

Applied Science

Advanced GCE A2 H575/H775

Advanced Subsidiary GCE AS H175/H375

Mark Schemes for the Units

June 2007

H175/H375/MS/R/07

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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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MARK SCHEMES FOR THE UNITS

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Mark Scheme G622
June 2007

Question		Expected Answers	Mk	Additional Guidance	
1	a	electrocardiogram / ECG ;	1	allow electrocardiograph and recognisable phonetic	
	b	scale reading / 0.8 ; $\frac{1 \quad \times \quad 60}{0.8}$; 75 ;	3	scale +/- 0.01 Answer only = 3 marks ecf	
	c	0.35 ;	1		
	d	<i>two from:</i> QRS expanded / extended; T expanded / extended; T depressed / flattened; slower heart rate / beat ; time values ; ;	4	2 from 4 statements (some comparison) PLUS appropriate/relevant time values unless specified assume statement relates to B QRS A = 0.06 ca. 0.2 QRS B = 0.12 ca. 0.3	
	e	i	fibrillation / VF ;	1	allow phonetic
		ii	death ;	1	allow cardiac arrest
Total			11		

Question			Expected Answers	Mk	Additional Guidance
2	a	i	ACCEPT on or between values 0.16 – 0.18 ; per second / s ⁻¹ / bps	2	ACCEPT on or between values 9.75 – 10.8 ; per minute / min ⁻¹ / bpm;
		ii	ACCEPT values on or between 0.5 – 0.75dm ³ ; 4.89 / 4.9 dm ³ ;	2	
		iii	15 – 18 breaths per minute / bpm ; 0.4 – 0.5 dm ³ / l ;	2	ALLOW single value or correct range for both ALLOW 400 – 500 cm ³ or ml
		iv	lungs healthy / belong to fit person ; BR at lower end of range 10 – 18 bpm / TV at top end of normal range 0.4 – 0.5 / VC higher than normal 4.25 for female ;	2	ecf if data incorrect in (i) (ii) (iii)
	b	<i>four from:</i> ribs (and sternum) raised / up and out; by contraction of (external) intercostal muscles; diaphragm lowered / contracted / flattens volume thorax / lung increases; pressure decreases; below atmospheric pressure / pressure gradient;	4		
c	i	alveoli / alveolus;	1	ALLOW phonetic	
	ii	<i>two from three:</i> fewer walls / walls broken / fewer air spaces / air spaces bigger ; dark patches / scar tissue / deposits / 'growths' ; surface area statement ;	2	answer relates to diseased unless stated otherwise ALLOW any reasonable observation	
	iii	<i>four from:</i> air and blood separated by thin walls; diffusion ; gradients exist; [oxygen] higher in air than in blood; [carbon dioxide] higher in blood than in air; (net) diffusion oxygen into blood; (net) diffusion carbon dioxide in to air;	4	ALLOW as AVPs: small diffusion distance; reference to gases dissolving in moisture on surface membrane ;	
	iv	BR faster / greater number; shallower / less;	2		
d	<i>five from:</i> (spirometer) with medical grade oxygen ; left full with taps closed ; ensure subject sitting down / at rest ; mouthpiece rinsed in antiseptic solution / sterilised ;	5			

		<p>mouthpiece placed in subject's mouth ; nose clip in place / breathing through nose only ; tap open to atmosphere ; start recorder ; tap turned to connect subject to spirometer (at end of outward breath) ; record normal breathing for about 1 minute ; ask subject to breathe in as deeply as possible ; resume normal breathing for a few breaths ; breathe out as far as possible ; normal breathing for a few minutes ;</p> <p><i>appropriate use of English ;</i></p> <p><i>spelling, punctuation and grammar ;</i></p>		<p>not disjointed</p> <p>2 ALLOW one error for each</p>
		Total	28	

