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RECOGNISING ACHIEVEMENT

GCE

Science

Advanced GCE **G641**

Remote Sensing and the Natural Environment

Mark Scheme for June 2010

Oxford Cambridge and RSA Examinations

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Question			Expected Answer	Mark	Rationale/Additional Guidance
1	a	i	The sun ✓	1	
		ii	Dead plants / dead animals / faeces etc ✓	1	**Accept** any reasonable suggestion
		iii	Bacteria / fungi ✓ Breaks down, (dead) organic matter/biomass/waste ✓ To, recycle/release, nutrients ✓	3	**Accept** minerals, elements etc
	b	i	Amount of energy ✓ Trapped in an ecosystem as biomass ✓	2	AW mass of biomass produced per m^2 per year (= 1 marks) **Not** 'stored / produced' instead of trapped. Energy flow / used is CON for 1st mark
		ii	Open ocean least productive / lakes & streams more productive than oceans ✓ Estuary, most/much more, productive ✓	2	
		iii	*(Comparing lakes, rivers, estuaries with oceans):* Nutrients washed down river/from land/sewage ✓ Encourages growth (of plants / animals / biomass) ✓ *(High productivity of estuaries):* Shallower / warmer ✓ Encourages growth ✓ Tidal /fresh & salt water, present / more ecological niches greater range of organisms/more biodiversity (owtte) ✓	4	1 mark for the factor. 2nd mark for more detail Needs to make it clear which ecosystems are being discussed **Accept** any other reasonable suggestion. Must be qualified for second mark
	c		*any **five** from:* Only one original population of wrens ✓ Populations of wrens became isolated from each other as sea level rose / geographical isolation ✓ Environment different to the original one (owtte) ✓ Unable to breed with each other ✓ Habitats slightly different/ suggestion of different habitats ✓ Become adapted to that habitat by natural selection (AW describes natural selection fully)✓	5	The following words should be spelled correctly if present: Habitat Adapted/adaptation Population Isolation
			Total	**18**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
2	a	i	Chlorophyll ✓	1	
		ii	Chloroplast ✓	1	
	b		Water ✓ Hydrogen atoms ✓ Oxygen (molecules) ✓ ATP ✓	3	Water for the first mark (other substances: CON) then any two of the other 3 marking points. If other products present, CON oxygen mark.
	c	i	430 - 450 nm ✓	1	
		ii	Nanometre ✓	1	**Not** 10^{-9}
		iii	Conversion of nm to m ✓ f= c/λ ✓ 7.5×10^{14} ✓ ecf from conversion Hz ✓	4	If no conversion to nm, answer = 7.5×10^{5} scores 2 marks
			Total	**11**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
3	a		ROYGBIV (or reverse)✓	1	
	b	i	Dust particles / water droplets / molecules of water / O_2 / N_2 ✓	1	
		ii	Blue / Violet ✓ It has the shortest wavelength ✓	2	Marking points unrelated (accept lowest / smallest wavelength)
	c		(the energy absorbed) heats the, Earth/land/oceans ✓ Radiated / emitted ✓ As infrared ✓	3	**NOT** just "heat is absorbed" **Accept** thermal radiation
	d		$5.2 \times 10^{24} \times 30/100$ ✓ 1.56×10^{24} ✓	2	**Accept** 1.6, not 1.5
	e	i	uv has higher frequency ✓	1	
		ii	Cell damage / DNA mutation ✓ Sunburn / (skin) cancer / cataracts ✓	2	
			Total	**12**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
4	a		In the cytoplasm ✓	1	
	b	i	1 mark for each correct row ✓ ✓ ✓ CO_2 and O_2 : Between phosholipid mols & simple diffusion Glucose: protein channel & simple diffusion &/or active transport	3	
		ii	Glucose + oxygen → carbon dioxide + water ✓	1	**Ignore** 'energy'
		iii	Correct mention of ATP ✓ Biosynthesis (owtte) / correct named cellular process / active transport ✓	2	**Not** 'movement' unless specific cell specified e.g. muscle. Not photosynthesis for biosynthetic process
	c	i	When they lack oxygen ✓	1	
		ii	Less energy produced/ toxic / harmful waste products ✓	1	**Not** just 'lactic acid'
		iii	Lactic acid / ethanol / alcohol / methane / CO_2 ✓	1	
			Total	**10**	

Question			Expected Answer	Mark	Rationale/Additional Guidance
5	a	i	The spreading out of <u>waves</u> ✓ After they pass an, obstacle/gap (in a barrier) ✓	2	**Not** 'bending' 2nd marking point independent of first
		ii	Semicircular arc ✓ Wavelength remains the same ✓	2	
		iii	Less curvature of wavefront / owtte ✓	1	**Not** bends less
	b		3 rays correctly drawn (needs to work!) with ∠i = ∠r AND mirrors labelled✓ Travels in straight lines (ruler drawn) ✓ Explanation: Remote control <u>emits</u> (infrared) radiation owtte ✓ Reflection (occurs at the mirrors)✓	4	**QWC** Either *emitted/emits* or *reflection/reflected* spelled correctly Interpret angles generously
			Total	**9**	

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