

# **Mark Scheme for January 2011**

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Question		Answer	Mark	Guidance
1	a	Correct waveform ✓ Uses 12 boxes for one wavelength ✓	2	If several waves should be similar in wavelength and amplitude
	b	Selects and rearranging ( $\lambda = c/f$ ) OR $4.4 \times 10^7 / 2.5 \times 10^9$ ; ✓ $1.76 \times 10^{-2}$ ✓ m ✓	3	0.0176 scores 1 mark
	c	Higher frequency / shorter wavelength / higher energy ✓	1	<b>ACCEPT</b> 'more penetrating' / "ionising"
	d	Gamma / X radiation / uv ✓ Damage to cells / DNA / genetic material ✓ Leading to cancer / other specified relevant health effect ✓	3	ACCEPT alpha, beta NOT "mutate cells" alone ALLOW mutation of DNA IF cell damage mention needs to give some detail e.g. proteins damaged
		<b>Total</b>	<b>9</b>	

Question		Answer	Mark	Guidance	
2	a	Mild/(moderately) warm AND wet (owtte) ✓	1	NOT hot, high temperature NOT constant temperature	
	b	<p>any <b>five</b> from:</p> <p>CO<sub>2</sub> from air/taken in through leaves ✓  H<sub>2</sub>O from soil/taken in through roots ✓  Chloroplasts / chlorophyll ✓  Photosynthesis ✓  Gives details of light dependent OR light independent reactions ✓  This makes glucose / maltose ✓  Glucose is converted to starch ✓</p>	5	<p>If used the following words should be spelled correctly: Photosynthesis, chloroplast, chlorophyll, dependent</p> <p><b>Credit</b> any correctly named enzyme for 1 mark  Mention of respiration is CON for photosynthesis mark (except in context of biosynthesis of starch)</p> <p>Glucose mark can be scored from correct word or symbol equation</p>	
	c	i	Rising / increasing ✓	1	IGNORE extra comments e.g. peaking
		ii	Increased use of fertilisers / higher yielding varieties / increased use of technology / education of farmers / greater <u>demand</u> ✓	1	NOT just "increasing population" unless qualified n.b. could have ecf from c (i) if fluctuations mentioned
		iii	Peaks in <u>1980s</u> / (only) rises until <u>1980s</u> ✓ Then falls ✓ Increasing world population ✓	3	<b>ALLOW (late) 1970s</b>
	d	i	Soil / plants / animals / rock / water ✓	1	<b>ACCEPT sea, rivers</b>
		ii	Leaching ✓	1	<b>ALLOW run-off</b>
		iii	Remains constant ✓ Because input equals output ✓	2	<b>ALLOW "input and output are balanced" NOT "balanced" alone</b>
		iv	Add, (powdered) rock/(powdered) bone ✓	1	<b>ALLOW rock phosphate owtte</b>
	e		Nitrogen / potassium / calcium / magnesium ✓	1	<b>ACCEPT</b> anything reasonable, but not CARBON
			<b>Total</b>	<b>17</b>	

Question		Answer	Mark	Guidance	
3	a	The number of, different/separate, <u>species</u> ✓ (Living) in an ecosystem/area ✓	2	ALLOW amount of, range of, variety of. Must imply a number of some kind Second mark depends on some mention of organisms living in ecosystem	
	b	<i>any four from:</i>  Geographical isolation owtte ✓ Large number of different ecosystems/niches ✓ Description of different niches ✓ Adaptation to different / new conditions ✓ Example of adaptation e.g. different beaks ✓ Reproductive isolation (of <u>adapted</u> organisms) owtte ✓	4		
	c	i	<i>any three from:</i>  Goats eat plants ✓ Plants aren't adapted to cope/some plant species eaten to the point of extinction/ no other large herbivores on island ✓ Competition for food with other animals (herbivores) ✓ Describe any knock on effect on carnivores / whole food chain is affected ✓ So other organisms become endangered/ die <u>out</u> / become extinct ✓	3	Last point depends on valid explanation for organisms dying
		ii	Ecosystems become unsustainable + reasoned argument (owtte) ✓ Extinction of species unique to Scotra AW may mean loss of resources to make medicines etc ✓	2	<b>ACCEPT</b> any reasonable scientific explanation linking food chains to whole ecosystem for first point
<b>Total</b>			<b>11</b>		

Question			Answer	Mark	Guidance
4	a	i	London white/pink ✓ North Sea dark blue ✓ River Thames (pale) blue ✓ Thetford forest (dark) red ✓	2	All correct 2 marks 3 correct, 1 mark North Sea and River Thames need to be different shades of blue
		ii	Show up areas of, poor growth of <u>trees</u> /dead <u>trees</u> / in the forest ✓	1	ACCEPT density of (trees in) forest / deforestation / health of (trees in) forest NOT just reference to vegetation Need to imply that information is about the trees in the forest
		iii	Nitrates cause, algae/vegetation, to grow ✓  <b>plus any two from:</b>  Vegetation will show up as red on image ✓ Water appears as blue ✓ Mixture of Red + blue (= purple) ✓	3	
	b		Thermal ir waves longer (wavelength) / lower frequency(ora) ✓	1	<b>NOT shorter frequency</b>
	c	i	Sunny / clear sky OR hot / warm ✓	1	<b>ACCEPT mild</b>
		ii	So that it looks more realistic ✓	1	ALLOW "to make the clouds look white" (must imply that this is the usual appearance of clouds)
		iii	They are cold ✓  <b>plus any two from:</b>  Cold features emit less infrared ✓ So would appear black on the original image ✓ This is a negative, so look white ✓	3	
<b>Total</b>				<b>12</b>	

Question			Answer	Mark	Guidance
5	a	i	(Green) plants / algae / autotrophs ✓	1	<b>ACCEPT</b> any reasonable suggestion but NOT leaf / nectar
		ii	160 x 12/100 ✓ 19.2 ✓	2	
		iii	Lost as heat / movement / excretion ✓	1	Respiration, reproduction, biosynthesis etc is CON
	b		ANY 3 from: Less food for blackbirds / fewer blackbirds Shrews/foxes/ sparrowhawks must find alternative sources of food ✓ Hence more snails/thrushes/wrens /shrews etc , eaten ✓ Fewer dead leaves removed/broken down / energy doesn't <u>enter</u> food web✓	3	Must include names No marks for simply saying that populations fall (except in case of blackbirds)  NOT just "more dead leaves" unless justified
	c		Oxygen ✓ Respiration / correct word equation or description ✓ These reactions occur in mitochondria (and cytoplasm)✓ The <u>energy from reaction</u> (converts ADP to) ATP / energy transferred to ATP OR ATP <u>breaks down</u> to release / transfer energy✓	4	<b>Credit</b> any correct detail of Krebs Cycle as additional marking point  <b>QWC</b> If used the following words should be spelled correctly: oxygen, glucose, respiration, mitochondria.
<b>Total</b>				<b>11</b>	

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