

Mark Scheme for June 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			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	Aerobic (bacteria);	1	
		(ii)	Carbon dioxide; Water;	2	ACCEPT formula if correct
		(iii)	<u>Anaerobic</u> bacteria / respiration OR <u>aerobic</u> bacteria die / no <u>aerobic</u> respiration; Producing different products / methane / <u>different</u> decomposition process occurs ;	2	ACCEPT any reasonable gaseous product
	(b)		Nitrate/phosphate / ammonia / ammonium;	1	NOT nitrogen, phosphorus, potassium
	(c)		4 marks from: <i>How it works:</i> More O ₂ in the water (by action of reeds); <i>Effects</i> Encourage aerobic bacteria / discourage anaerobic bacteria; So more animals / fish can live in water / AW; <i>How it works</i> Reeds remove nutrients (which encourage algal growth); <i>Effects</i> Discourage algal growth; More plants can grow; More oxygen in the water (<i>linked to more plants growing</i>); More animals /fish can live ;	4	Mention of bacteria oxygenating water is CON for 1 st mark Effects must be linked to some kind of valid reasoning for how it works ACCEPT increased biodiversity Last two marking points can be awarded if not awarded above
	(d)		Thatching / food / biofuel / compost;	1	Any reasonable suggestion NOT fertiliser
			Total	11	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	Correct waveform; Wavelength correctly labelled; Amplitude correctly labelled;	3	Need not be drawn to scale.
		(ii)	2.8 cm = 0.028m; $f = c/\lambda$; 1.07×10^{10} ; Hz;	4	1.07×10^8 scores 2 marks
	(b)		Converts information into a number / digital form; Depending on the intensity of the radiation /the higher the number, the higher the intensity; Numbers are between 0 – 255 / AW <u>number</u> refers to a specific pixel owtte ; Number is converted into a shade of grey / brightness / Higher number = lighter shade of grey ora	4	
	(c)	(i)	Different numbers / ranges of numbers / shades of grey (in the image); Assigned <u>different</u> colours / gives an example of how a colour is allocated;	2	2 nd marking point must be clearly linked to first NOT just reference to grey scale NOT “colour is represented by numbers”.
		(ii)	Conveys more information / easier to understand / more contrast / greater range of colours than of shades of grey;	1	
			Total	14	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	Absorbed: photosynthesis; Released: respiration/decay/burning;	2	QWC All words used should be spelled correctly
		(ii)	Correct plotting 2 marks	2	Deduct 1 mark for each incorrectly plotted point up to a max of 2. Allow +/- half a square IGNORE lines linking points
		(iii)	<u>Released</u> in winter (October-March) AND <u>absorbed</u> in summer (April-Sept); Absorption / plant growth occurs <u>faster (owtte)</u> when there is more sunlight/warmer (ora); Because rate of photosynthesis is greater	3	Must refer to pattern of whole year and mention both released and absorbed ALLOW "winter and autumn" / "spring and summer" / "middle of the year" etc to describe seasons Allow 'more photosynthesis than respiration'
		(iv)	Unusually cold / cloudy / rainy / dry;	1	
	(b)	(i)	Cutting down trees / forest fire / ;	1	Any reasonable suggestion e.g. fertiliser, climate change etc.
		(ii)	Negative; Feedback;	2	
			Total	11	

Question			Expected Answers	Marks	Additional Guidance
5	(a)	(i)	No vegetation: B Vegetation struggling to survive: C Healthy vegetation: A	1	All 3 must be correct for the mark
		(ii)	Healthy vegetation reflects NIR well / do not absorb NIR;	1	NOT emits
	(b)		<i>Any five from:</i> Reflection; By clouds; Scattering; Of blue light; by small molecules / e.g. oxygen, nitrogen; OR of green / red light; By dust etc; OR by clouds (if clouds not mentioned earlier) Diffraction; Caused by interaction of light with edges of objects e.g. of sensor / water droplets / dust particles Visible light no use at night;	5	QWC 1 mark lost for a marking point containing a spelling / significant punctuation error Detail e.g. "by clouds" must be linked to name of process
	(c)	(i)	Mobile phone: microwave; Broadcasting: radio; Remote control: infrared; Reading DVDs: visible light / infrared;	4	
		(ii)	<i>Any two from:</i> Gamma; X ray; UV;	1	
		(iii)	High energy / frequency OR short wavelength;	1	NOT long frequency etc
			Total	13	

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