Question		Expected Answers	Mk	Additional Guidance												
3	a	<table border="1"> <thead> <tr> <th>feature</th> <th>anaerobic</th> <th>aerobic</th> </tr> </thead> <tbody> <tr> <td>substrates</td> <td><i>glucose</i> ;</td> <td><i>glucose + oxygen</i> ;</td> </tr> <tr> <td>products</td> <td>[lactic acid (lactate)]</td> <td><i>carbon dioxide + water</i> ;</td> </tr> <tr> <td>number of ATP</td> <td>2 ;</td> <td>38 ;</td> </tr> </tbody> </table>	feature	anaerobic	aerobic	substrates	<i>glucose</i> ;	<i>glucose + oxygen</i> ;	products	[lactic acid (lactate)]	<i>carbon dioxide + water</i> ;	number of ATP	2 ;	38 ;	5	[1 mark for each completely correct cell] [ACCEPT whole number from range 32 – 38 for aerobic]
		feature	anaerobic	aerobic												
		substrates	<i>glucose</i> ;	<i>glucose + oxygen</i> ;												
		products	[lactic acid (lactate)]	<i>carbon dioxide + water</i> ;												
number of ATP	2 ;	38 ;														
b	<p><i>six from:</i> <i>rate of blood flow:</i> increases ; heart rate increases ;</p> <p><i>composition of blood:</i> correct change in [O₂] (decrease) / [CO₂] (increase) / [lactate] (increase ; related correctly to muscle activity ;</p> <p><i>oxygen debt:</i> lactate build up; anaerobiosis ; AVP ;</p>	6	AVP e.g. use of creatine phosphate / use of oxygenated myoglobin													
c	i	1 cannabinoids / amphetamines / cocaine / caffeine / methadone/ morphine / diamorphine (heroin) ; 2 anabolic steroids / anabolic androgenic steroids / e.g. nandrolone / e.g. stanozolol / beta-blockers / erythropoietin /EPO ;	1 1	extras 1 alcohol / nicotine / ketamine extras 2 caffeine / ketamine												
	ii	<p><i>four from:</i> blood sample / sample taken ; red / white cell count ; using haemocytometer / automatic counter ; count compared to standard ; packed cell volume ; repeat ;</p>	4	ACCEPT injection signs												
		Total	17													

Question		Expected Answers	Mk	Additional Guidance	
4	a	both use x-rays (to generate images) ;	1		
	b	MRI uses magnetism (to generate images) ;	1		
	c	i	<i>two from:</i> (high levels) of radiation; accumulative; hazardous / cause mutation / cancer / foetal damage / AW ;	2	
		ii	to build up an image of a thin slice through the body / to generate 3D outcome ;	1	
	d	<i>advantage:</i> better resolution of soft tissue or organs / obtain 3D image ; <i>disadvantage:</i> expense / higher levels of radiation necessary / not portable / not widely available;	2		
	e	e.g.s [Haz] noisy (given) [Risk] deafness /ear damage / panic; [S.Prec] ear-plugs / muffs / headphones / music / calming music / protection of ears ; [Haz] magnetism (and metal) e.g staples, earrings, pace maker ; [Risk] MRI not allowed therefore diagnosis may be incomplete / jewellery may be 'sucked into' machine/cause damage to machine and or patient ; [S.prec] interview / medical records / remove jewellery ;	5	[ALLOW any valid combination of H, R and S.P]	
f	<i>three from:</i> age of patient ; patient rating / cost-benefit; medical need; quality of life outcome; 'post code'; private v NHS;	3			
		Total	15		

**Mark Scheme G623/01
June 2007**

Planning Exercise

The effect of temperature on the population growth of a culture of a Cyanobacterium e.g. *Anabaena* or a member of the Chlorophyta e.g. *Chlamydomonas* or *Chlorella*.

Marking of the plan:

- 1 Read the material presented.
- 2 Then *award 1 mark* if *scientific terminology* has been used appropriately.
Record using the letter Y.
- 3 Then re-read, this time point marking up to 24, by placing letters A to X in the margin where you see evidence of the marking criteria.
- 4 The same piece of evidence can be used to award one criterion only.

Marking Point	Marking Criteria	Mark	Additional notes
A	easily recognised safety procedures highlighted;	1	Evidence of something that is going to make doing the investigation safer – an active document, a working document <u>related</u> to the plan. Reject anything 'over the top'.
B	prediction made;	1	Prediction related to task.
C	with justification;	1	Use evidence
D	description of preliminary work;	1	At least one from:
E	clear and in detail;	1	Explain how to do it.
F	reason (for doing it) explained;	1	Explain why it's necessary for completion of the whole investigation.
G	clear and in detail;	1	Extra information/suitable extension.
H	at least two secondary sources of information identified;	1	State at least 2 references. Full website address needed. Full description of named text (Title, Author, Publisher.)
I	relevance explained;	1	Brief explanation as to how references helped in the planning.
J	basic practical skills and accuracy;	1	Simple method / list of instructions. Basic. 'Is it a feasible approach?'
K	sound practical skills and accuracy; (may also look for evidence of 'P' here)	1	Could someone follow the instructions unaided? Are quantities shown? Is it repeatable to appropriate degree of accuracy?

