OCR
RECOGNISING ACHIEVEMENT
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GCE

Applied Science

Advanced GCE **A2 H575/H775**

Advanced Subsidiary GCE **AS H175/H375**

Mark Schemes for the Units

January 2010

H175/H375/MS/R/10J

Oxford Cambridge and RSA Examinations

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MARK SCHEMES FOR THE UNITS

G622 Monitoring the activity of the human body

Question			Expected Answers	Marks	Additional Guidance
1	a	i ii iii	Nerve, impulse/transmission ✓ Active, transport/secretion/uptake ✓ Metabolic reactions ✓	3	**ALLOW** named examples e.g. motor neuron transmission **ALLOW** synthesis / making proteins, synthesis / making glycogen (from glucose) **ALLOW** swimming sperm/ beating cilia/ cell division = metabolic reactions **IGNORE** general references to characteristics of living things e.g. nutrition, digestion, excretion, breathing
	b		*Aerobic:* mitochondrion / mitochondria ✓ *Anaerobic:* (cell) cytoplasm ✓	2	*Aerobic:* **ACCEPT** any correct named part of a mitochondrion e.g. inner membrane/folded membrane/crista/matrix
	c		38 ✓ Glucose ✓ 2 ✓ Carbon dioxide / CO_2 ✓ Water / H_2O ✓ Lactic acid ✓ Glycogen ✓	7	**ALLOW** carbon dioxide (and) water in any order **ACCEPT** lactate = lactic acid **REJECT** CO2/CO^2 and other formulae must be correct
	d	i	(Exercise) increases (blood lactic acid levels) ✓ Correct data quoted for athlete 1 OR athlete 2 / both increase by 1.4 / both increase by same amount/ athlete 1 goes up from 0.6 to 2.0/ athlete 2 goes up from 0.4 to 1.8 ✓	2	OWTTE **IGNORE** reference to units

Question			Expected Answers	Marks	Additional Guidance
1	d	ii 1	***respiratory*** *-* ***one*** *problem* ***&*** *explanation from:* Asthma / narrow airways ✓ Less oxygen reaching (muscle) cells / less oxygen for respiration / more anaerobic respiration / respiration rate reduced ✓ **OR** Lung disease / damaged , ribs / diaphragm / lungs ✓ Less oxygen reaching (muscle) cells / less oxygen for respiration / more anaerobic respiration/respiration rate reduced ✓	2	**ALLOW** any correct problem & explanation linked to the named problem – **IGNORE** location of response(s) within each pair of marks Correct problem = 1 mark Correct explanation linked to problem = 1 mark
		ii 2	***circulatory*** *-* ***one*** *problem* ***&*** *explanation from:* Atherosclerosis / fatty deposits in walls of arteries ✓ Less oxygen / glucose reaching (muscle) cells / less oxygen for respiration/ less oxygen for respiration / less carbon dioxide leaving (muscle) cells / more anaerobic respiration / respiration rate reduced ✓ **OR** Heart disease / faulty valves / damaged blood vessels / damaged heart ✓ Less oxygen / glucose reaching (muscle) cells / less oxygen for respiration / less carbon dioxide leaving (muscle) cells / more anaerobic respiration / respiration rate reduced ✓ **OR** Anaemia/low red blood cell count✓ Less oxygen / glucose reaching (muscle) cells / less carbon dioxide leaving (muscle) cells / more anaerobic respiration / respiration rate reduced ✓	2	**ALLOW** any correct problem/explanation linked to the named problem – ignore location of response(s) within each pair of marks **IGNORE** less oxygen (unqualified) Correct problem = 1 mark Correct explanation linked to problem = 1 mark **IGNORE** weak heart
			Total	**18**	

Question			Expected Answers	Marks	Additional Guidance
2	a		***Benefits*** *– any* ***two*** *from:* Non-invasive / does not require surgery ✓ Is not painful ✓ Can distinguish bones easily / good bone resolution ✓ Does not take a long time to carry out ✓ Obtain results quickly ✓ Relatively cheap/ cheaper ✓ Portable units available ✓ ***Risks*** *- any* ***two*** *from:* Dosage can accumulate ✓ Can cause mutations / cancer ✓ Electric shock ✓ (Poor soft tissue resolution) potential for incorrect diagnosis✓	4	**ACCEPT** widely-available✓ **ACCEPT** dense tissue = bones **IGNORE** cheap / specialist needed **IGNORE** too many X rays **ACCEPT** damage to unborn baby **IGNORE** woman may be pregnant

Question			Expected Answers	Marks	Additional Guidance
2	b		**[Level 1]** Candidate shows a high level of understanding and gives a full explanation of the principles of X ray radiography, including **at least four** valid points expressed clearly and logically. There is no more than one spelling error. **4 – 5 marks** **[Level 2]** Candidate shows an understanding, explaining the basic principles of X ray radiography, including **at least two** valid points expressed clearly and logically. There may be occasional errors in spelling. **2 – 3 marks** **[Level 3]** Candidate shows a basic understanding of X ray radiography, including at least **one valid point**, poorly expressed. Errors of spelling may be intrusive. **1 mark** **valid points** include: • X-ray / radiation , through body to film/plate A/W • (Radiation) produces an image (on the film) • Bones / denser material , absorb more radiation • Soft tissues absorb less radiation A/W • Different tissues absorb different amounts of X-rays • Image dark where most gets through/ shadow image/ bones white or light grey/ bones give better resolution • X-ray film/ computerised image saved as a record	**5**	**ACCEPT** photographic film **REJECT** photographic image **ACCEPT** greater/lower atomic mass
	c		*any **one** from :* MRI provides contrast between different soft tissues ✓ MRI can reveal lesions or disease in, muscle tissue / ligaments / tendons/ soft tissues ✓ MRI can identify damaged nerves ✓	**1**	**REJECT** gives a 3D image **IGNORE** better resolution (unqualified)

