

Twenty First Century Science

PILOT Examination Questions

GCSE Science Jan 2005

**Keeping healthy, Radioactive materials, Life on Earth
(Mark Scheme)**

Please note:

- **These questions are not Sample Assessment Materials (SAMs) for the new OCR specification (for Sept 2006).**
- **The style of question varies from that used for the new specifications.**
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1			Tears; Acid; Skin;	1 1 1 3	
2	a			2	1 correct = 1 2 or 3 correct = 2
	b		Millions of years ago	1	
				3	
3	a		Genetic inheritance; Lifestyle;	2	
	bi		All 3 bars drawn correctly = 2 marks; 2 bars drawn correctly = 1mark;	2	
	bii		Lack of exercise;	1	
	c		Any one from Age / gender / size of population / stress / genetic references / diet / level of exercise / level of smoking;	1	Ignore ref. to other countries Ignore ref. to lifestyle unless specified
				6	

Qn	part	Expected answers	marks	Additional guidance
4	a	Alpha; Beta;	2	Accept α , β
	b	Gamma rays can kill living cells / bacteria / penetrate the packaging;	1	
	c	Gamma rays cannot penetrate thick concrete / protect people / does not escape;	1	
	d	Idea of time to halve; Idea of quantity / radioactivity dropping;	2	

	ei		Background radiation;	1	
	eii		Ionising radiation can cause cancer; Idea of risk increasing with dose;	2	Ignore harm Accept too much
	fi		Sievert;	1	
	fii		Idea of reaching a limit;	1	Accept too much
	g		Any two from Radiographers; Dentists; Nuclear power station workers; People who have X-rays; People who take X-rays; Doctors / scientists working with radioactive materials / X-rays;	2	Do not accept 'exposure to X-rays' unless qualified
				13	
5	ai		Hydra before crayfish; Crayfish before human;	2	
	aii		Brain; Learn; Successful;	3	
	b		Brain; Spinal cord;	2	
				7	

6	ai		Furnace; Steam; Generator;	3	
	aii		Any two from Easily transmitted from place to place; Used in <u>many</u> ways / universally used in <u>many</u> appliances; Clean at point of use; Provide heating / light;	2	Ignore list Ignore just operates devices
	b		0.8%;	1	
	ci		Any two from Creates jobs; Reduce carbon dioxide emissions; Reduce pollution from (fossil fuels); Wind is free / renewable; Reference to visual pollution qualified; QWC Correct use of SPAG	2 1	Ignore clean Accept reduce non- renewable (fossil fuel) energy production Accept 1 mistake per sentence
	cii		Any two from Unattractive / visual pollution;		Ignore ruining the countryside

			Not reliable / depend on weather; Hazard to wildlife; Large concrete foundations causing harm;	2	Ignore noise
				11	
7	a		Any two from Look for safety / side effects; Look for effectiveness;	2	
	b		Idea of assessing safety / effectiveness; Patients already ill so may make worse;	2	
	c		Any two well reasoned arguments from Cruelty issues; Animals may have different responses; QWC Well ordered answer	2 1	Must qualify cruelty point with ethical back up
				7	

Qn	part		Expected answers	marks	Additional guidance
8	a		Flu microbes reproduce / damage body cells; Flu microbes produce poisons / toxins;	2	
	b		Any two from Flu microbes are viruses; Antibiotics destroy bacteria / cannot kill viruses;	2	Cannot kill viruses on its own = 1 mark
	c		Any two from Prevent people getting flu / develop immunity; Prevent it being passed on / to prevent epidemics; Need to vaccinate a high percentage of a population / achieves herd immunity; Ill or elderly; Idea of protecting;	2	Accept resistance Accept qualified cost argument = 1
				6	
9	a		Universe is too large / other planets are too far away; It would take a very long time (to reach the nearest star); Large number of them to visit;	2	Ignore find out more about our planet
	b		Looking for life on another planet; Might be a planet suitable for us to live on; To find out how our planet formed;	2	Accept how long it will last
				4	
			Total for paper	60	