Preliminary work here

Main investigation starts here

dilution factors, how to set up dilution series; range of dilution to consider; suitable population density for counting; incubation time; volume/type of vessel; light source; source of organism;

L	range of appropriate equipment listed;	1	List of names of main items of equipment and materials needed for the investigation. Generic terms: beakers, flasks etc are OK here.
M	full range of appropriate equipment listed;	1	Qualifications noted. Indication of number of each, specific sizes, e.g. 250 cm ³ beaker, 1dm ³ flask. If any major item is missing do not award.
N	appropriate number of measurements stated;	1	Mentions replicates / repeats
surface area (exposure)O	need for range of measurements stated;	1	Statement: reason for range chosen
P	appropriate range stated;	1	5 values to provide a sensible range e.g. not to include 100°C unless therm bacteria etc. have been discussed somewhere
Q	relevant variables are identified (stated); controlled variables	1	At least 2 from:
R	how variables to be controlled explained;	1	Explanation for at least 2 of the variables.
S	one suitable method to display data;	1	One display of results e.g. Table with appropriate column headings
T	additional method to display data;	1	Any <u>different</u> display e.g. graph.
U	simple data handling;	1	Mean / use of graph data
V	possible conclusions;	1	Statements of expectations or observations to confirm or reject prediction made in B . 'What would the results need to show to confirm or reject the prediction?'
W	recognises sources of error;	1	At least two examples: equipment / materials / specific human error.

Variables
age of sample; time of incubation; surface area (exposure); light intensity; light wave length; carbon dioxide conc'n; nutrient solution; source of algae; initial mass/volume / population

X	suggests methods for improving accuracy and or validity;	1	Accuracy: relate to 'W' or use of alternative technique(s). AND/OR Validity: state aspect of collected data to be compared with secondary sources.	<p>Accuracy: precision of water bath</p> <p>Validity: comparison with secondary source</p>
Marks	Maximum for plan = 25	24 + 1 (<i>scientific terminology</i>)		

**Mark Scheme G623/02
June 2007**

GENERAL ADVICE TO ASSISTANT EXAMINERS ON THE PROCEDURES TO BE USED

1. The schedule of dates for the marking of this paper is of paramount importance. It is vital that you meet these requirements. If you experience problems then you must contact your Team Leader without delay.
2. Please ensure that you use the **final** version of the Mark Scheme which will be available at the end of the Examiner's Standardisation meeting. You are advised to destroy all draft versions.
3. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words which appear in the detailed sheets which follow. If the science is correct and also answers the question then the mark(s) should normally be credited. If you are in doubt about the validity of any answer then contact your Team Leader for guidance.
4. Mark in red. A tick (✓) should be used, at the appropriate point, for each answer judged worthy of credit.
5. Correct answers to calculations always gain full credit even if no working is shown (The 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
6. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
7. The mark total for each question should normally be ringed at the bottom right hand side.
8. In cases where candidates give multiple answers, mark the first answer(s) up to the total number required. In specific cases where this simple rule cannot be applied, the exact procedure to be used will be given in detail at the Examiners' Standardisation meeting.
9. Some questions may have a 'Level of Response' mark scheme. Details of these are given in Appendices attached to this Mark Scheme.
10. If an answer has been crossed out and no alternative answer has been written then mark the answer crossed out.
11. **Abbreviations, annotations and conventions** used in the detailed Mark Scheme

/	=	alternative and acceptable answers for the same marking point
;	=	separates marking points
NOT	=	answers which are not worthy of credit
()	=	words which are not essential to gain credit
	=	(underlining) key words which must be used to gain credit
ecf	=	error carried forward
AW or owtte	=	alternative wording
Ora or vv	=	or reverse argument

12. Abbreviations to be used when marking

^	=	omission mark
bod	=	benefit of the doubt
nbod	=	benefit of the doubt not given
ecf	=	error carried forward
W	=	working towards credit, but not awarded the mark
Con	=	contradiction (Cases where candidates contradict themselves in the same response)