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>2</td><td>d</td><td></td><td>
any two from five:
<table>
<tr><th>hazard</th><th>risk</th><th>safety</th></tr>
<tr><td>high/ harmful/ ionising radiation (sources) ✓</td><td>DNA/nucleic acid/genes damage / cancer / mutation ✓</td><td>expose for short periods of time / covered most of body ✓</td></tr>
<tr><td>patient may be claustrophobic ✓</td><td>stress factor/ induce claustrophobia ✓</td><td>use for short time intervals / relax or sedate the patient / A/W ✓</td></tr>
<tr><td>narrow tube / machine/ obese patient ✓</td><td>stress factor/ claustrophobic patient ✓</td><td>use for short time intervals / relax or sedate the patient / A/W ✓</td></tr>
<tr><td>high voltage / faulty machine / parts move ✓</td><td>physical injury ✓</td><td>frequent equipment checks ✓</td></tr>
<tr><td>operator error ✓</td><td>DNA damage / physical injury of patient ✓</td><td>(update) technician training / use supervision ✓</td></tr>
<tr><td>injected, contrast material ✓</td><td>allergic response ✓</td><td>check for allergies ✓</td></tr>
<tr><td>noise of machine ✓</td><td>stress factor / claustrophobic patient / deafness ✓</td><td>wear head phones / play background music</td></tr>
</table>
</td><td>6</td><td>Mark across each row – responses must be linked

Risk and safety marks must relate to the relevant hazard

Look for the correct hazards, look for related risks = 1 mark for each (max. 2)

Look for the correct risks, look for related safety precautions = 1 mark each (max. 2)

IGNORE unqualified radiation – but continue to allocate marks for risk and safety, as appropriate</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>16</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
3	a		A B **C** tricuspid/atrioventricular, <u>valve</u> ✓ D **E** pulmonary artery ✓ F **G** bicuspid/atrioventricular/mitral, <u>valve</u> ✓ **H** left ventricle ✓	4	For **C, E and G** – if left/right used – must be correct **ACCEPT** AV = atrioventricular
	b		*Any **one** from:* Right chambers are seen on the left side ✓ Pulmonary artery overlaps the aorta near the heart ✓ Thicker left ventricle wall is seen on the right side ✓ Pulmonary artery leaves the right ventricle, seen on the right side ✓ Aorta leaves the left ventricle, seen on the left side ✓	1	**ALLOW** any clear reference to a left hand structure seen on the right side.
	c		*any **one** from:* Adrenaline – increases the heart rate ✓ Thyroxin – increases the heart rate ✓	1	Correct hormone **and** correct affect on heart rate linked to hormone = 1 mark **ACCEPT** epinephrine / dopamine – increases the heart rate. **ACCEPT** acetylcholine (within the parasympathetic system) – decreases the heart rate.

Question			Expected Answers	Marks	Additional Guidance
3	d		*Any **three** from:* Heart muscle, is myogenic / can contract automatically ✓ Heart rate is controlled by the SAN/ acts as a pacemaker✓ SAN is affected by the, sympathetic/parasympathetic nerves / autonomic nervous system ✓ Sympathetic nerves speed up the heart rate ✓ Parasympathetic nerves slow down the heart rate ✓ Medulla sends impulses to the SAN✓	3	**IGNORE** – additional references to Purkyne tissue/AVN **IGNORE** medulla sends messages/tells SAN to change
	e	i	ECG / electrocardiogram ✓	1	**ACCEPT** electrocardiograph
		ii	4.0 squares (on graph paper) / 0.8s to 0.85s between each beat/ 60 ÷ 0.8(to 0.85) A/W✓ 75 (beats per minute) ✓	2	**ALLOW** correct response within range from 70 to 78 (beats per minute) = 2 marks
		iii	***For trace B** - *any **two** from:* Spikes (points R) are, higher / greater ✓ Troughs (points S) are, deeper / greater ✓ Beats are closer together / faster heart beat rate ✓ Only clear ridge between spikes (not clear points P and T) ✓ Spikes (points R) are at different heights ✓ Irregular pattern at point T ✓	2	**ALLOW** vice versa for trace A. must state the trace (either A or B) clearly, if not, 1 mark max. **ACCEPT** correct value for beats per minute i.e. more than 70 beats per minute (accepted range for A) **ACCEPT** correct references to atrial systole, ventricular systole and diastole – clear explanation needed = 1 or 2 marks possible
		iv	(Ventricular) fibrillation / myocardial infarction / heart attack ✓	1	**REJECT** stroke
		v	(Another) heart attack / die ✓	1	
			Total	16	

Question			Expected Answers	Marks	Additional Guidance
4	a		(Tidal volume =) 0.5 (dm^3) ✓ (Breathing rate) = 12 (breaths in 1 minute) ✓ Correct use of given equation / VR = 0.5 dm^3 x 12 breaths ✓ = 6 ($dm^3\ min^{-1}$) ✓	4	Do not accept e.c.f **ALLOW** correct final response (6) = **4 marks**
	b		The spikes / depth of inhalations / tidal volume, would increase A/W The distance between the spikes would be decreased / more inhalations / more breathes per minute/breathing rate increased A/W✓	2	OWTTE **IGNORE** reference to ventilation rate
	c		5 (dm^3) ✓	1	**ALLOW** range 4.8 to 5.2 dm^3
	d	i	Speed / rate of expired air / air breathed out ✓ OWTTE	1	**IGNORE** force/peak flow
		ii	*Any **two** from:* (Patient/subject) Susan takes as deep as breath as possible/taking a deep breath ✓ (Patient/subject) Susan blows out as hard as possible ✓ AVP ✓	2	**ALLOW** only one AVP including zero meter (before use) ✓ hold horizontally ✓ take a maximum of three (ignore reference to average) ✓ at rest ✓ sterilise mouth piece ✓ put lips firmly over the mouth piece ✓ **IGNORE** blowing out hard (unqualified)
		iii	The (peak flow) rate will be, reduced / become less ✓ Less air is inhaled / less air in the, pathways / trachea / lungs, to be exhaled (into the meter)/ less air breathed, in/out ✓	2	OWTTE **IGNORE** oxygen/air received (passive process)

