Mark Scheme January 2009

GCE

GCE Biology (8040/9040)
GCE Biology (Human) (8042/9042)
International Supplement

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MARK SCHEMES

Please note that this document is an International Supplement to the GCE Biology / Biology (Human) Mark Schemes (8040/8042/9040/9042) and provides Mark Schemes for Units 5 and 6, which were only available to International centres.

GENERAL INTRODUCTION

Mark schemes are prepared by the Principal Examiners and revised, together with the relevant questions, by a panel of senior examiners and subject teachers. The schemes are further amended at the Standardisation meetings attended by all examiners. The Standardisation meeting ensures as far as possible that the mark scheme covers the candidates' actual responses to questions and that every examiner understands and applies it in the same way.

The schemes in this document are the final mark schemes used by the examiners in this examination and include the amendments made at the meeting. They do not include any details of the discussions that took place in the meeting, nor do they include all of the possible alternative answers or equivalent statements that were considered to be worthy of credit.

It is emphasised that these mark schemes are working documents that apply to these papers in this examination. Every effort is made to ensure a consistent approach to marking from one examination to another but each marking point has to be judged in the context of the candidates' responses and in relation to the other questions in the paper. It should not be assumed that future mark schemes will adopt exactly the same marking points as this one.

Edexcel cannot under any circumstances discuss or comment informally on the marking of individual scripts. Any enquiries about the marks awarded to individual candidates can be dealt with only through the official Enquiry about Results procedure.

Unit 3 (6103/02 W1)

Question Number	Answer	Mark
1(a)	(see table and marking points below)	**(4)**

pH	**Week**	**Mass of water lost /g week $^{-1}$**		**Mean mass of water lost /g week $^{-1}$**		**Overall mean mass of water lost /g week $^{-1}$**
		Chamber 1	**Chamber 2**	**Chamber 1**	**Chamber 2**	
	1	0.25	0.24			
2.5	2	0.27	0.27	0.26	0.26	0.260
	3	0.26	0.27			
	1	0.17	0.13			
3.5	2	0.19	0.11	0.19	0.12	0.155
	3	0.20	0.12			
	1	0.12	0.13			
4.5	2	0.12	0.11	0.12	0.11	0.115
	3	0.12	0.09			
	1	0.08	0.07			
5.5	2	0.10	0.20	0.09	0.12	0.105
	3	0.09	0.09			

1. neat table correctly formatted ;
2. correct rows and columns with labels and units ;
3. <u>**correct means**</u> for chambers 1 and 2 ;
4. correct overall means calculated from values in Chambers 1 and 2 ;

(4)

Question Number	Answer	Mark
1(b)	1. **A**xes – correct orientation and labels ; 2. **F**ormat – correct format line graph ; 3. **P**lots – all points plotted correctly ; 4. **L**ines – well drawn and through all points ;	**(4)**

Question Number	Answer	Mark
1(c)	**Trends and patterns** 1. mass loss decreases {as pH increases / from 2.5 to 4.5} ; 2. greatest decrease (in mean mass) from pH 2.5 to 3.5 / least decrease from pH 4.5 to 5.5 ; *3. any correct manipulation of figures ;*	**(3)**

Question Number	Answer	Mark
1(d)	1. mean values variable between chambers except pH 2.5 ; *2. greatest difference between mean values occurs at pH 3.5 ;* 3. {raw data in chamber 1 always higher than Chamber 2 at pH 3.5 / vice versa}, {raw data in Chambers 1 and 2 consistent / e.g. at pH 2.5 and 4.5 } ; 4. anomalous result of 0.20 g at pH 5.5 ; 5. overall means at {pH 2.5 or 4.5 are most reliable / at 3.5 and 5.5 are least reliable} ; 6. mean values at pH 3.5 or 5.5 could be {different / higher /lower} ; 7. any logical progression from 6 explaining possible change in trends / patterns in graph (reference to trends between pH 3.5 and 4.5) ;	**max (3)**

Question Number	Answer	Mark
2(a)	1. same volume of ONPG used throughout ; 2. same volume of β-galactosidase used throughout ; 3. same concentration of {ONPG / β-galactosidase} ; 4. minimum of 5 concentrations of lactose / milk ; 5. stated temperature (between 30-50 ^{0}C) ; 6. use of buffer to maintain pH ; 7. equilibrate solutions separately for specific time (minimum 1 minute) ; 8. named method of assessing colour e.g. use of colorimeter / use of colour standards ; 9. further detail of assessment method e.g. fixed volume in cuvette / standards from fixed concentration of lactose / eq ; 10. reference to measurement of rate e.g. colorimeter reading in fixed time / time taken to reach fixed colour / eq ; 11. repeat twice more (any whole procedure) ;	**max (9)**

