

Applied Science

Advanced Subsidiary GCE (Double Award) **A2 H375**

Advanced Subsidiary GCE **AS H175**

Mark Schemes for the Units

June 2006

H175/H375/MS/R/06

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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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Advanced Subsidiary GCE Applied Science (H175)

MARK SCHEMES FOR THE UNITS

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Mark Scheme G622
June 2006

Question		Gd	Expected Answers	Mk	Additional Guidance	
1	a	e/u	<u>right</u> atrium;	1		
	b	e/u	body / vena(e) cava(e);	1		
	c	i	e/u	<i>two from:</i>	2	ACCEPT converse if qualified
		1 2	e	(B) thinner; less muscle; no Purkyne fibres;		
		ii	e/u	chamber B / left atrium collects qualified / pumps qualified; chamber C/left ventricle collects qualified / pumps qualified;	2	
	d		e	1. D / right ventricle pumps blood to lungs;	4	
			d c c c b	2. C / left ventricle pumps blood to the body; 3. shorter distance to lungs / converse qualified; 4. less muscle required in chamber D / less force needed to pump blood to lungs / OWTTE / converse;	2	
			QWC: organisation; appropriate use of English;			
e		e	X inside right atrium;	1	anywhere inside atrium excluding valve region	
f		e	controls events of cardiac cycle / initiates contraction (of the atria) / acts as pacemaker / sets rhythm for other cardiac muscle cells / OWTTE;	1		
g		e	Y. lungs;	3	anywhere but on all four	
		e d	Z. body; correct directional arrows for <u>all four</u> lines;			
Total				17		

Question	Gd	Expected Answers	Mk	Additional Guidance
2	e/u e/u e d d d c c b	<p><i>any ten points from:</i></p> <p>1 material / procedure max 1: e.g. plating Petri dishes / blood test;</p> <p>2 hazard max 1: culture may contain infective microbes;</p> <p>3 what could go wrong max 2: inhale spores / cells; get contaminated; transfer mechanism problems / spillage; penetrate / physical injury;</p> <p>4 safety precautions max 4: wear gloves / mask; reference to sterilisation; reference to following protocols; seal culture bottle / Petri dish/keep Petri dish lid at angle over plate / good technique / evidence of good practice;</p> <p>5 in case of accident max 2: wash / sterilise; inform someone;</p> <p>6 risk explained max 1: any level provided explanation correct;</p> <p>7 regulations max 1: safe disposal of plates / cultures / media;</p>	10	<p>if incorrect context: 1. and 2. = 0 therefore max. 8</p> <p>award 1 mark for each section covered, then look for 3 additional marks within 3. , 4. and 5. up to max for each</p>
Total			10	

Question			Gd	Expected Answers	Mk	Additional Guidance	
3	a	i	e e	<i>tidal volume female:</i> 0.4 to 0.5 / correct value within range; <i>vital capacity male:</i> 4.6 to 6.0;	2		
		ii	e	spirometer / phonetic;	1		
	b		e	15–18 / correct value between limits;	1	whole number only	
	c	i	e	<i>Richard lung ventilation:</i> 6(.0);	2		
			e	<i>James' breathing rate:</i> 30;			
		ii	e/u	low qualified / lower / under;	1		
	d	i	1	e/u	trachea;	3	[any order] ACCEPT phonetic REJECT bronchial tubes REJECT windpipe
			2	e/u	bronchus / bronchi;		
			3	e	bronchioles;		
		ii	b a a	0.2 – 0.15; 0.05 x 30; 1.5;	3	ecf from Table 3.2	
	iii	c b a a	<i>four from:</i> 1. physical exercise demands extra supply of oxygen; 2. Richard's alveolar ventilation OK (more than double James'); 3. Richard's muscles would receive extra oxygen; 4. James' muscles would be starved of oxygen; 5. switching to anaerobic respiration; 6. likely that James not able to take part / fatigues faster; 7. AVP e.g. accurate ref to lactic acid / longer aerobic;	4	ora ecf from d(ii) may alter argument		
Total					17		