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>4</td><td>e</td><td>i</td><td><table><tr><td>D</td><td>B</td><td>C</td><td>A</td></tr></table>D adjacent to and before B ✓
B adjacent to and before C ✓
C adjacent to and before A ✓</td><td>3</td><td>1 mark for each correct sequence – max. 3</td></tr>
<tr><td></td><td></td><td>ii</td><td><table><tr><td>alveolus</td><td>X</td><td>X</td><td>X</td><td>X</td></tr><tr><td>bronchus</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>large bronchiole</td><td>X</td><td>✓</td><td>X</td><td>✓</td></tr><tr><td>trachea</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr></table></td><td>4</td><td>one mark for each correct row

crosses (X) and / or ticks (✓) must be shown on each row to be awarded each mark</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>19</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
5	a		*Cause:* Diminished production of insulin / damage to pancreas ✓ *Treatment:* Treated with insulin, <u>injections / pump</u> ✓	2	
	b		*Cause:* Resistance to the effects of insulin / linked to genetic factors / heredity/ lack of insulin production as, beta/pancreatic, cells are, damaged/exhausted ✓ *Treatment:* Treated / controlled, with dietary adjustment/ more fibre/ less sugar/ less fat/ glucose-lowering pills A/W ✓	2	**IGNORE** unqualified less insulin produced **ACCEPT** weight-loss diets **IGNORE** balanced diet/ pills (unqualified)/ diet (unqualified)
	c		*Any **one** from:* Type 2 diabetes (involved) ✓ Excess sugar, carbohydrate, fats, in diet causes problems in insulin production, recognition ✓	1	OWTTE
	d	i	*Any **one** from:* Food (is likely to) contain(s), glucose/sugar ✓ Increases the, glucose/sugar, levels in the blood ✓ No way of controlling the levels at the start of the test ✓ Adds an (unnecessary) variable to the test ✓	1	OWTTE **ACCEPT** cannot, work out / calculate, fasting glucose level
		ii	*Any **one** from:* Gives a point of comparison between patients ✓ Allows a valid test to be carried out ✓ So that changes in blood glucose levels can be monitored ✓	1	OWTTE **IGNORE** references to accuracy
		iii	(50 x 1.75) = <u>87.5</u> (g glucose in a drink) ✓	1	

Question			Expected Answers	Marks	Additional Guidance
5	d	iv	(Person) **Z** is normal ✓ Little change to blood glucose levels/ stay within the normal range (during test period) ✓ (Person) **Y** is a mild diabetic ✓ Glucose levels increase but start to decrease / do not increase to the highest levels ✓ (Person) **X** is a severe diabetic ✓ Glucose increases to highest levels/ does not decrease during test period/ starts at a much higher level ✓	**2** **2** **2**	Evidence statement must relate to the correct letter for person. **ALLOW** correct references to values from graph. OWTTE for all explanations
		v	*Any **three** from:* Blood sample is taken/ prick the finger ✓ Biosensor dipped into blood ✓ See a colour change / digital reading ✓ AVP e.g. reference to, timing / frequency, of tests ✓	**3**	OWTTE
	e	i	*Any **two** from:* Bacteria / viruses (in blood) ✓ HIV / named infectious disease (via blood transfer) ✓ Excessive sampling ✓ (Hypodermic) needle/ sharps ✓	**2**	**ACCEPT** pathogens **Reject** germs **IGNORE** contamination **ACCEPT** infection/ disease (unspecified) **IGNORE** AIDS **ACCEPT** damage to, skin / blood vessels/ bruising **ACCEPT** accidental damage to person taking sample

Question			Expected Answers	Marks	Additional Guidance
5	e	ii	*Any **two** from:* Use of, antibiotic swabs / cleaning agents ✓ Use only, clean / sterilised, needles ✓ Put an, 'elastoplast' / cover, over the puncture site ✓ Take samples from different parts of body ✓ Safe disposal of used needles ✓ Trained person (patient/ medical staff) taking samples ✓ Wearing (protective) gloves ✓ Apply pressure to puncture wound ✓	2	**ACCEPT** qualified staff
			Total	21	

G623/01 Cells and Molecules - Plan

Planning Exercise
Determination of vitamin C content of *two* species of kiwi fruit.

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. **At least three** from: ref to allergic reactions/DCPIP/glassware/knives/electrical hazards
B	prediction made ✓	1	Prediction related to a comparison between ***two*** varieties/species of fruit.
C	with justification ✓	1	Statement related to vitamin C concentration for the varieties chosen (ref to source material/secondary data)
D	description of preliminary work ✓	1	e.g. how to prepare tissue / mass of tissue to be used / type of tissue /dilution factors/ suitable range of DCPIP concs for standards/ prep of colour standards / ratio of core/flesh to use;
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. Accept ref to interpolation of standard curve to determine concentration of vit C if production of standards is preliminary work.
H	at least two secondary sources of information identified ✓	1	State at least 2 references. Accept OCR insert as one ref source. Full website address needed. Full description of named text
I	relevance explained ✓	1	Brief explanation as to how references helped **in the planning**.

Marking Point	Marking Criteria	Mark	Additional notes
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. Limit to 'L' if no kiwi fruit.
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 (kiwi fruit) do not award.
N	appropriate number of measurements stated ✓	1	Mentions replicates / repeats – a minimum of two repeats;
O	need for range of measurements stated ✓	1	Statement: e.g. 'To enable a comparison to be made between two species of fruit against conc standards and ensure reliability of results'
P	appropriate range stated ✓	1	Related to prediction made. Ref to 2 varieties of kiwi fruit and comparison to known standard(s).
Q	relevant variables are identified (stated) ✓	1	At least 2 from: age of tissue / mass of tissue / source of fruit /species of fruit / source of extract / volume of extract / dilution of extract / concentration range of stock solution (ascorbic acid) used for test / volume of DCPIP or equiv. reagent / concentration of DCPIP or equiv. reagent / cold stored or not / time in cold storage;
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 with clear headings and units. Can be in preliminary work.
T	additional method to display data ✓	1	Any <u>different</u> display e.g. graph with units on both axes. Graph type must relate to prediction.
U	simple data handling ✓	1	mean / colour comparison / use of graph data / any ref to correct quantitative calculation to measure conc. or use of calibration curve.