Question Number	Answer	Mark
2(b)	1. (suitable table with correct rows and columns to include raw data which matches suggested method ; 2. suitable method of calculating rate indicated ; 3. correct graphical format for data ; 4. correct orientation of axes with labels and units ;	**max (3)**

Question Number	Answer	Mark
2(c)	**Limitations** 1. difficult to standardise yellow colour / eq ; 2. reference to effect of milk colour / different lactose concentration / eq ; 3. difficult to standardise enzyme concentration / activity ; 4. milk / other chemicals might affect the reaction / β-galactosidase ; **Further work** 5. quantify lactose using another procedure (to confirm validity of using ONPG) (e.g. Benedict's test) ; 6. use other types of milk / sources of lactose ; 7. use to detect {presence of / quantities of} β-galactosidase ; 8. check ONPG is active-site directed inhibitor / change concentration of ONPG ;	**max (6)**

Unit 5B (6105/01)

Question Number	Answer	Mark
1(a)(i)	(plant) hormone / growth substance / PGS / synthetic auxin / PGR / growth hormone ;	**(1)**

Question Number	Answer	Mark
1(a)(ii)	1. idea of selective ; 2. only {kill / affect} weeds / do not {kill / affect} grass ; 3. reference to weeds {broad-leaved / eq}, grasses {narrow-leaved / eq} ; 4. reference to differential sensitivity / uncontrolled growth in weeds causes their death / eq ; 5. can be used in (very) small quantities / fertiliser boosts grass growth once weeds killed / eq ; 6. do not affect other organisms / biodegradable / doesn't bioaccumulate / eq ;	**max (3)**

Question Number	Answer	Mark
1(b)	1. a qualified reference to diffusion / eq ; 2. active transport {requires energy / ATP / against concentration gradient} ; 3. idea that active transport can {accumulate {ions / eq} in cell / be selective} ; 4. reference to protein carriers in membrane / eq ;	**max (3)**

Question Number	Answer	Mark
2(a)(i)	different letter for each character and dominant and recessive alleles indicated ;	**(1)**

Question Number	Answer	Mark
2(a)(ii)	correct genotypes using symbols given ;;	**(2)**

Question Number	Answer	Mark
2(b)(i)		**(1)**

Phenotype	**Observed frequency**	**Expected frequency**
		3150
		1050
		1050
		350

Question Number	Answer	Mark
2(b)(ii)	1. reference to (autosomal) linkage ; 2. {genes / alleles} on same chromosome ; 3. idea of not independent of each other / inherited together ; 4. low chance of {crossing over / eq} ; 5. unless chiasma(ta) form between them ; 6. reference to {bivalent / tetrads} stage ; 7. during prophase 1 ; 8. idea of high frequencies of parental phenotypes in {F2 / offspring} / eq ; 9. idea of low frequencies of {recombinants} / eq ;	**max (5)**

Question Number	Answer	Mark
3(a)	1. idea of a stable community / eq ; 2. prevented from reaching climatic climax / eq ; 3. by {human intervention / activity / grazing / eq} ;	**max (2)**

Question Number	Answer	Mark
3(b)	1. reference to succession ; 2. grazing by sheep {cuts off tall-growing plants / only allows low-growing plants to survive} / eq ; 3. (when sheep removed) grazing stops ; 4. {a greater variety of {seedlings / eq} able to grow} / arrival of {shrubs / trees} ; 5. taller plants outcompete grasses / eq ;	**max (4)**

Question Number	Answer	Mark
3(c)	1. other grazers present / eq ; 2. {seeds / eq} of shrubs did not reach some islands / eq ; 3. reference to unsuitable abiotic factor ;	**max (2)**

Question Number	Answer	Mark
4(a)	holozoism / holozoic / predator / predation ;	**(1)**