Question			Expected Answers	Mk	Additional Guidance	
1	a	i	correct plots;;; [deduct 1 mark for each error] line of best fit;	4		
		ii	e.c.f read off value from graph;	1		
		iii	<i>six from:</i> osmosis; differences of concentration of solvent occur; idea of effect on direction of ; diffusion / movement of water; cell membrane; selective/differential permeability; definition of water potential; water potentials in equilibrium; mass water gained by tissue = mass water lost; isotonic ;	6		
		iv	sample masses at start different/ AW	1	ACCEPT: idea to 'enable valid comparison'	
	b	i	hydrolase;	1	R amylase	
		ii	condensation;	1		
		iii 1	Benedict's / Fehling's;	1	phonetic	
		iii 2	(brick-) red / orange (precipitate)	1	ACCEPT green	
	Total				16	

2	a		feature	student m'scope	electron microscope	7	ACCEPT comparison (words or numbers) for 1 mark correct units for 1 mark
			beam	light	electron (beam)		
			lenses	glass	electromagnets / magnetic field		
			specimen	dead or alive	dead		
			max mag	answer in range 100 - 400	500 000		
			approx resolution	(lower) / 200 nm	(higher) / 0.5 nm		
b	i	<i>two from:</i> carries ribosomes; transports protein; makes Golgi; makes lipids / steroids;				2	
		aerobic respiration / Krebs's cycle / oxidative phosphorylation; makes A.T.P;				2	
		<i>two from:</i> have enzymes (peptidyle transferase) to link the peptide chain; make protein; translation (of protein);				2	
Total					13		

3	a	<p>measurement of scale = 38 (mm);</p> <p>m'ment between arrows = 47.5 / 48 (mm);</p> <p>ratio = $\frac{10}{38} \times 47.5$;</p> <p>value = 12.5 μm ;</p>	4	<p>if either of first two marking points incorrect then apply e.c.f max 2 or 3 accordingly</p> <p>ACCEPT 48 mm as second marking point. It will give correct value = 12.6 μm</p>	
	b	i	<p>too slow / laborious /counts live and dead cells;</p> <p>sample too small ;</p>	2	
		ii	<p><i>three from:</i></p> <p>counts 'particles' (live cells, dead cells and inanimate particles);</p> <p>automatically ;</p> <p>A.V.P about Coulter Counter ;</p> <p>perfusion viability approx. 100 % ;</p> <p>count obtained more accurate because more of the particles counted will be living cells;</p>	3	max. 2 marks on technique
Total			9		

4		<p><i>five from:</i></p> <p>religious beliefs</p> <p>possibility of error arising during testing;</p> <p>human rights issues including employment;</p> <p>insurance;</p> <p>mortgage facilities;</p> <p>whether or not to pursue elective abortion;</p> <p>how serious a defect has to be before elective abortion might be considered;</p> <p>cost-effectiveness of screening;</p> <p>AVP ; ; ;</p> <p><i>appropriate use of English ;</i></p> <p><i>spelling, punctuation and grammar ;</i></p>	5	
			2	QWC approp. use of English : look for 'flow'. ALLOW 1 error for each of spelling and grammar.
Total			7	

Mark Scheme G628
June 2007

Question	Expected Answers	Mark
1 a	ACCEPT values of less than 1500 °C	1
b	the cement mixture may not be homogeneous / uniform in composition	1
c i	in the absence of moisture / sealed vessel; cement absorbs / reacts with water	2
c ii	date of manufacture / batch number / irritant	1
d	gives accurate results; 'easy' / 'quick' / small quantities are needed	2
e i	<p style="text-align: center;"> concentration of calcium / mg dm⁻³ emission reading conc of <u>calcium</u> emission reading 5.0 17 0.29 10.0 32 0.31 15.0 52 0.29 </p> <p>correct answers; two significant figures</p>	2
e ii	0.30 (mg dm ⁻³)	1
e iii	0.30 x 43 = 12.9 (mg dm ⁻³)	1
e iv	mass of calcium = 1290 (mg)	1
e v	mass of calcium = 1.29 g; % of Ca = $\frac{1.29 \times 100}{2.00} = 64.5 / 65$	2
f i	so that the result is accurate	1
f ii	to remove all traces of impurities	1
f iii	to ensure that the material was completely dry	1
f iv	<p>mass of Si in the yellow precipitate = $\frac{1.23 \times 43.71}{100}$ = 0.538;</p> <p>% of silicon in the cement sample = $\frac{0.538 \times 100}{2.56}$ = 21.0;</p>	1 1
g i	scientific books / journals; electronic sources	1 1
g ii	better mixing / faster reaction	1

