

GCE

Science

Unit **G641**: Remote Sensing and the Natural Environment

Advanced Subsidiary GCE

Mark Scheme for June 2016

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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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Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	= alternative and acceptable answers for the same marking point
(1)	= separates marking points
not	= answers which are not worthy of credit
reject	= answers which are not worthy of credit
ignore	= statements which are irrelevant
allow	= answers that can be accepted
()	= words which are not essential to gain credit
—	= underlined words must be present in answer to score a mark
ecf	= error carried forward
AW	= alternative wording
ora	= or reverse argument

Annotations: the following annotations are available on SCORIS.

✓	= correct response
✗	= incorrect response
bod	= benefit of the doubt
nbod	= benefit of the doubt not given
ECF	= error carried forward
^	= information omitted
I	= ignore
R	= reject

Highlighting is also available to highlight any particular points on the script.

Question		Expected Answers	Marks	Additional Guidance
1	a	Excretion (AW) from the ducks; Run-off / leaching from the land;	2	IGNORE fertilizers
	b	i	4	ACCEPT phosphate treated samples grew the least NOT phosphate inhibits/reduces growth (without a comparison) Comparison needed - not just 'grew a lot' Accept reference to just one of the sites D,E,F or G e.g. grew best at F
		ii	2	IGNORE reference to phosphate MUST be talking about experiment
	c	i	3	Any formula must be correct
		ii	1	
			12	

Question			Expected Answers						Marks	Additional Guidance
2	a	i		infrared	microwave	radiowave	ultraviolet	visible	2	4 correct = 2 marks 3 or 2 correct = 1 mark 1 or 0 correct = 0 mark Extra tick loses mark
			Has the longest wavelength			x				
			Has the shortest wavelength				x			
			Has the highest frequency				x			
			Has the lowest frequency			x				
		ii	Speed;						1	Allow transverse wave
	b	i	<u>Thermal</u> infrared;						1	
		ii	TWO from: White indicates more (intensity of) infrared; (so) Y is hotter (than surroundings); (cannabis farm here since) heat needed to grow plants;						2	Any reference to 'reflected' CON White areas are hotter 1 mark Y emits more infrared 1 mark
		iii	Reference to the link between the intensity of radiation and the shade of grey/brightness of a pixel; Any two from: Radiation emitted by hot object; Detected by sensor/ CCD; Converted into numbers;						3	Not just hotter = white Accept 0 - 255
	c		Ionising/ high energy/high frequency (radiation); Damages DNA causing cancers;						2	Accept other named large molecules NOT just 'mutation'
								11		

Question			Expected Answers	Marks	Additional Guidance
3	a	i	REFLECTION: Reflected ray correctly labelled; Angle of incidence = angle of reflection; REFRACTION: Refracted ray correctly labelled; Bent towards the normal;	4	Accept any angle between 40° and 60°
		ii	Wave(front)s closer together/ shorter wavelength; Because they slow down;	2	
	b	i	Light waves with a similar wavelength to the gap; Waves/wavefronts spread out/bend/distort/ change shape; Make the gap is bigger;	3	Information can be in the form of diagrams, but must be labelled to show similar wavelength and gap. If the aperture is simply a obstacle, there must be distortion around it
		ii	Blurred image; At edges;	2	
				11	

Question		Expected Answers	Marks	Additional Guidance
4	a	Energy cannot be created or destroyed; Only transferred from one form to another;	2	Accept: Input = output Accept 'converted'
	b	i A carbon dioxide/water; B water/carbon dioxide; C glucose/oxygen; D oxygen/glucose;	2	A and B correct: 1 mark C and D correct: 1 mark Accept correct formulae
		ii H (sun)light; J chemical/ATP;	2	
		iii As starch/biomass;	1	Accept chemical energy/glucose
	c	i 47%;	1	
		ii Respiration/active transport; Create biomass/biosynthesis;	2	ALLOW : movement/muscle contraction NOT growth or heat
	d	i Bacteria/fungi;	1	Ignore qualification of bacteria Allow earthworms
		ii Lack of oxygen/waterlogging/ too dry/too cold; Then any 2 from: Dead material/waste doesn't rot/break down/ builds up; Nutrients not recycled/lack of nutrients; Poor growth of plants/poor productivity;	3	Accept any sensible suggestion Accept: named dead material Accept named nutrient Accept plants unhealthy Mention of energy poorly recycled CON NOT less photosynthesis
			14	

Question		Expected Answers	Marks	Additional Guidance
5	a	Strong sunlight; High temperatures/warm; High rainfall/wet;	3	
	b	i		
		The variety/number of species/ different organisms; Living in an ecosystem;	2	NOT amount
		ii		
		<ul style="list-style-type: none"> • Different adaptations needed for different conditions (AW) • Wide range of climates/ecosystems; • Many different niches within ecosystems OR named examples of niches; • (Ecosystems) very productive/climate encourages growth of vegetation; • Extensive food webs in different niches OR named examples; • Geographical isolation; • Rivers run into different oceans, so different species in each; • mixture of species from North & South America 	5	<p>ALLOW: named examples of more than one type of climate/ecosystem</p> <p>ALLOW: description of high productivity/ lots of photosynthesis</p> <p>QWC: If used the following terms should be spelled correctly: Niche adaptation habitat isolation</p>
	c	Global warming/climate change/decreased rainfall; Reduce growth of plants/(plant or animal) species die; OR Deforestation/logging; Removal of habitats/ extinction of species; OR Hunting/fishing; Extinction of animals; OR Tourism; Destruction of habitats/ damage wildlife;	2	Accept reference to forest fires if they are deliberate
Total			12	

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