Titration with standardised DCPIP; Colour standards using ascorbic acid & NBS solution using acidified iodine ions as indicators; Colorimetry using standard I/KI against ascorbic acid stock solutions

Marking Point	Marking Criteria	Mark	Additional notes
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?' i.e. the higher the vit C conc in named juice, the lower the volume of juice needed to decolourise DCPIP.
W	recognises sources of error ✓	1	At least two examples: equipment / materials / specific human error e.g. bubbles in burette / blockage of burette with tissue extract / end point determination / size of drops of juice.
X	suggests methods for improving accuracy and or validity ✓	1	Accuracy: relate to '**W**' or use of alternative technique(s) e.g. iodine titration / record volume of juice instead of drops / repeat with sodium sulphite solution as a control. AND / OR Validity: state aspect of collected data to be compared with secondary sources.
Marks	Maximum for plan = 25	24 + *1 (scientific terminology)*	

G623/02 Cells and Molecules

Question			Expected Answers	Marks	Additional Guidance
1	a		*Any **three** from:* Obtain tissue **OR** method ✓ Use of stain **OR** named stain ✓ Place cover slip over drop ✓ Describe how / lower cover slip at an angle ✓ Attempt to exclude air bubbles ✓ Removal of excess stain ✓ AVP ✓	3	**ACCEPT** ref to cheek swab; e.g. methylene blue / eosin / haematoxylin **IGNORE** Iodine **ACCEPT** second slide used instead of cover slip
	b	i	*Aerobic respiration:* **D** ✓ mitochondria ✓ *Protein synthesis:* **C** ✓ ribosome / rough ER / RER ✓ *Secretory vesicles:* **B** ✓ *Digestive enzymes:* lysosome ✓	6	**ACCEPT** mitochondrion

Question			Expected Answers	Marks	Additional Guidance
1	b	ii	*Any **two** from:* Clearer / more detailed / SAW ✓ EM <u>greater</u> resolution **OR** ability to distinguish between two points **OR** max resolution for light microscope is 200nm ✓ Greater magnification ✓ Description of any relevant feature of EM linked to obtaining greater magnification ✓	2	Emphasis is on ONE advantage **and** an explanation. Explanation must be linked to the advantage. **IGNORE** 'Better' image. **IGNORE** 'More accurate' **ACCEPT** 'greater magnification' as explanation for 'clearer/more detailed'. Do not credit twice. e.g. use of electromagnets as lenses / high accelerating voltage / electron beam / specimen viewed in a vacuum.
			Total	11	

<table>
<tr><th colspan="3">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>2</td><td>a</td><td></td><td>A = glycoprotein ✓
B = glycolipid ✓
C = cholesterol ✓
D = phospholipid ✓</td><td>4</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><td>✓</td><td></td><td></td><td>no</td></tr><tr><td></td><td></td><td>✓</td><td>no</td></tr><tr><td>✓</td><td></td><td></td><td>yes</td></tr></table></td><td>6</td><td>Award 1 mark for each correct answer.
Reject if two or more ticks in row under movement columns but award yes/no response if correct.</td></tr>
<tr><td></td><td>c</td><td></td><td>A = 2 ✓
C = 4 ✓
D = 1 ✓</td><td>3</td><td>Label lines must clearly indicate correct box destination.

Reject if more than 1 label line from each box.</td></tr>
<tr><td></td><td>d</td><td>i</td><td>Protein ✓
Non-reducing sugar / sucrose ✓</td><td>2</td><td>Only accept correct answers in test order.</td></tr>
<tr><td></td><td></td><td>ii</td><td>Emulsion test:

Add lipid sample to, (absolute) ethanol or alcohol ✓
Add, lipid and alcohol or mixture or sample, to water ✓

OR alternative answer:
Add lipid sample to Sudan III/IV ✓
Shake ✓</td><td>2</td><td>

Award 1 mark if only ‘emulsion test’ given.
Award 2 marks for full explanation for correct test.

Award 1 mark if only ‘Sudan III/IV’ given.
Award 2 marks for full explanation for correct test.</td></tr>
<tr><td></td><td></td><td>iii</td><td>Emulsion test:
Emulsion / milky / cloudy ✓

Sudan III/IV:
Red dye associates with fat droplets
OR red colour stains fat droplets
OR red ring on surface of liquid ✓</td><td>1</td><td>
Result / observation must link to reagent used.
ACCEPT white colour.
REJECT ‘precipitate’</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>18</td><td></td></tr>
</table>

Question			Expected Answers	Marks	Additional Guidance
3	a		16 ✓	1	
	b		in mm^3 $\frac{1 \quad x \quad 16}{0.004}$ ✓ In 1 cm^3 $\frac{1…..x……16…x..1000}{0.004}$ ✓ 4 000 000 ✓	3	**ACCEPT** ecf from (a) and correct answer for 3 marks. **MAX 2** marks for ecf from (a) and correct answer but no working **ACCEPT** correct answer for 3 marks
	c	i	Culture may not be uniformly sampled **OR** Some of the cells likely to be dead / AW **OR** Human error ✓	1	
		ii	Fewer red blood cells **OR** Distorted cells **OR** Paler / cells with less Hb ✓	1	**REJECT** sickle cell.
	d	i	**[Level 1]** Candidate shows a high level of understanding & includes a detailed description of the Coulter counter, including at least 3 valid points, expressed clearly and logically. ***(3 marks)*** **[Level 2]** Candidate shows some understanding & includes a description of the Coulter counter, including at least 2 valid points, expressed clearly and logically. ***(2 marks)*** **[Level 3]** Candidate shows a basic level of understanding of the Coulter counter, including at least 1 valid point written in a sentence with little explanation. ***(1 mark)***	3	**valid points** include: • Probe with (two) electrodes placed in sample • One electrode enclosed in glass tube • Electrical current, flows/passes, between electrodes/through electrodes or sample • Cell(s) pass through, (small) hole / entrance / gap in tube • Number / size of cell alters current / conductivity, inside probe / OWTTE

Question			Expected Answers	Marks	Additional Guidance
	d	ii	Quicker **OR** Can be, automated / set up & left **OR** Easier to use **OR** Can get a permanent record **OR** Reduces chance of human error ✓	1	**REJECT** 'more reliable' **IGNORE** reference to accuracy – depends on accuracy of technician
				11	