Ques 1 (cont) h i	any four from	1
	add the cement to the water ;	1
	stir / form a paste;	1
	description of how it is decided when setting has occurred;	1
	repeat and average times; AVP	1
	QWC organise relevant information clearly and coherently, using specialist vocabulary when appropriate; ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear;	1
h ii	temperature varied / different proportions of water and cement	1
i	when the slag is made in the Blast Furnace carbon dioxide is produced	1
j	correct figures; values arranged in ascending order	2
k	advantage – comparatively little energy is required; disadvantage – very corrosive materials are used	1 1
l	any two from e.g. Portland cement breaks down very easily in acidic conditions; geopolymer is largely unaffected by acids; consideration of GGBS with the two acids	2
m	e.g. the quantities of the reactants and water needed; period of mixing before removal	2
Total		38

Question	Expected Answers	Mark
2 a	it grows very fast	1
b i	any four from same concentration (ACCEPT amount) of fertiliser used; same watering regime; kept under the same (temperature) conditions; test carried out for the same time period; same amount of light	4
b ii	any two from measure the height of the plant; satisfactory colour of leaves / stem; measure thickness of stem; count number of shoots	2
b iii	the type of fertiliser used	1
b iv	different varieties may need different fertilisers; the climatic conditions are different from those used in the test	2
c i	height = $\tan 31^\circ \times 30 = 0.6 \times 30 = 18 \text{ m}$	1
c ii	less accurate, as there will be a greater percentage error in reading the angle than in measuring the distance	1
c iii	circumference = $\frac{\text{height}}{58}$; = $\frac{20}{58} = 0.34 \text{ m}$;	2
d	40 000 = 200 x 200 200 poles in 100 m ; therefore 0.5 m apart	2
e i	the insecticide circulates through the sap of the plant	1
e ii	the insects are poisoned by sucking the sap; since they are very small it is difficult to spot the mites when a contact insecticide is used	2
e iii	any three from the ingredients are safe to use; inexpensive; biodegradable; mites cannot build up a tolerance to it; can be made 'at home'	3
f	dig a trench / use impervious material (to prevent rhizomes growing through)	1
g	find the risks in using it (ACCEPT protective clothing)	1

Ques 2 (cont) h	keep the length of the poles constant between the two supports ; have the same number of nodes in each pole	2
i i	the highest % is in the outer stem	1
i ii	it <u>contains</u> potassium carbonate NOT is potassium carbonate	1
j i	length of pipe = 59cm	1
j ii	as the frequency increases the length of the pipe decreases or vice versa	1
Total		30

Question	Expected Answers	Mark
3 a	sieve / centrifuge	1
b i	gloves / use of a fume cupboard	1
b ii	the oil is less dense than the acid layer	1
b iii	description / drawing of a separating funnel; correct description of its use (ACCEPT other appropriate methods)	2
c	use of a press / description of solvent extraction (and solvent removal) / AVP	1
d i	use a longer tube / use a wider tube / cover the end of the tube (loosely) / use anti-bumping granules	1
d ii	the reaction is too slow / may not work (needs qualifying)	1
e i	a solid which forms when two solutions are mixed	1
e ii	use of a (named) acid-base indicator / pH paper ; result showing a high pH if sodium hydroxide still present	2
f i	there is no / less danger of fire ; the heating rate is more easily controlled	2
f ii	to condense the solvent	1
f iii	to run off concentrated lavender oil	1
f iv	so that the oil is free from solid plant material	1
f v	any two from internal heating; method of recycling the solvent; a method of cooling and recycling the water in the condenser; continuous addition / removal of flowers	2
g	any three from safe to use on the body; does not react with the ingredients in the soap; does not fade on standing; dissolves evenly in the soap	3
h	the shavings have a larger surface area, water is lost more quickly	1
Total		22