Question Number	Answer	Mark
4(b)	1. both relationships involve two organisms of different species / eq ; 2. reference *H.v*. and *Z*. is mutualism, *H.v*. and *D*. is predator-prey ; 3. in *H.v.* and *Z*. both benefit, in *H.v.* and *D*. {only *H.v.* benefits / *D*. does not benefit} ; 4. *H.v.* and *D.* are both animals, *H.v*. and *Z*. is between an animal and a protoctist / eq ; 5. *H.v*. and *Z*. is permanent relationship, *H.v*. and *D*. is temporary ;	**max (3)**

Question Number	Answer	Mark
4(c)	1. carbohydrate {digested / broken down} by carbohydrase / eq ; 2. to give {monosaccharides / glucose} ; 3. absorbed by *Hydra* ; 4. reference to glycolysis ; 5. to give pyruvate ; 6. (which enters) Krebs' cycle / eq ; 7. in mitochondrion (of *Hydra*) ; 8. carbon dioxide released / respiration produces CO_2 ; 9. enters chloroplast (of *Zoochlorella*) / stroma ; 10. reference to fixation to {5C compound / RuBP} ;	**max (6)**

Question Number	Answer	Mark
5(a)	1. amylose has {straight / unbranched / helical} (chain), amylopectin has branched (chain) ; 2. 1-4 (glycosidic) {links / bonds} only in amylose, 1-4 and 1-6 {links / bonds} in amylopectin ;	**(2)**

Question Number	Answer	Mark
5(b)	1. {digested / broken down} to give glucose / eq ; 2. glucose is respired / eq ; 3. reference to source of energy ;	**max (2)**

Question Number	Answer	Mark
5(c)(i)	1. idea that {gene / DNA} {extraction / yield} from bacteria may be very small / eq ; 2. PCR used to {magnify / increase} quantity of {gene / DNA} ; 3. to produce enough for {commercial / eq} use ;	**max (2)**

Question Number	Answer	Mark
5(c)(ii)	1. abiotic factors are {non-living / physical} factors ; 2. that (might) affect growth of plants ; 3. reference to {differences / variation / eq} in yields in different regions ; 4. in all three varieties ; 5. use of manipulated figures ;	**max (3)**

Question Number	Answer	Mark
5(c)(iii)	1. in some regions, hybrids {increase yield by more than 100% / more than double yield} (compared with traditional varieties) / eq ; 2. idea that extra additional yield using Bt GM varieties is relatively little compared with hybrids ; 3. {cost / availability} of GM seed ; 4. other reason e.g. ethical, benefits of the hybrid (such as taste, disease resistance) ;	**max (3)**

Question Number	Answer	Mark
6(a)	population consists of members of the same species, community consists of members of different species / eq ;	**(1)**

Question Number	Answer	Mark
6(b)	1. left for sufficient time to mix freely with rest of population / eq ; 2. second sample captured ; 3. number of marked individuals in second sample noted ; 4. (and) total number in second sample ; 5. formula quoted ;	**max (3)**

Question Number	Answer	Mark
6(c)	1. incorrect ; 2. primary consumers {are herbivores / eat plants / eq} ; 3. pond skaters are {predators / eat animals / do not eat plants / eq} ; 4. they are {secondary / tertiary / higher} consumers ;	**max (3)**

Question Number	Answer	Mark
6(d)	1. acid-rain will lower pH of pond(water) ; 2. idea that digestive enzymes only work {within a narrow pH range / at optimum pH} ; 3. so alters shape of active site / ionization of enzymes / eq ;	**max (2)**

Question Number	Answer	Mark
6(e)	1. non-biodegradable insecticides {are persistent / do not break down / eq} ; 2. remain in bodies of dead / dying insects ; 3. pass into pond skaters and (then) into fish and (then) into birds / {along the food chain to birds} ; 4. reference to bioaccumulation / description ;	**max (3)**

Question Number	Answer	Mark
7(a)(i)	1. decrease in population ; 2. increase in {mean / average} beak depth ; 3. narrower range of beak depth ; 4. use of data to support at least one change ;	**max (2)**

Question Number	Answer	Mark
7(a)(ii)	1. less food ; 2. cannot support large population ; 3. increases intra-specific competition ; 4. birds with smaller beaks {starve/ die out}, because they cannot eat large, tough seeds / birds with larger beaks can eat large, tough seeds when small, soft seeds run out / selection of large beaks ;	**max (3)**

Question Number	Answer	Mark
7(b)(i)	1. reference to {characteristic / trait / feature} controlled by more than {2 genes / eq} ; 2. tends to show continuous variation ;	**(2)**

