

# **Mark Schemes for the Units**

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**January 2009**

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

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### Advanced Subsidiary GCE Science (H178)

#### MARK SCHEMES FOR THE UNITS

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# G641 Remote Sensing and the Natural Environment

Question		Expected Answers	Marks	Additional Guidance
1	(a)	Cancer / birth defects / death / AVP ;	1	
	(b) (i)	Correct waveform ; Correct labelling of wavelength ; Correct labelling of amplitude ;	3	Labelling of wavelength must be exact
	(ii)	$\frac{3 \times 10^8}{2 \times 10^{-12}} = 1.5 \times 10^{20} \text{ Hz/s}^{-1}$	3	
	(c)	any <b>four</b> from: Some individuals / species in a population are better able to cope with gamma radiation than others (owtte) ; CON if implies adaptation has occurred since the accident ; Survive (long enough to reproduce) ; Reproduce ; Characteristic passed on to the offspring ; Future generations possess the ability to survive ;	4	Ora
	(d)	any <b>two</b> from: Many (prey) animals diseased / deformed (owtte), so more food for wolves ; Other predators (e.g. humans, bears) may have died, therefore more food / less competition ; No human interference, so wolves not killed ;	2	
		<b>Total</b>	<b>13</b>	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	A = nitrogen fixing ; C = decomposition ; D = denitrification ;	3	
		(ii)	A,C & D only ;	1	
	(b)		Addition of (chemical) fertiliser / manure / organic matter ; Increases the amount of nitrate / ammonium compounds / nutrient elements ; Increases growth of plants / increases uptake ; <b>OR</b> Harvesting of plants / removal of animals ; Reduces the amount of nitrate / ammonium compounds / nitrates lost by leaching / run off ; Reduces growth of plants ;	3	Allow ploughing
	(c)		Encourages growth of algae / eutrophication ;  Prevents sunlight reaching <u>lower depths</u> ; Algae / plants die ; Decompose ; Bacteria use up O <sub>2</sub> ; Fish / other creatures unable to survive ;	4	First point only awarded if algae or eutrophication is spelled correctly
	(d)		Phosphorus / potassium / magnesium / calcium ;	1	
<b>Total</b>				<b>12</b>	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	B ;	1	
		(ii)	<i>Aerobic</i> : carbon dioxide / water <u>vapour</u> ; <i>Anaerobic</i> : methane ;	2	<i>Anaerobic</i> : <b>allow</b> CO <sub>2</sub> (in yeast) N <sub>2</sub> (denitrification) NH <sub>3</sub>
		(iii)	<i>Aerobic</i> : produces much more energy ; <i>Anaerobic</i> : doesn't need oxygen ;	2	<i>Aerobic</i> : <b>allow</b> no toxic products / reference to a high number of ATP molecules
	(b)	(i)	Diffusion / passive transport / moves down a concentration gradient ; Involving protein (molecule) ;	2	
		(ii)	Glucose reacts with oxygen / respiration ; In the mitochondria / cytoplasm ; ATP ; (Mobile) energy source/ broken down to ADP / used in some named cellular process ;	4	
<b>Total</b>				<b>11</b>	

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	Night time / no reflected sunlight/visible light ;	1	<b>accept</b> it's dark
		(ii)	Infra red still emitted ; CON clouds are emitting infra red	1	<b>AW:</b> clouds and land are at different temperatures
	(b)	(i)	We expect to see clouds depicted as white (owtte) / clouds show up better ;	1	
		(ii)	They're cold ;  plus any <b>two</b> from: Cold features emit less infrared ; So would appear black on original image ; This is a negative, so appear white ;	3	<b>AW:</b> clouds have different temperatures; Different shades of grey; + one of the remaining points
	(c)	(i)	Frequency lower / smaller ;	1	<b>Allow</b> wavelength longer
		(ii)	(Radar beam is) scattered ;	1	(allow reflected)
		(iii)	The nature of the surface / terrain / how bumpy it is (owtte) ;	1	
	(d)		any <b>three</b> from: Absorption (in the atmosphere) ; Scattering (in the atmosphere) ; Diffraction ; Pixel density / area of land covered by one pixel ; ( <b>QWC:</b> deduct 1 mark for incorrect spellings)	3	
			<b>Total</b>	<b>12</b>	



# Grade Thresholds

Advanced GCE Science H178  
January 2009 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
G641	Raw	60	46	40	35	30	25	0
	UMS	90	72	63	54	45	36	0

For a description of how UMS marks are calculated see:

[http://www.ocr.org.uk/learners/ums\\_results.html](http://www.ocr.org.uk/learners/ums_results.html)

Statistics are correct at the time of publication.

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