Mark Scheme G635
June 2007

Question	Expected Answers	Mark
1 a	sound	1
b	(visible) light / radio / microwaves	1
c	any 5 from velocity all same; velocity 3×10^8 (m s ⁻¹); light greater frequency / radio smaller frequency; light significantly greater frequency / radio significantly smaller frequency; radio greater wavelength / light smaller wavelength; radio significantly greater wavelength / light significantly smaller wavelength	5
d i	radio waves more penetrating; accept valid exception e.g. light can go through metal grid / mesh	1
d ii	e.g. brick is penetrated by radio waves	1
e i	any 2 appropriate points e.g. wave has electric field; wave (energy) / field makes electrons move along the rod / aerial; (radio / TV) waves are transverse; oscillating field produces oscillating / electric signal; max 1 mark for answer relating to transmitting aerial	2
e ii	any 4 appropriate points written or in diagram e.g. (radio / TV) waves are transverse; radio / television waves are polarised; direction of polarisation depends on aerial at the transmitting station; receiver orientation must match transmitter; stations have different directions of polarisation to avoid interference; e.g. horizontal aerial will not pick up signal from a vertical transmitter in adjacent region	4
Total		15

Question	Expected Answers	Mark
3 a i	radioactive / Gamma emitter / tracer / specific example e.g. technetium	1
a ii	<p>any 3 appropriate points e.g.</p> <p>half life; 6 hours \pm / long enough for investigation to be carried out, not so long the patient continues to be exposed to high levels of radiation after investigation is completed;</p> <p>desired radiation only; no α or β;</p> <p>energy; within range for which camera is most sensitive / ca. 140kV;</p> <p>non-toxic; avoid poisoning patient</p> <p>amount; does not cause harm / minimise dose / detectable / depends on function / organ;</p> <p>biological half life; excretion affects time in body / long enough for investigation to be carried out, not so long the patient continues to be exposed to high levels of radiation after investigation is completed</p>	6
b i	collimator made of lead; parallel (or slightly converging or diverging) lines representing holes; indication of rays passing through collimator / patient & detector positions / parallel rays	3
b ii	any 3 from: improves (spatial resolution); position of source more precisely known; absorbs γ photons not parallel to channels	2
b iii	reduces (sensitivity); by large factor / because some of gamma rays absorbed by lead / absorbed rays going in unwanted directions / only rays in desired direction get through	2

c	<p>2 components from scintillator / crystal; to convert the γ energy to visible photons;</p> <p>photomultiplier; to convert visible photons to electronic signal;</p> <p>acceptable alternatives; photocathode; to transfer the photon energy to photoelectrons;</p> <p>dynodes; to multiply the number of electrons / amplify the signal;</p> <p>scintillation counter; to convert the γ energy to an electrical signal;</p> <p>associated circuitry; to analyse / process the information screen; to display the image;</p> <p>software / mechanical components; appropriate purpose</p>	4
d i	<p>she is radioactive / emitting γ / harmful rays; important to avoid children being exposed to radiation / radiation hasn't died away</p>	2
d ii	<p>biological half life; excretion / respiration of (radioactive) material</p>	2
Total		22

Question	Expected Answers	Mark
4 a	suitable number of cycles of (sine) wave shown; amplitude of wave varies; at least one modulation cycle shown	3
b	suitable number of cycles of (sine) wave shown; frequency of wave varies; at least one modulation cycle shown	3
c	interference / attenuation of the signal affects amplitude; frequency unaffected by interference	2
d	square waves shown; two (or more) <u>discrete</u> levels	2
e	two valid points (text or diagram) e.g. interference causes degradation of wave shape; because shape is known it can be restored; less prone to noise	2
f	signal consists of 0 & 1 (OWTTE); problem occurs when the detector can't distinguish between the two values / signal cannot be interpreted	2
g	any 4 appropriate points e.g. faster transfer of information / data; telephone <u>bandwidth</u> much less than broadband; telephone bandwidth <4 kHz [ACCEPT any value 1 - 10 kHz]; broadband bandwidth several M Hz [ACCEPT any value 1 - 10 MHz]; sound quality much better; more information carried by greater bandwidth; so higher / greater range of audio frequencies transmitted QWC ALLOW one error in each of spelling, punctuation and grammar	4 1
h	sound waves (we hear) are analogue	1
Total		20