Question			Expected Answers	Marks	Additional Guidance
4	a		*Any **two** from:* Personality changes ✓ Psychiatric disorders such as severe depression ✓ Progressive chorea* / OWTTE ✓ Dystonia / lack of muscle tone / OWTTE ✓ Dementia / general loss of intellect / memory loss / impaired judgement / impaired abstract thinking / OWTTE ✓	2	**ACCEPT** correct ref to number of CAG repeats / more than normal / normal number between 10 – 30 / accept number between 36-121 as HC. Chorea* involves motor coordination disorder e.g. minor involuntary movement such as non-repetitive, non periodic jerking.
	b		**[Level 1]** Candidates show a high level of understanding of the moral & ethical implications, clearly giving a detailed & coherent discussion linked to the question, which includes at least 4 valid points. ***(4 marks)*** **[Level 2]** Candidates show some understanding of the moral & ethical implications in a clear discussion, including at least 2 valid points, but with limited linkage to the question. ***(2 - 3 marks)*** **[Level 3]** Candidates make a relevant statement of either a moral or ethical implication. ***(1 mark)***	4	**valid points** include: • HC is a possible 'life sentence' for family members / OWTTE • Whether or not to inform relatives / family members may not want to know • Whether or not to plan **further** children • Whether or not to pursue selective abortion • Patient human rights e.g. confidentiality issues/ discrimination issues e.g. employment / insurance / mortgage facilities • Religious issues, with explanation • Test result may not be 100% accurate / OWTTE • AVP **ACCEPT** No cure / treatment / bleak outlook if have allele & develop disease. **IGNORE** 'Religious issues' without explanation. **IGNORE** Reference to child welfare / child rights. **IGNORE** Reference to cost of test
				6	

G628 Sampling, testing and processing

Question			Expected Answers	Marks	Additional Guidance
1	a	i	So that comparisons (of the quality) can be made / representative sample ✓	1	**IGNORE** reliable
		ii	*Any **three** from :* Ripeness / length of growing time ✓ Variety / type ✓ Growing conditions / type of soil ✓ Size of berry ✓	3	**IGNORE** weather **IGNORE** time **IGNORE** how / where / when to collect **IGNORE** how many **IGNORE** reference to disease **IGNORE** sample
		iii	To prevent contamination of other berries / so that the selected samples are of the, best/most appropriate/optimum, quality / diseased berries, are poor quality/differ in taste / AVP ✓	1	
		iv	*Any **two** from :* Location / sample number ✓ Date / time ✓ Variety / type / name ✓ Who collected the berries✓	2	**IGNORE** mass **IGNORE** hazard label
		v	Stored under, correct/sterile/sealed, conditions / no contamination / so that the sample does not deteriorate ✓	1	**REJECT** suitable / same / safely
		vi	Same granule sizes will produce same amounts of, flavourings/taste, / give same, concentrations/strength ✓	1	**IGNORE** references to rate
		vii	Taste/flavour/opinion, varies from person to person ✓	1	
	b	i	5 m^2 ✓	1	

Question			Expected Answers	Marks	Additional Guidance
1	b	ii	*Any **two** from :* Volume/amount, of solution given (each day) ✓ Time of adding the fertiliser ✓ Number of applications ✓ Even distribution ✓ Duration of trial ✓ Amount of light ✓ Same type of fertiliser ✓	2	**IGNORE** amount of fertiliser Time needs qualification
		iii	To act as a control / for comparison ✓	1	
		iv	Size/height, of the shrub / leaf size ✓ Yield of berries ✓	2	**IGNORE** growth of plant Need measurable quantity
	c	i	*Any **two** from :* Poisonous (to humans) ✓ Persistent in the environment ✓ CBB becoming resistant ✓ Non specific in use / kills beneficial insects ✓	2	**IGNORE** specific to CBB **REJECT** dangerous to the environment **IGNORE** references to contact pesticide
		ii	$0.0002 / 2 \times 10^{-4}$ ✓	1	
	d		*Drawing shows:* Container containing a liquid ✓ Some effective device to stop escape of insects, steep/curved sides / flap ✓ Appropriate size indicated ✓	3	**ACCEPT** sizes from 1cm - 25cm Needs to be labelled for mark
	e		*Any **two** from :* Can be made at home ✓ Non-toxic ✓ Can kill in 2 weeks / effective ✓ Reference to green technology / renewable ✓	2	**IGNORE** cost

Question			Expected Answers	Marks	Additional Guidance
1	f	i	Make sure it is clean / sterilise ✓	1	
		ii	Risk assessment / OWTTE ✓	1	
		iii	*Drawing method shows:* Heat source / water bath / heating mantle ✓ Easy evaporation / suitable glassware / distillation ✓ Use of a fume cupboard ✓	3	**REJECT** heat source using a naked flame **ALLOW** diagrams showing large surface area **ACCEPT** conical flask
		iv	0.247 / 0.25 ✓	1	**REJECT** 0.24
		v	Yes – the mass of the caffeine would have been much smaller ✓ Leading to increased weighing errors ✓	2	**IGNORE** just YES
		vi	*Any **two** from :* Use a solvent that only extracts caffeine ✓ Further purify the caffeine obtained ✓ Chromatography ✓ Multiple solvent extractions ✓ AVP ✓	2	**REJECT** gas chromatography
		vii	Percentage/how much/amount/concentration, of each compound present ✓	1	
		viii	(Relative) molecular mass of the impurity ✓	1	**ACCEPT** Molar Mass
	g		A compound that, increases the amount of urine/encourages urination ✓	1	**REJECT** visits to the toilet **REJECT** dehydration alone
			Total	37	

Question			Expected Answers	Marks	Additional Guidance
2	a	i	5.10 / 5.1 ✓	1	
		ii	Plots correct ✓ Smooth curve ✓	2	**REJECT** double lines
		iii	As the distance increases, the size of the ash particles decrease ✓ At distances greater than (about) 300 km there is little change in the ash particle size ✓	2	
		iv	12 ✓	1	
		v	2×10^{-4} / 0.0002 ✓	1	
	b	i	*Any **two** from :* Peak use, around 6-8 am/early morning ✓ Staggered times for vehicle home use ✓ Fewer people drive at night ✓	2	**REJECT** reference to emissions once
		ii	The Sun's, rays/light, are (the most) intense then ✓	1	**REJECT** hottest by itself **REJECT** strongest / highest **REJECT** just 'most'
	c	i	*Design shows:* Filter paper ✓ Pump after filter paper ✓ 'Roof' / lid / inverted funnel ✓	3	Only need lid if particles collected from above.
		ii	0.1728 (g) / correct fraction ✓ 60 ✓	2	
	d	i	*Flowmeter:* monitors/records/measures, airflow ✓ *Silica gel in the U–tube:* drying agent / absorbs, water/moisture/liquid ✓	2	