Question Number	Answer	Mark
7(b)(ii)	1. reference to selection ; 2. reference to changes in {allele / gene} frequencies ; 3. {fewer / eq} alleles for smaller beaks / {more / eq} alleles for larger beaks ;	**max (2)**

Question Number	Answer	Mark
7(c)	1. reference to {drought / water shortage} as a selection pressure ; 2. some plants {have adaptations to resist water loss / more likely to survive drier conditions} ; 3. favours / reference to xeromorphic plants ; 4. plants with large tough seeds {survive / increase in number} no finches eat small seeds / eq ;	**max (3)**

Unit 6 (6106/02 W2)

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Type of mower</th><th>Lawn number</th><th colspan="2">{Mean times daisies present / frequency of daisies} / 0.25 m^{-2}</th></tr>
<tr><td rowspan="4">With grass box</td><td>1</td><td>2.4</td><td rowspan="4">2.70</td></tr>
<tr><td>2</td><td>2.0</td></tr>
<tr><td>3</td><td>1.1</td></tr>
<tr><td>4</td><td>5.3</td></tr>
<tr><td rowspan="4">Without grass box</td><td>5</td><td>5.5</td><td rowspan="4">5.40</td></tr>
<tr><td>6</td><td>7.4</td></tr>
<tr><td>7</td><td>5.7</td></tr>
<tr><td>8</td><td>3.0</td></tr>
</table>

1. table of values with correct headings and units ;
2. correct means for each lawn ;
3. correct overall means calculated from those in each lawn ;
</td><td>(3)</td></tr>
</table>

Question Number	Answer	Mark
1(b)	**A** Axes correct orientation and scale with units and labels with and without grass box clearly identified ; **F** All data plotted as bar charts with key (no pairing of data) ; **P** All points plotted correctly ;	**(3)**

Question Number	Answer	Mark
1(c)	1. calculated value (3.81) is greater than the critical value at 5% level (1.98) ; 2. (therefore) there is a significant difference between (the means of) { their frequency / the presence of daisies / eq } on the lawns cut with two types of lawn mower ;	**(2)**

Question Number	Answer	Mark
1(d)	1. (on the lawns mown with a boxed mower), the mean on Lawn 4 is greater than the rest ; 2. (on the lawn mown without a box), the mean on Lawn 8 is lower than the rest ; 3. the range of data is 0 – 12 on lawns mown with box mower / 1 –15 on lawn mown without a box ; 4. reference to high variability reduces reliability of data ;	**max (3)**

Question Number	Answer	Mark
2(a)	**Investigating selection by thrushes** 1. woodland and grassland sites selected to have at least TWO named abiotic factors similar ; 2. sites large (100m x 100m min) / well separated to ensure snails collected from stated habitat / eq ; 3. anvil stone sites (min 5 in total) identified in each area ; 4. use of suitable key (to identify song thrush OR banded snail) ; 5. anvil stone sites cleared of broken shells ; 6. reference to care taken not to disturb birds / snails / habitat ; 7. fixed time (min 1 day) allowed for birds to collect new shells / sites checked daily ; 8. shells collected and <u>number of stripes</u> recorded ; 9. standard method of collecting broken shell (e.g. only shell fragments over half a complete shell counted / fixed area around anvil stone) ; **Investigating living snail population** 10. method of randomising sample selection at each habitat ; 11. count number of stripes on shells in quadrat of stated size / clear site <u>and</u> add equal or stated numbers of different banded snails ; **Style** Account is concise and well-organised, there is good use of technical vocabulary and almost no spelling errors – **2 marks** There is some lack of organisation, limited vocabulary and a number of spelling errors – **1 mark** The account lacks organisation, there is little or no technical vocabulary and many spelling errors – **0 marks**	**max (8)** **(2)**

Question Number	Answer	Mark
2(b)	1. suitable table with units for raw data and manipulated data matched to method account ; 2. calculation of mean numbers of stripes for each habitat / mean number for each stripe class ; 3. suitable graphical format (**ACCEPT** histogram or bar chart) which allows direct comparison of the habitats with suitable axes labelled ; 4. suitable statistical test: t-test or Mann-W U for single means / chi-squared for categorical number classes ; 5. correct comment on 5% confidence limits ;	**(5)**