Question		Gd	Expected Answers	Mk	Additional Guidance
4	a	1	e <i>hormone:</i> insulin;	1 +	1 mark for name and 2 marks for explanation for each hormone
		2	c promotes storage of glucose in liver / stores / c converts glucose as / to glycogen / increases glucose uptake by fat cells; reduces blood glucose concentration;		
			e <i>hormone:</i> glucagon; glucagon promotes conversion of glycogen to glucose / converts fat / non-carbohydrates to glucose; c increases blood glucose concentration;	1 +	if no name mark explanations if incorrect hormone explanation 0
	b	i	e/u d <i>two from:</i> 1. wash hands; 2. choose left hand finger / thumb as skin softer (converse for LHPerson); 3. obtain blood sample / prick finger / use lancet; 4. add blood to enzyme kit / self monitoring reagent strips; 5. names, Accu-chek® / Clinistix®; 6. drop of blood must cover test area completely; 7. colour measured by spectrophotometer / against chart / through machine; AVP;	2	
		ii	c <i>four from:</i> b 1. reagent strip / meter is a biosensor / b transducer; a 2. glucose oxidase oxidises glucose present in blood sample; 3. one of the products is hydrogen peroxide; 4. hydrogen peroxide reacts with dye; 5. peroxidase involved; 6. standardisation / OWTTE; 7. dehydrogenase / oxidase reaction emits an electrical signal this is converted into digital readout; 8. AVP;	4	NB peroxidase is not involved in the digital meter
	c	i	e <i>glucose appears in urine:</i> more than 9.0 / correct value;	1	REJECT value above double figures
		ii	c <i>two from:</i> a management / treatment; (fasting level indicates) normal / blood sugar control normal / healthy; (glucose in urine means) blood concentration above renal threshold / OWTTE / person diabetic qualified / just eaten large CHO meal / unhealthy; AVP;	2	
Total				15	

Question			Gd	Expected Answers	Mk	Additional Guidance
6	a	i	e/u e/u	2(.0) ; °C;	2	
		ii	e/u e/u e e	<i>four from:</i> e.g. 1. increase in body temperature after exercise; 37.5 to 39.0 / 1.5 °C OR 37.8 to 39.8 / 2.0 °C; e.g. 2. acclimatised final temperature lower; 39.0 (acc) 39.8 (unacc); e.g. 3.. unacclimatised got to 39 °C in half the time / converse; 45 mins before acclim. and 90 mins after; e.g. AVP;;	4	trends are 'vertical' through the table. If not 'vertical' award data marks only.
		iii	e	before acclimatisation 75 mins / 39.3 / before acclimatisation 60 mins / 39.5;	1	numbers alone OK since both are unique values
	b		d d c c	after acclimatisation heart rate lower for all time periods; e.g. 118 cf 120; bigger decreases with longer exercise periods; e.g. 2 at 0 and 37 at 90 mins;	4	comparative not descriptive statements. look for comparatives then check for data. award one comparative 'across' the table and one 'vertically'.
	c	i	e	less oxygen / lower pressure / thinner;	1	
		ii	b b a a	<i>four from:</i> 1. in short races muscles operate anaerobically; 2. oxygen not limiting factor / OWTTE; 3. therefore performance/times not affected by lower oxygen availability; 4. in longer races more ATP required; 5. more oxygen required for aerobic respiration; 6. oxygen was a limiting factor / OWTTE; 7. performance/times were affected; 8. AVP;	4	
Total					16	

Total for written paper = 90 marks

**Mark Scheme G623
Planning Exercise
June 2006**

Planning Exercise

Comparison of the sugar content of four varieties of apple to include two varieties of dessert and two varieties of cider apple.

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 related to the plan.
B	prediction made;	1	Prediction related to comparison in task.
C	with justification;	1	Statement related to sugar concentration for the varieties chosen.
D	description of preliminary work;	1	E.g. how to prepare tissue / mass of tissue to be used / colour standards / investigation of sugars involved
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.
H	at least two secondary sources of information identified;	1	State at least 2 references. Full website address needed. Full description of named text
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;	1	Could someone follow the instructions unaided? Are quantities shown? Is it repeatable to appropriate degree of accuracy?
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 missing do not award.
N	appropriate number of measurements stated;	1	Mentions replicates / repeats
O	need for range of measurements stated;	1	Statement: e.g. 'To enable comparison to be made.
P	appropriate range stated;	1	Related to prediction made.
Q	relevant variables are identified (stated);	1	At least 2 from: age of tissue / mass of tissue / volume of juice / temperature used for test / volume of Benedict's or equiv. reagent / concentration of Benedict's or equiv. reagent / time
R	how variables to be controlled explained;	1	How for at least 2 of the variables.
S	one suitable method to display data;	1	One display of results e.g. Table.
T	additional method to display data;	1	Any <u>different</u> display e.g. graph.
U	simple data handling;	1	mean / colour comparison / use of graph data
V	possible conclusions;	1	Statements of expectations or observations to confirm or reject prediction made in B . 'What would your results need to show to confirm or reject your prediction?'
W	recognises sources of error;	1	At least two examples: equipment / materials / specific human error.
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.
Marks	Maximum for plan = 25	24 + 1	(<i>scientific terminology</i>)