Question			Expected Answers	Marks	Additional Guidance
2	d	ii	So that, rain/dust, falling down cannot enter ✓	1	
		iii	960 ✓	1	
		iv	4800 ✓	1	ecf 5 x answer d(iii)
	e	i	500 ✓	1	
		ii	240 x 100 / 19 500 ✓ 1.23 / 1.2 ✓	2	
	f	i	Sulfur dioxide/gases, are, toxic/poisonous/hazardous/can cause breathing problems/ asthma ✓	1	**IGNORE** harmful
		ii	Filter ✓ Wash ✓ Dry <u>below 120 °C</u> ✓	3	
		iii	Mass of gypsum = 6.723 g ✓ Mass lost = 1.378 g ✓ % loss = 20.5 ✓ The gypsum is within the allowed range and is therefore pure ✓ *conclusion clearly relates answer to the acceptable range allowed*	4	**ACCEPT** correct comment related to calculated answer
		iv	To check that all decomposition has occurred / to ensure constant mass / to ensure all, water/moisture, removed ✓	1	**REJECT** reliable, accurate
			Total	32	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	52.8 /53 ✓	1	
		ii	**[Level 1]** Candidate presents a detailed design of the experiment, using a correct degree of accuracy. Including **at least six** valid points expressed clearly and logically. ***(6 – 7 marks)*** **[Level 2]** Candidate presents a design of the experiment that adequately allows the density to be determined. Including **at least four** valid points expressed clearly and logically. ***(3 – 5 marks)*** **[Level 3]** Candidate presents a basic design of part of the experiment. Including at least **one valid point** but with little or no explanation. ***(1 – 2 marks)***	7	**valid points** include: • Complete a risk assessment • Find the mass of bronze • Use an appropriate level of accuracy/to at least one decimal place • Record volume of water in a measuring cylinder / fill a eureka can with water • Add the piece of bronze • Read the new volume/ collect the displaced water • Subtract the volume readings to find the volume of the bronze / measure volume displaced • Calculation recall density = mass / volume
	b	i	79 ✓	1	**ALLOW** 78 to 80 inclusive
		ii	That the percentage of copper v density is a straight line graph / linear (relationship) ✓	1	
		iii	*Any **three** from :* Ease of carrying it out ✓ Safety / PPE / risks ✓ Accuracy ✓ Reliable ✓ Availability of materials/equipment/quantity of brass ✓ Duration/time with qualification ✓ Cost ✓	3	

Question			Expected Answers	Marks	Additional Guidance
3	b	iv	Heat ✓ Use more concentrated acid ✓ Stir ✓ Catalyst ✓	2	**REJECT** mix **IGNORE** just more acid **REJECT** increase surface area
		v	Repeat it / ignore it ✓	1	**REJECT** draw line of best fit
		vi	0.70/0.7 g zinc / 79.9/80% copper ✓ 20 / 20.1 / 20.11 ✓	2	**ACCEPT** 20.12
	c		Concentration of salt in the salt water ✓ Temperature ✓ Duration of test ✓	3	**REJECT** amount of salt water **REJECT** volume/mass of alloy
			Total	21	

G635 Working waves

Question			Expected Answers	Marks	Additional Guidance
1	a	i	Any straight line 6 – 9 mm long ✓	1	Expect but DO NOT REQUIRE appropriate line e.g. radial line from centre of compression to centre of next compression, **OR** from centre of rarefaction to centre of next rarefaction
		ii	Attempted measurement of 4 or more wavelengths ✓	6	This mark is for knowing that larger reading is better so **ALLOW** this mark if even if measurement has been made of a diameter instead of a radius **ALLOW** even if measurement inaccurate but clearly attempting to measure 4+ wavelengths e.g. factor of 10 error, cm/mm confused or no units
			Accurate measurement including unit (expect mm, cm or m. If non SI unit used penalise here then allow ecf) ✓		Either ± 1 mm of length of line drawn (BOD if end of line lost in dots) or if no line drawn 6 wavelengths 44 – 46 mm 5 wavelengths 36 – 38 mm 4 wavelengths 29 – 31 mm 3 wavelengths 22 – 23 mm 2 wavelengths 14 – 16 mm 1 wavelengths 7 – 8 mm
			Repeat and average ✓		**NOT** allowed if only scaled values shown (e.g. 4.4.m for 6 wavelengths)
			Correct division by number of wavelengths ✓		**ALLOW** ecf from 2nd mark. Allow if only scaled values shown. **ALLOW** if measurement across centre or not shown where measured PROVIDED number of wavelengths close for length measured

Question			Expected Answers	Marks	Additional Guidance
1	a	ii cont	Multiplication by 100 ✓ Answer = 600 - 900 mm including correct unit ✓		**ALLOW** ecf from 2nd mark but not scored if length measured is only one wavelength. Allow if only scaled values shown. OK if combined with conversion to alternative unit correctly given. e.g.division of length in mm by 10 and result expressed in m May be before or after division by number of wavelengths **ALLOW** if length measured is only one wavelength. **NOT** allowed if only scaled values shown otherwise allow ecf Answer within range but without measurement or working scores last mark only. Allow if only scaled values shown One wavelength only measured loses 1st & 4th marks Scaled values only loses 2nd & 5th marks
		iii	Sound wave ✓	1	**ALLOW** valid alternative. E,g. pwave earthquake
	b		$v = f\lambda$ ✓ $3.0 \times 10^8 = 2.0 \times 10^8 \times \lambda$ ✓ $\lambda = 1.5$ m ✓	3	stated or implied stated or implied expect sf as shown for 3rd mark
	c		Radio f 10 000 times larger than sound f ✓	1	**ALLOW** much larger **ALLOW** RA clearly stated
	d	i	Amplitude modulated ✓	1	**ALLOW** modulation but NOT modulator or modified
		ii	Frequency modulated ✓	1	**ALLOW** modulation but NOT modulator or modified

Question			Expected Answers	Marks	Additional Guidance
1	d	iii	Text or diagram showing: **AM:** Fixed frequency ✓ Amplitude/size of wave varies according to sound signal or wtte ✓ **FM:** Fixed amplitude ✓ Frequency of wave varies according to sound signal or wtte ✓	4	
	e		Gamma ✓	1	
	f		Absorbed by atmosphere ✓	1	**NOT** reflects **ACCEPT** blocked, ozone
			Total	20	

