MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0608 TWENTY FIRST CENTURY SCIENCE

0608/04   Paper 4 (Extended Written), maximum raw mark 60

Question			Expected Answers	Mks	Additional Guidance
1	(a)	(i)	a correlation between carbon monoxide concentration and number of cars / as the number of cars increases so does the carbon monoxide concentration	[1]	
		(ii)	results can be repeated (by other scientists) / more data can be obtained	[1]	allow: causal link found
	(b)	(i)	second nitrogen monoxide molecule on left; two carbon dioxide molecules on right	[2]	
		(ii)	$2CO + 2NO \rightarrow N_2 + 2CO_2$	[1]	do not allow ecf from (b)(i)
		(iii)	it causes acid rain; that attacks crops	[2]	allow: other correct damage from acid rain
			Total	**[7]**	
2	(a)	(i)	73 to 77	[1]	
		(ii)	(77+76+73+74+75)/5; = 75	[2]	allow one mark for 77
	(b)		mean of polymer A does not lie in range of polymer B;	[1]	allow: ranges do no overlap
	(c)	(i)	make chains longer / add cross linking	[1]	allow: increased crystallinity
		(ii)	increases forces between chains; more energy is needed to separate chains	[2]	
			Total	**[7]**	
3	(a)		they carry out carry out risk assessments; to find the safe levels of chemicals in food	[2]	
	(b)		pesticide chemicals may get into organic food from other sources; e.g. blow from other farms / in water supply	[2]	allow: soil may contain pesticides from previous use
	(c)		moulds/bacteria/microbes grow on food in storage (and release toxic chemicals); toxic chemicals may be formed during cooking; toxic chemicals may be produced by a plant as it grows; chemicals in the plant may cause an allergic reaction	[2]	any two
			Total	**[6]**	

	Question		Expected Answers	Mks	Additional Guidance
4	(a)		(clouds of) gas; and dust; over long periods of time; (condensed under gravity)	[2]	Any two points
	(b)	(i)	Distance light travels in a year	[1]	
		(ii)	300 000	[1]	
	(c)	(i)	above atmosphere; no light pollution; no clouds; no atmospheric distortion	[2]	Any two points
		(ii)	For: increase human knowledge; find new planets; find life on other planets; find new home for mankind in future Against: very expensive project; unlikely to succeed; money would be better spent on (another more worthwhile project) e.g. health	[2]	One mark for a 'for' argument and one mark for an 'against' argument.
			Total	**[8]**	
5	(a)	(i)	X-rays and gamma radiation	[1]	Both needed (either order)
		(ii)	Damage cells/DNA/nuclear material; breaks up molecules and makes them reactive / causes mutations/cancer	[2]	allow: will kill cells
	(b)	(i)	Risk: skin cancer and benefit: look and feel good/vitamin D production; Reason: Benefit outweighs risk owtte	[2]	allow: risk is small
		(ii)	put on sunblock/cover up with (cotton) clothing <u>because</u> it absorbs/reflects UV	[1]	
			Total	**[6]**	
6	(a)	(i)	$370 + 800 + 380 + 310 + 500 = 2360 \mu Sv$	[1]	
		(ii)	Calculates 800 divided by own answer to **(a)(i)** or compares 800 to ½ of own answer to **(a)(i)**; draws appropriate conclusion	[2]	Correct total in **(a)(i)** gives the answer no.
		(iii)	$(1600 + 2360 = 3960)$ $100 \times 1600/3960 = 40.4\%.$	[1]	Allow ecf for own answer to **(a)(i)**
	(b)		alpha all absorbed by body; absorbed by lungs (which are delicate); radon stays in lungs, as it is heavy; gammas mostly pass through without effect;	[2]	Any two points allow ionisation more for alpha than gamma
			Total	**[6]**	

Question			Expected Answers	Mks	Additional Guidance
7	(a)		male: XY; female: XX	[2]	
	(b)		controls development of sex organs; ref to ovaries (female) or testes (male)	[2]	
	(c)		may sack him / may no longer employ him; may not promote him / he may be discriminated against; it is an invasion of privacy	[2]	Any two
	(d)	(i)	to see if he will develop the condition when older; to see how likely it is condition will be passed onto his offspring;	[2]	
		(ii)	may cause him stress / may cause him to become depressed / may affect his mental health / it is an invasion of privacy / he may have problems getting life insurance / the test may give a false positive result	[1]	
			Total	**[9]**	
8	(a)		poor diet / stress / cigarette smoking / excess alcohol intake / high saturated fat intake / high salt intake / lack of exercise	[2]	any two
	(b)	(i)	F	[1]	
		(ii)	C **and** D	[1]	
		(iii)	E	[1]	
	(c)		takes time for heart disease to develop / incidence of disease is low / takes account of other factors involved	[1]	
	(d)		1816/66000; 2.75	[1]	allow 2.8
			Total	**[7]**	
9	(a)		sun	[1]	
	(b)		horseshoe crab **and** diamondback terrapin	[1]	either order
	(c)		(striped bass population will) increase because: fewer turtles to eat the crabs; larger population of crabs; more food for the bass	[2]	any two reasons no marks for increase alone
			Total	**[4]**	

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