Question Number	Answer	Mark
2(c)	**Limitations** 1. difficult to confirm in which habitat the birds select the snails / eq ; 2. birds may use more than one anvil site ; 3. difficult to count stripes on broken shells / difficult to ensure shells not counted twice when broken ; 4. clearing / counting at anvil sites might disturb natural habits of song thrushes ; 5. song thrushes may have different prey / could vary with seasons / banded snails may have other predators ; **Further work** 6. field / laboratory observations to confirm selection of snails by thrushes ; 7. repeat investigation in different habitats ; 8. investigate total diet of song thrushes ; 9. investigate other predators of banded snails ; 10. investigate distribution of banding in snails over long period (to determine effect of predation) ;	**max (6)**

Unit 6 (6106/03)

Question Number	Answer	Mark
1(a)	**Action potential:** 1. correct reference to depolarisation / change in membrane potential / change from –ve to +ve / inside becomes +ve ; 2. due to {influx / eq} of sodium ions ; **Transmitter substance:** 1. (chemical substance) released by presynaptic neurone /eq ; 2. diffuses across {synaptic cleft / eq} / attaches to {receptor / postsynaptic membrane / eq} / affects activity of postsynaptic cell / reference to post-synaptic potential / eq ;	**(2)** **(2)**

Question Number	Answer	Mark
1(b)	1. reference to proportional relationship ; 2. credit a suitable quantitative comment (e.g. ‘as axon diameter increases from 2 to 14, the conduction velocity increases by 67 m sec^{-1}’) ;	**(2)**

Question Number	Answer	Mark
1(c)	1. conduction of nerve impulses would {stop / slow down}/ eq ; 2. active transport stops / eq ; 3. {ion / named ion} gradients not maintained / eq ; 4. (because) sodium <u>and</u> potassium ions not re-exchanged / eq ;	**max (3)**

Question Number	Answer	Mark
2(a)(i)	1. some light is reflected (by the leaf) / eq ; 2. some will {be transmitted / not absorbed /eq}; 3. some inappropriate wavelength / eq ; 4. inefficiency of photosynthesis / eq ; 5. light energy used to evaporate water / eq ; 6. reference to saturation of chlorophyll with light (at high light intensity) ;	**max (3)**

Question Number	Answer	Mark
2(a)(ii)	2000 $\underline{\text{kJ m}^{-2}\text{ yr}^{-1}}$;	**(1)**

Question Number	Answer	Mark
2(a)(iii)	appropriate calculation (e.g. 8000 ÷ 1000 000 × 100) ; 0.8 (%) ;	**(2)**

Question Number	Answer	Mark
2(b)(i)	1. overall {**greater / faster / eq**} (growth) on diet containing **maltose** (or converse for glucose) /eq ; 2. little difference up to 12 days / greater difference from 12 to 18 days /eq ; 3. manipulated quantitative <u>comparison</u> ; e.g. 'mean mass when fed on diet containing maltose is 110 mg higher than on diet containing glucose at 18 days' 'increase in mass on maltose diet is 535 g, but 425 g on glucose diet' 'mass of locusts on maltose diet is 24% higher (than those on glucose diet) at 18 days'	**max (2)**

Question Number	Answer	Mark
2(b)(ii)	1. reference to use (as substrates) for respiration / used to produce ATP ; 2. reference to energy for flight / movement / active transport / growth / eq ; 3. reference to synthesis of{new substances / named example e.g. amino acids, lipids, chitin} ; 4. conversion to storage compounds / eq ;	**max (2)**

Question Number	Answer	Mark
2(c)	1. biopesticides are specific to locusts / no harm to non-target species / eq ; 2. locusts are unlikely to become <u>resistant</u> ; 3. biopesticide may only need to be applied once / self sustaining idea / eq ; 4. no bioaccumulation / no harmful residues in crops / ref to {persistence / stability} of chemical insecticides ; 5. reference to no resurgence / eq ;	**max (4)**

Quick guide to the scientific content mark

AS content	**A2 content**	**S mark**
No relevant or accurate content at all		0
Very few correct facts		1
Some correct facts	Little or no relevant A2 content	3
Generally accurate AS content	Some A2 content, but lacks depth and accurate details	5
Generally accurate AS content	Average A2 content	7
Accurate and relevant AS content **must be present**	Good A2 content	9
Accurate and relevant AS content **must be present**	Excellent A2 content	11

AS content ONLY	**S = 3 max**
A2 content ONLY	**S = 7 max**

ESSAY MARK SCHEME

Outline scheme for marking essay questions 3, 4B and 5H

11 available for Scientific content (S)
2 available for Balance (B)
2 available for Coherence (C) **Total maximum mark available: 15**