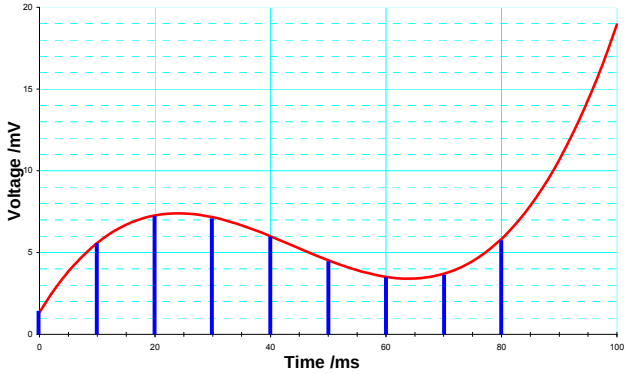
Question			Expected Answers	Marks	Additional Guidance
2	a	i	Red ✓ Then yellow / orange ✓ Then white ✓	3	**ALLOW** 1 mark for single colour or incorrect sequence **NOT** brighter
		ii	Decreases ✓	1	**NOT** specified amounts
		iii	Increases ✓	1	**NOT** specified amounts
		iv	Increases ✓	1	**NOT** specified amounts **ALLOW** more
	b	i	Infrared ✓	1	**NOT** just electromagnetic (radiation) **NOT** thermal
		ii	People emit, higher frequency / lower wavelength ✓ (because) people at higher temperature ✓ (emit) more power (accept energy) ✓	3	**NOT** just more/higher radiation, **NOT** different colour **ALLOW** more/higher radiation
		iii	False colours ✓ **OR** Different colours / shades of grey ✓	1	**ALLOW** any specified colours
			Total	11	

Question			Expected Answers	Marks	Additional Guidance
3	a		**[Level 1]** Candidate demonstrates a full understanding of refraction and T.I.R. by additional detail such as: • Linking refraction to wave velocities in different media • One or more equations such as n= sin i/sin r OR $n=c_{air} / c_{Glass/Perspex}$ OR sin C = 1/n • Emerging ray would emerge at< 90° • Some internal reflection occurs if rays incident inside Glass/Perspex at < C • Totally internally reflected ray is brighter than partially reflected ray • Ray deviated towards normal as it enters Glass/Perspex/more dense medium from air(or vice versa) ***(5 – 6 marks)*** **[Level 2]** Candidate links T.I.R. to refraction and critical angle*: covering the following points* • Refraction causes change of direction of light when light passes from one medium to another (glass/air etc) • Light travelling in Glass/Perspex/more dense medium does not emerge when meeting air/interface with less dense medium • Correct description of critical angle • Rays incident inside Glass/Perspex at > C totally internally reflected ***(3 – 4 marks)*** **[Level 3]** Candidate gives relevant statements linking TIR to materials, *covering the following points:* • TIR keeps light in (within fibre) • Light is reflected at surface /interface • Between two different media / glass/Perspex and air ***(1 – 2 marks)***	**6**	Equations on their own show some knowledge of linking

Question			Expected Answers	Marks	Additional Guidance
3	b	i	*Any **three** appropriate points e.g.:* Smaller diameter / ~ 60 μm (allow 10 – 90 μm) ✓ Coating/cladding with a, glass / Perspex, ✓ Of lower refractive index ✓ Outer protective sheath/layer ✓ Larger critical angle✓ Glass instead of Perspex ✓	3	
		ii	*Any **four** appropriate points from text or diagram e.g.:* Degraded ✓ Multiple paths ✓ Some further than others ✓ So signals that started together arrive at different times ✓ Square wave no longer has sharp corners / diagram ✓	4	
		iii	*Any **five** appropriate points from text or diagram e.g.* Refractive index gradually changes ✓ Radially / towards outside ✓ Less further out ✓ Rays follow curved path / diagram ✓ Rays following longer path travel through lower refractive index material ✓ Rays following longer path travel faster ✓ So arrive at same time ✓	5	

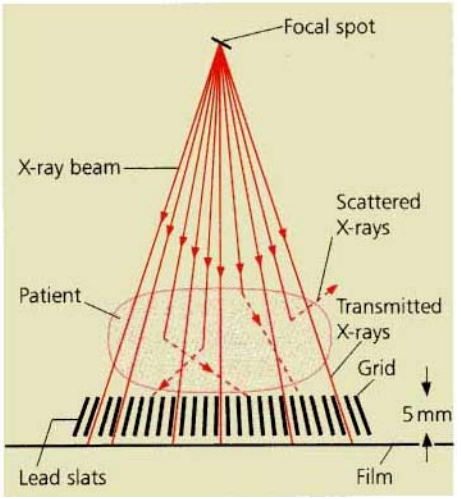
Question			Expected Answers	Marks	Additional Guidance
3	c		*Any **three** from* Very large information capacity / faster data transfer ✓ Low material costs ✓ Small cable size ✓ Negligible crosstalk ✓ High immunity to interference ✓ Complete electrical isolation ✓ Large repeater spacings / less attenuation ✓ Wire tapping more difficult / more secure✓ May be used in water✓	3	**ALLOW** cheaper **NOT** safer
			Total	21	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	Analogue signals are continuously variable ✓	1	**ALLOW** curved wave drawn **ALLOW** they can have any / infinite number of value/s
		ii	Digital signals have only certain discrete values / usually only two values are used: 0 or 1 ✓	1	**ALLOW** Binary/on or off/square wave drawn
		iii	If digital signals are degraded they can be, reconstructed / retrieved (exactly as they were originally) ✓ *Any **one** further point e.g.* By booster stations ✓ **OR** With analogue can't distinguish between interference and signal ✓ **OR** Because only two levels	2	

Question			Expected Answers	Marks	Additional Guidance
4	a	iv	*any **seven** from text or diagram from :* Converts analogue to digital ✓ Sample analogue signal; or diagram showing (e.g. see below) At many points ✓ At regular/equal (time) intervals ✓ At frequent time intervals OR diagram showing at least 5 samples ✓ Voltage OR time axes labelled on diagram ✓ Size of this voltage/signal is converted to a number / quantised ✓ Number is expressed in binary form for transmission ✓ At the receiving end the numbers can be reconverted back to an analogue signal ✓ A smooth curve will now appear as a series of steps ✓	7	

