

Physics A

General Certificate of Secondary Education

Unit **A331/02**: Modules P1, P2, P3 (Higher Tier)

Mark Scheme for June 2011

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Question		Answer	Mark	Guidance
1		<p>effects: damages/kills living cells; can lead to cancer; produces ions/causes ionisation / causes unwanted chemical reactions in cells / removes electrons from atoms; mutations / DNA/genes altered;</p> <p>factors: type of radiation / alpha / beta / gamma; idea of irradiation / contamination; intensity/activity/level/strength of radiation/dose; half-life; time of exposure; distance from source; amount of radioactive material;</p>	4	<p>at least one from each group of ideas is required for 4 marks</p> <p>ignore changes living cells / kills you / damages eyes / any heating effect eg burns or blisters / cells ionised</p> <p>ignore radiation poisoning/sickness, damage to foetus</p> <p>eg breathe in and become contaminated accept how much radiation you get</p>
		Total	4	
2	a	B and F	1	both required, any order accept lower case
	b	D	1	accept lower case
	c	C and E	1	both required, any order accept lower case
	d	E	1	accept lower case
		Total	4	

Question		Answer	Mark	Guidance
3	a	<p>1 mark for correct use of each term eg</p> <p>chain reaction – energy producing reaction / description of chain reaction including neutrons;</p> <p>fuel rod – contains radioactive material / atoms that undergo fission / chain reaction;</p> <p>control rod – absorbs neutrons / idea of movement of control rods altering chain reaction/energy production;</p> <p>coolant – idea of heat/energy transfer;</p>	3	<p>'gives energy' is insufficient</p> <p>ignore cools it down / lowers temperature / stops overheating</p>
	b	2100 million / 2,100,000,000 / 2100000000 / 2.1 billion / 2.1 x 10 ⁹ (1)	1	
	c	gamma, beta, alpha / γ , β , α (1)	1	in this order
Total			5	

Question		Answer	Mark	Guidance
4	a	idea of a correlation between CO ₂ and human activity / CO ₂ and global warming / human activity and global warming (1) idea of disagreement about the cause of global warming / a correlation does not mean a cause (1)	2	accept there is more than one cause of global warming or examples
	b	expansion of water in the oceans <input checked="" type="checkbox"/> <input type="checkbox"/> some places getting colder winters <input checked="" type="checkbox"/> <input type="checkbox"/> melting of icecaps <input checked="" type="checkbox"/>	2	3 correct answers = 2 marks 2 correct answers = 1 mark 0 or 1 correct answers = 0 marks more than three ticks deduct 1 mark for each extra tick
Total			4	

Question		Answer	Mark	Guidance
5	a	X-ray (1) gamma / γ (1)	2	either order
	b	i intensity decreases with distance / fewer photons reach Earth / less radiation reaches Earth(1) photons spread out (from source) (1) so less photons over same area / photons spread over greater area (1)	3	ORA ignore absorption
		ii less; more;	1	both required for one mark
		iii atmosphere/stratosphere (1) absorbed/transmitted (1) reversible (1) living organisms (1)	4	accept any named living organism, including humans/us ignore Earth
	c	any two from: number of people at risk / number of people hurt; severity of the damage; benefits (of getting a tan); financial/business issues; enforceability; age of people at risk / younger people involved; dose / exposure times / intensity levels;	2	accept specific examples of these general ideas allow perceived risk arguments ignore ALARA and precautionary principle 'benefits greater than costs' = 1 mark unless costs are further explained/qualified for finance mark
Total			12	

Question	Answer	Mark	Guidance
6	<p>object in the solar system</p> <p>description</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>asteroids</p> <p>comets</p> <p>moons</p> <p>planets</p> </div> <div style="width: 45%;"> <p>can be large or small, but always orbit planets (1)</p> <p>are usually made of rocks and ice, ... (1)</p> <p>are large and orbit the Sun (1)</p> <p>are very large and produce their own light</p> <p>are usually made of rock, ... (1)</p> </div> </div>	4	<p>one mark for each correct line drawn from a left hand box</p> <p>if two lines start from the same left hand side box then no mark awarded for that box</p>
Total		4	

Question			Answer	Mark	Guidance
7	a	i	<p>types of plant and animal fossils <input type="checkbox"/></p> <p><input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p>rock types <input checked="" type="checkbox"/> (1)</p>	2	
		ii	jigsaw / fit (of continents) (1)	1	<p>allow coasts match</p> <p>allow named continents fit</p> <p>ignore shapes/mountains/fossils/animals/plants/rocks/movement of continents</p>
	b		<p>Wegener could not measure ... <input type="checkbox"/></p> <p><input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Wegener's idea was too big ... <input checked="" type="checkbox"/></p> <p><input type="checkbox"/></p> <p>Wegener was not a geologist <input checked="" type="checkbox"/></p>	2	<p>3 correct ticks for 2 marks</p> <p>2 correct ticks for 1 mark</p> <p>deduct one mark for each additional tick above 3 ticks</p> <p>candidate cannot score less than zero marks</p>
				[5]	

Question		Answer	Mark	Guidance
8		(electromagnetic) radiation (1) distance speed/velocity (of recession) (1) expanding / getting bigger (1) thousand million / (14)000 million / (14),000,000,000 / (14)000000000 / 10^9 / billion (1)	4	accept light / radio waves / microwaves / infra red / ultraviolet both needed for 1 mark , either order allow for 2 marks: Hubble showed - 'brightness of cepheid variables' and 'distance to galaxies' and Universe 'bigger than previously thought'
		Total	4	

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