Question	Expected Answers	Mark
5 a i	any 2 appropriate points e.g. the available spectrum is split up into (uniform) chunks of bandwidth; each call is on a separate frequency	2
a ii	any 2 appropriate points e.g. a narrow frequency band is spilt into time slots; each call is given a certain portion of time (at the designated frequency)	2
a iii	any 2 appropriate points e.g. each signal is coded; each signal is spread over the entire bandwidth; at the receiver the code is used to recover the signal	2
a iv	a version of TDMA; international standard (in Europe, Australia and much of Asia and Africa) different frequency band used in United States; different SIM cards used in different countries	2
a v	any 2 appropriate points e.g. a technique for expressing an analogue signal digitally / analogue signal is divided into sections; each voltage level is represented by a binary code / given a number	2
b	<p><i>full duplex:</i> one frequency for talking / transmitting and one for listening / receiving; so both people can talk / transmit at once;</p> <p><i>half duplex:</i> same frequency for talking / transmitting and for listening / receiving; so only one person can talk / transmit at once (ACCEPT any indication this is understood)</p>	4
Total		14

**Advanced GCE Applied Science AS (H175, H375) and
GCE Applied Science A2 (H575, H775)
June 2007 Assessment Session**

Portfolio Unit Threshold Marks (AS)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of candS
G620	Raw	50	40	35	30	25	21	0	1518
	UMS	100	80	70	60	50	40	0	
G621	Raw	50	40	35	30	25	21	0	1640
	UMS	100	80	70	60	50	40	0	
G624	Raw	50	40	35	30	25	21	0	289
	UMS	100	80	70	60	50	40	0	
G625	Raw	50	40	35	30	25	21	0	250
	UMS	100	80	70	60	50	40	0	
G626	Raw	50	40	35	30	25	21	0	393
	UMS	100	80	70	60	50	40	0	

Examined Unit Threshold Marks (AS)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of candS
G622	Raw	90	66	57	48	39	31	0	1629
	UMS	100	80	70	60	50	40	0	
G623	Raw	90	66	57	48	40	32	0	573
	UMS	100	80	70	60	50	40	0	

Portfolio Unit Threshold Marks (A2)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of candS
G627	Raw	50	40	35	30	25	20	0	648
	UMS	100	80	70	60	50	40	0	
G629	Raw	50	41	36	31	26	22	0	304
	UMS	100	80	70	60	50	40	0	
G630	Raw	50	40	35	30	25	21	0	122
	UMS	100	80	70	60	50	40	0	
G631	Raw	50	40	35	30	25	20	0	97
	UMS	100	80	70	60	50	40	0	
G632	Raw	50	40	35	30	25	20	0	117
	UMS	100	80	70	60	50	40	0	
G633	Raw	50	40	35	30	26	22	0	272
	UMS	100	80	70	60	50	40	0	
G634	Raw	50	40	35	30	25	20	0	299
	UMS	100	80	70	60	50	40	0	

Examined Unit Threshold Marks (A2)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of candS
G628	Raw	90	61	55	49	43	38	0	412
	UMS	100	80	70	60	50	40	0	
G635	Raw	90	55	48	41	34	27	0	452
	UMS	100	80	70	60	50	40	0	

Specification Aggregation Results

Uniform marks correspond to overall grades as follows.

Advanced Subsidiary GCE (H175):

Overall Grade	A	B	C	D	E
UMS (max 300)	240	210	180	150	120

Advanced Subsidiary GCE (Double Award) (H375):

Overall Grade	AA	AB	BB	BC	CC	CD	DD	DE	EE
UMS (max 600)	480	450	420	390	360	330	300	270	240

Advanced GCE (Single Award) (H575)

Overall Grade	A	B	C	D	E
UMS (max 600)	480	420	360	300	240

Advanced GCE (Double Award) (H775)

Overall Grade	AA	AB	BB	BC	CC	CD	DD	DE	EE
UMS (max 1200)	960	900	840	780	720	660	600	540	480

Cumulative Percentage in Grade

Advanced Subsidiary GCE (Single Award) (H175):

A	B	C	D	E	U
1.5	9.0	26.7	54.1	78.1	100.0
There were 946 candidates aggregating in June 2007.					

Advanced Subsidiary GCE (Double Award) (H375):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	2.0	4.9	10.4	21.8	33.2	49.2	61.6	78.5	100.0
There were 346 candidates aggregating in June 2007.									

Advanced GCE (Single Award) (H575):

A	B	C	D	E	U
0.8	8.8	28.0	62.9	89.3	100.0
There were 375 candidates aggregating in June 2007.					

Advanced GCE (Double Award) (H775):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	0.8	4.7	10.1	20.6	37.4	58.8	76.3	91.8	100.0
There were 277 candidates aggregating in June 2007.									

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication.

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