Question			Expected Answers	Marks	Additional Guidance
4	b		**[Level 1]** Candidate shows a full understanding and explains how structure and size of cells allows frequencies to be reused in different parts of the country and this relates to population density. Answer will be well organised and include additional detail i.e. • Explanation of frequency reuse including adjacent cells must have different frequencies And some of: • Base station can only handle a certain number of calls • Explanation of terms down-link and/or up-link • Each base station transmits and receives three sets of frequencies into three cells. **OR** each cell is served by base stations at three of its corners • Callers are automatically passed from one cell/base station to another if moving around ***(6 – 7 marks)*** **[Level 2]** Candidate demonstrates some understanding why cells may vary in shape and size and of transmission of information, with some attempt at structure: • Indication of cell size • Links cell size to population density • Callers need to be in range of base station • Base station can only handle a certain number of calls. • Use of terms down-link and/or up-link. ***(3 – 5 marks)***	**7**	from half a mile to 20 miles across.

Question			Expected Answers	Marks	Additional Guidance
4	b		**[Level 3]** Candidate's answers give only a limited description of cells and base stations. Response may lack structure. Response may state: • The country is divided up into many cells (or diagram of cells) • For each cell there is a base station at corners or centres of cells (text or diagram) which transmits and receives calls to and from phone. ***(1 – 2 marks)***		The diagram may show few cells not necessarily hexagonal with limited annotation.
			Total	**18**	

Question			Expected Answers	Marks	Additional Guidance
5	a	i	Lead ✓	1	
		ii	*any **six** from:* Source patient grid and film/detector labelled ✓ All in correct order ✓ Grid shown as series of slits ✓ Slits wider apart nearer film / slits diverging from source ✓ X-rays beam/s shown radial from source and passing through grid ✓ X-rays beam/s shown or described as scattered in patient ✓ Not passing through / absorbed by grid ✓ Scattered X-rays would arrive at the wrong part of the, film / detector✓ Would cause, blurred / unclear, image ✓	6	***For example:*** 

Question			Expected Answers	Marks	Additional Guidance
5	b		**[Level 1]** Candidate demonstrates a sound understanding and clearly and logically describes **how an image is produced** *covering Some of the following points:* • Higher frequencies give better soft tissue resolution • X-ray beam is shaped like a fan • Combined effect of movement of source and patient is a spiral • Body modelled as set of, cells / pixels (each of which attenuates beam) ***(4 – 5 marks)*** **[Level 2]** Candidate shows a reasonable understanding, describing in some detail **how a scanner produces an image** in a logical way, *covering at least two of the following points:* • Source and detector opposite to each other • Computer (used to reconstruct image • Use higher frequencies ***(3 marks)*** **[Level 3]** Candidate shows a limited understanding explaining **how a scan is taken**, *covering at least two of the following points:* • Cat scanners use X rays • Movement of the source or detector • Produce images (of the body) slice by slice • 3D image • Patient / bed, moves relative to the machine ***(1 – 2 marks)***	**5**	

Question			Expected Answers	Marks	Additional Guidance
5	c	i	Cancer / leukaemia / genetic mutations ✓	1	
		ii	X-rays Ionise ✓ Ionisation of molecules causes chemical change ✓ Which causes, uncontrolled / disrupted, cell division /Cell death / damage / mutation ✓	3	
	d	i	The thickness (of lead) that will, absorb / stop, half the (X-) rays entering it ✓	1	
		ii	Calculating the number of half thicknesses ✓ 4 units ✓	2	Number of half thicknesses = 3.0/1.5 = 2 Give both marks if correct answer without working
	e		Any appropriate answer ✓ e.g. wear, film badge / monitor **OR** reduce exposure time **OR** wear lead apron	1	**NOT** leave the room (equivalent of lead screen) **NOT** do not, eat / drink /smoke **NOT** wear protective clothing
			Total	20	

Grade Thresholds

Advanced GCE Applied Science AS (H175, H375) and
GCE Applied Science A2 (H575, H775)
January 2010 Assessment Session

Portfolio Unit Threshold Marks (AS)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of cands
G620	Raw	50	43	38	33	28	23	0	781
	UMS	100	80	70	60	50	40	0	
G621	Raw	50	43	38	33	28	23	0	340
	UMS	100	80	70	60	50	40	0	
G624	Raw	50	42	37	32	27	22	0	62
	UMS	100	80	70	60	50	40	0	
G625	Raw	50	43	37	32	27	22	0	74
	UMS	100	80	70	60	50	40	0	
G626	Raw	50	42	37	32	27	23	0	100
	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	58	50	42	35	0	1565
	UMS	100	80	70	60	50	40	0	
G623	Raw	90	73	64	55	47	39	0	126
	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	44	39	34	29	24	0	178
	UMS	100	80	70	60	50	40	0	
G629	Raw	50	43	38	33	29	25	0	29
	UMS	100	80	70	60	50	40	0	
G632	Raw	50	44	39	34	29	25	0	25
	UMS	100	80	70	60	50	40	0	
G633	Raw	50	43	38	33	28	24	0	92
	UMS	100	80	70	60	50	40	0	
G634	Raw	50	43	38	33	28	24	0	55
	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	63	56	49	42	36	0	302
	UMS	100	80	70	60	50	40	0	
G635	Raw	90	59	51	43	36	29	0	323
	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	479

Cumulative Percentage in Grade

Advanced Subsidiary GCE (Single Award) (H175):

A	B	C	D	E	U
2.3	11.4	34.1	70.5	97.7	100.0
There were 93 candidates aggregating in January 2010.					

Advanced Subsidiary GCE (Double Award) (H375):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	0.0	0.0	4.0	8.0	28.0	56.0	76.0	84.0	100.0
There were 25 candidates aggregating in January 2010.									

Advanced GCE (Single Award) (H575):

A	B	C	D	E	U
0.0	28.6	57.1	85.7	100.0	100.0
There were 7 candidates aggregating in January 2010.					

Advanced GCE (Double Award) (H775):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	0.0	0.0	0.0	33.3	100.0	100.0	100.0	100.0	100.0
There were 3 candidates aggregating in January 2010.									

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/learners/ums/index.html

Statistics are correct at the time of publication.

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