1	a	Universe is too large / other planets are too far away; It would take a long very time (to reach the nearest star); Large number of them to visit;	2	Ignore find out more about our planet
	b	Looking for life on another planet; Might be a planet suitable for us to live on; To find out how our planet formed;	2	Accept how long it will last
			4	
2	a	Any two from Look for safety / side effects; Look for effectiveness;	2	
	b	Idea of assessing safety / effectiveness; Patients already ill so may make worse;	2	
	c	Any two well reasoned arguments from Cruelty issues; Animals may have different responses; More effective to test on human volunteers; QWC Well ordered answer	2 1	Must qualify cruelty point with ethical back up
			7	
3	a	Flu microbes reproduce / damage body cells; Flu microbes produce poisons / toxins;	2	
	b	Any two from Flu microbes are viruses; Antibiotics destroy bacteria / cannot kill viruses;	2	Cannot kill viruses on its own = 1 mark
	c	Any two from Prevent people getting flu / develop immunity; Prevent it being passed on / to prevent epidemics; Need to vaccinate a high percentage of a population / achieves herd immunity; Ill or elderly; Idea of protecting;	2	Accept resistance Accept qualified cost argument = 1
			6	
4	ai	One named species extinct or endangered;	1	
	aii	Description of 2 examples of human activity habitat; hunting; pollution; introduction of predator; introduction of disease; competitor;	2	
	b	Any two from When part of a food chain becomes extinct it affects other organisms in the food chain; Species have more chance of surviving in an		

			ecosystem with a diverse range of species; Maintaining biodiversity ensures a sustainable environment; We do not yet understand the full potential of some of the plants; Important to maintain biodiversity for future development of food crops; And medicines; Gene bank;	2	
				5	
5	ai		Heat from coal turns water into steam (in furnace); Steam <u>turns</u> turbines; Turbines <u>turn</u> generators; Generators produce electricity;	3	any 3 stages
	aii		It / electricity has to be produced from another source QWC SPAG	1 1	Accept 1 error per sentence
	b		Benefits creates jobs; - local economy benefits; reduce carbon dioxide emissions / pollution; - world benefit; <u>out to sea</u> so less visible pollution; - locals benefit; wind is free / renewable; - consumer; Disadvantages unattractive; - local people / reduce tourism; hazard to wildlife / birds; - wildlife / naturalists / birds; large concrete foundations <u>cause harm</u> ; - marine life / fishermen;	6 max	4 max for each category Accept converse Must have link for second mark
				11	
6	ai		The lower the level of physical activity the higher the risk of dying from heart disease;	1	Accept the reverse
	aii		Any two from May be difference in age of people taking part; Size of groups; Interpretation of level of physical activity between different groups; Gender difference; Differences in diet / smoking / stress / health / weight / genetics;	2	Ignore lifestyle unless qualified
	b		For People can be healthy but unfit / unhealthy but fit;		[Exercise = fitness]

		Some healthy people die from heart disease; Fit people can catch diseases and become ill; Some fit people may not eat properly; Health can be genetically determined; Against Regular exercise is good for health; Exercise will reduce weight / slimmer / reduce blood pressure / heart disease;	2 2	
			7	
7	a	Any two from Penetrate packaging; Highly energetic; Damage living cells / kill bacteria;	2	Ignore travel further Ignore stronger / more radioactive
	bi	Idea of quantity / radioactivity dropping; Idea of time to halve;	2	
	bii	Activity would decrease rapidly; Would need replacing;	2	
	ci	Ionising radiation can cause cancer; Idea of risk increasing with dose;	2	Ignore harm Accept too much
	cii	Idea of reaching a limit;	1	Accept too much
	d	Nuclear power worker / scientists or doctors working with radioactive materials; → limit exposure time / wear protective clothing; radiographers / people who take X-rays / dentists; → withdraw from room; people who have X-rays; → control dose / shield part of body; people exposed to radon gas; → check houses / masks / protective clothing;	1 1	
			11	
8	a	Any two from Information / Observations / Drawings of different types of animals and plants; From different countries / islands / on his travels; Fossils;	2	Accept named organism
	bi	Any one from Could support his theory with evidence; Had the support of other scientists; The theory explained phenomena / observations; He could make predictions that were then confirmed;	1	
	bii	This was against their religious beliefs/		

			The church did not agree with the theory / difficult to understand / did not think that the earth was old enough;	1	
	ci		The work of Hutton was difficult to understand / too long; The work of Hutton was not supported by observations / had less evidence; He was not well known / less supported by other scientists;	2	Accept the reverse
	cii		Mutation produces variation / new gene; Organism may be more likely to survive; and so reproduce / produce offspring / breed; pass on genes; population will change over long period of time;	3	Accept survival of fittest MAX 2 without an example
				9	
			total	60	