 12)/<u>5</u> (1)	[1]	allow 63/<u>5</u>
	(c) (i)	the mean for unplasticised is outside the range for plasticised / the mean for plasticised is outside the range for unplasticised (1)	[1]	accept 'the ranges do not overlap' as that implies both alternative marking points in this case
	(ii)	plasticiser makes the polymer softer / more flexible (1); plasticiser gets between polymer molecules (1); forces are lower (1); molecules / chains slide over each other more easily (1)	[3]	Any three points.
		Total:	**[7]**	

3	(a)		glucose AND amino acids (1)	[1]	both required
	(b)	(i)	look on label for food type they are trying to avoid (1); eat less of/do not eat if food type listed (1)	[2]	allow answers that use examples e.g. sugar/fat Credit answers which imply checking for chemicals in the food which could cause health problems
		(ii)	Risk explained (1); Consequence explained (1); weighs up risk and consequence and comes to a judgement thereon (1)	[3]	Either: risk is low (may not get diabetes / diabetes only occurs late in life) Or risk is high (number of cases increasing); Either consequence is serious because life threatening/grave health problems Or consequence not serious due to good treatments now available;
	(c)		if energy input in food exceeds energy used, person will gain weight (1)	[1]	allow arguments based on activity/exercise
			Total:	**[7]**	
4	(a)	(i)	to see if it is large / see if will collide with Earth (1); collision may result in climate change from dust clouds/serious local damage to cities/creation of tsunamis (1);	[2]	Allow 'may be able to deflect/destroy asteroid' as alternative
		(ii)	small and dim so hard to see (1); movement rapid so appear suddenly (1); need many observations to establish it is near-Earth (1)	[2]	Any two points. Allow other valid suggestions.
	(b)		crater caused by asteroid impact (1); gives more (independent) evidence about dinosaur extinction (1); shows that time of asteroid impact fits with time of extinction (1); this observation increases confidence in the asteroid impact theory (1)	[2]	Any two points.
			Total:	**[6]**	

5	(a)	(i)	4 correctly plotted points = (2) 2 or 3 correctly plotted points = (1)	[2]	
		(ii)	Smooth curve following trend (1)	[1]	Not a curve which slavishly goes through each point. Allow sensible straight line.
	(b)	(i)	Increased concentration of greenhouse gases, particularly CO_2, in atmosphere (1); CO_2 increase due to deforestation and increased burning of fossil fuels (1); absorbs radiation (emitted by warm Earth) so Earth as a whole absorbs more than it emits (1)	[3]	allow either 'it's global warming' gets 0 unless developed 1 allow other reasoned suggestions, e.g. solar output fluctuation
		(ii)	Same data allows different interpretations because of small range of time / variability of data / many variables involved in global warming (1)	[1]	Must qualify the reason for difference in interpretations
			Total:	**[7]**	
6	(a)	(i)	benefit: employment / revenue from tax / use of local facilities	[1]	allow any reasonable suggestion
		(ii)	risk reduction: strict regular inspections / regulations about handling materials / secure containment at all stages (1)	[1]	allow any reasonable suggestion, e.g. workers wear protective clothing, waste stored in secure conditions, waste kept away from local people
	(b)		$1 \Rightarrow ½ \Rightarrow ¼$ in two half-lives (1); must be (longer than) 2 half-lives = (more than) 48 000 years (1)	[2]	
	(c)	(i)	1) Cs: radiation would penetrate several mm of metal 2) Sr: radiation would penetrate paper, but stopped by couple of mm of metal 3) Am: radiation stopped by a sheet of paper	[2]	All 3 = (2); 1 or 2 = (1) Ignore any reference to half-life.
		(ii)	Am-241: long half-life / very ionising **and** Cs-137: highly penetrating γ radiation (1)	[1]	Both needed or great range
			Total:	**[7]**	

7	(a)	(i)	won't be able to produce antibodies (1)	[1]	
		(ii)	to prevent epidemics of the disease (1)	[1]	
		(iii)	people should be able to choose whether or not they are vaccinated (1); vaccination is against some peoples' religious beliefs / would be an infringement of rights to make it compulsory (1)	[2]	allow 'expensive' only if qualified, e.g. for developing countries
	(b)	(i)	rise after exposure to disease is: quicker than rise after vaccination (1); to a higher concentration than after vaccination (1)	[2]	ora
		(ii)	after vaccination body makes antibodies against microorganism (1); can make the antibody quicker on second exposure (1)	[2]	Ecf from (i)
			Total:	**[8]**	
8	(a)	(i)	any two correct examples of nervous communication	[2]	one mark for each example
		(ii)	receptor cells detect stimulus (1); passes impulse along nerve cells (1); to effector cells which respond to stimuli (1)	[2]	any two
		(iii)	faster impulses in vertebrates (1); some correct data quoted to support conclusion (1)	[2]	ora ignore units
	(b)		nervous communication is via nerve cells from one specific place to another (1); hormonal communication is via blood which travels all over body (1)	[2]	
			Total:	**[8]**	
9	(a)		stem cells are unspecialised cells (1); can develop into any type of cell (1)	[2]	
	(b)		unnatural (1); against religious beliefs (1); expensive (1); uses cells from embryos (1); embryos produced only for stem cells (1); unused embryos are discarded (1)	[2]	Any two Do not allow 'unethical' unless qualified
			Total:	**[4]**	