Mark Scheme G623
June 2006

Question		Gd	Expected Answers	Mk	Additional Guidance
1	a	e/u e/u e/u e	A fires / produces (beam) of electrons; B focusing / narrowing (beam) electrons / OWTTE C objective (electromagnetic) lens; D projects / focuses (image) onto screen / plate / OWTTE;	4	ACCEPT fires and receives
	b	a	air molecules stop electrons / beam / ref to anything that obstructs the beam;	1	
	c	e/u e c	<i>(advantage)</i> detailed view of cell ultra-structure/ higher resolution or magnification / OWTTE; <i>(disadvantage) two from:</i> specimen dead; sections much thinner; staining more difficult / lengthy prep / requires expertise; preparation of material may produce artefacts / distort the material / image; expensive to buy / operate; large / must be operated in a special room; image black and white;	1 2	
Total				8	

Question		Gd	Expected Answers	Mk	Additional Guidance
2	a		<p>d <i>five from:</i> d probe with two electrodes; d placed into culture; c one electrode enclosed in glass tube; b electrical current flows / passes through culture / sample; between electrodes; narrow entrance / small hole in glass tube; cell(s) passing through hole; alters current / conductivity inside probe; size of 'entrant' also influences deviation / OWTTE; deviation recorded;</p>	5	
	b		<p>e <i>two from:</i> e quicker; can be automated / set up and left / easier; reduces chance of human error; permanent record / print out;</p>	2	REJECT more reliable REJECT more accurate
	c		<p>a <i>two from:</i> a both / either named techniques register(s) dead cells; probe registers air bubbles / particles as well as cells; dilution problem with respect to haemocytometer;</p>	2	
Total				9	

Question		Gd	Expected Answers	Mk	Additional Guidance
3	a	e e d	<i>three from:</i> because it affects more than one organ / part of the body; respiratory system / lungs; digestive system / gut / pancreatic duct / intestine / pancreas; reproductive system;	3	
	b	e d c	<i>three from:</i> mucus blocks airways preventing movement of air; gas exchange impaired; (cellular) respiration impaired; breathing problems / physically difficult / persistent coughing / wheezing / asthma-like symptoms; need for regular physiotherapy / drug treatment; increased risk of lung infection; unable to take part in sports activities etc;	3	use OWTTE for each of marking points
		c b b	<i>three from:</i> prevents release of pancreatic juice / named pancreatic enzymes; digestion of food impaired; damage to pancreas; poor absorption; gut blockage; nutritional deficiency; symptoms similar to diabetes; poor growth; prevents neutralisation of stomach acids;	3	
c		e	<i>mutation</i> change in the DNA / change in genetic code / abnormal gene;	1	
		d c	<i>coding</i> <i>two from:</i> base / nucleotide sequence / order; specific order; 3 DNA bases for each amino acid; codon; named bases; coding bases equivalent to gene;	2	
		d	<i>recessive</i> expressed only when homozygous / expression prevented by dominant allele / OWTTE;	1	

Question		Gd	Expected Answers			Mk	Additional Guidance
4		e/u e/u e/u e/u e/u e/u	iodine;	purple / blue / black (colour);	<i>(starch present)</i>	6	
			alcohol <u>and</u> water ; OR Sudan III;	cloudy / milky / emulsion; OR red colour;	<i>(fat present)</i>		
			Biuret (reagent) / sodium hydroxide <u>and</u> copper sulphate;	claret / lilac / purple;	<i>(protein absent)</i>		
Total					6		

Total for written paper = 45 marks

**Advanced GCE Applied Science AS (H175, H375)
June 2006 Assessment Series**

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of candS
G620	Raw	50	40	35	30	25	20	0	947
	UMS	100	80	70	60	50	40	0	
G621	Raw	50	40	34	29	24	19	0	979
	UMS	100	80	70	60	50	40	0	
G622	Raw	90	69	60	51	42	34	0	1017
	UMS	100	80	70	60	50	40	0	
G623	Raw	90	71	62	53	45	37	0	447
	UMS	100	80	70	60	50	40	0	
G624	Raw	50	40	35	30	25	20	0	143
	UMS	100	80	70	60	50	40	0	
G625	Raw	50	40	35	30	25	20	0	248
	UMS	100	80	70	60	50	40	0	
G626	Raw	50	40	35	30	25	20	0	264
	UMS	100	80	70	60	50	40	0	

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
H175	300	240	210	180	150	120	0

	Maximum mark	AA	AB	BB	BC	CC	CD	DD	DE	EE	U
H375	600	480	450	420	390	360	330	300	270	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total nos of candidates
H175	1.2	9.6	26.7	52.1	80.4	100.0	543

	AA	AB	BB	BC	CC	CD	DD	DE	EE	U	Total nos of candidates
H375	0.5	1.0	3.8	9.6	16.7	26.8	38.8	58.9	70.3	100.0	248

For a description of how UMS marks are calculated see;
www.ocr.org.uk/OCR/WebSite/docroot/understand/ums.jsp

Statistics are correct at the time of publication.

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