Scientific content (S)

Scientific content (S)	Description
11 (good)	The essay demonstrates a sound understanding of the topic and contains a significant amount of material from most areas of the mark scheme, **including A2 content**. Suitable examples are included and the candidate has clearly and coherently linked together information from different parts of the specification.
9 (above average)	An above average essay, with accurate content. The essay includes a good balance of material from several areas of the mark scheme, **including A2 content**, and examples where appropriate. There may be some minor factual errors.
7 (average)	The essay includes relevant information from some areas of the mark scheme, **including A2 content**. The candidate links together some facts and principles. Some examples are included. There may be some minor factual errors.
5 (below average)	The essay includes some generally factually accurate and relevant material, and there is some attempt to link material from more than one area of the mark scheme. **The A2 content, in particular, lacks depth and accurate details**.
3 (poor)	There are some correct facts, but the essay lacks depth and accuracy. The essay contains **little or no relevant information from the A2 content**.
1 (poor)	There are very few correct facts. The essay is generally superficial and inaccurate.
0 (poor)	No correct or relevant material is included.

Note: If a **scientific content** mark of **0**, **1**, or **3** is awarded, it is very **unlikely** that a **balance** mark of more than **1** is appropriate.

An essay containing **AS** content **only** can be awarded a **max of 3** for scientific content.

An essay containing **A2** content **only** can be awarded a **max of 7** for scientific content.

S = 11 marks

Balance (B)

2 Most of the main topic areas outlined are covered
Some discussion of each of the areas chosen, illustrated with suitable examples where appropriate
Material included is all relevant to the topic and the candidate has linked information from more than one area of the specification.
Few, if any, errors

1 Some of the main topic areas outlined are covered.
Some discussion of each of the areas chosen.
Some irrelevant material included.
There are some examples which link together different areas of the specification. Some errors.

0 Very limited account, possibly only one aspect chosen
Material mostly irrelevant
No examples of the candidate linking information from different topics
Large number of errors

B = 2 marks

Coherence (C)

2 Material logically presented, with little or no repetition
Essay has coherence, ideas are developed well; continuous prose used throughout
Essay has an introduction and a conclusion, summing up the main points
Technical terms have been used correctly
Spelling, punctuation and grammar are sound

1 Material is presented in an orderly way and some ideas developed
Continuous prose used throughout
The introduction and conclusion may be present, but brief
Technical terms are used and generally in the correct context
Spelling, punctuation and grammar are generally sound

0 Essay style not used
Material in note form or numbered points
Very poor standard of spelling, punctuation and grammar

C = 2 marks

Question Number	Answer	Mark
3	Introduction could include overview of DNA, RNA and the genetic code – Basic structure of a mononucleotide – Phosphate, pentose and base - Purine and pyrimidine bases – Formation of a polynucleotide – Complementary base pairing- The double helix – Base sequence and the genetic code – **Point mutation defined -** **Specific reference to <u>effect</u> of point mutation on the genetic code and amino acid sequence -** **Frame shift -** **Specific reference to sickle cell anaemia -** **Credit other examples of point mutations e.g. PKU -**	**Scientific content 11 marks** **Balance 2 marks** **Coherence 2 marks** **(15)**

Question Number	Answer	Mark
4B	Introduction could include reference to the properties of water (Unit 1) – Uptake and transport of water – Symplast, apoplast and vacuolar pathways – Role of the endodermis and the Casparian strip – Transport in xylem – Cohesion-tension theory – The transpiration stream – Water as a solvent for the uptake and transport of mineral ions – **Reference to phosphate, nitrate and magnesium ions -** Water as a solvent for transport of organic solutes in phloem - **Water in the light-dependent reactions of photosynthesis -** Evaporative cooling – Changes in turgor and stomatal mechanisms – Turgor and support –	**Scientific content 11 marks** **Balance 2 marks** **Coherence 2 marks** **(15)**

Question Number	Answer	Mark
5H	Introduction could include a reference to the growth of human populations and outline of desertification – **Factors affecting growth of human populations -** **Variations in fertility -** **Birth rates -** **Death rates -** **Growth curves and population pyramids -** **Implications of world population trends -** Causes of desertification – Climatic factors – Human population pressures – Effects of desertification – Soil erosion – Salinisation – Reduction of biodiversity –	**Scientific content 11 marks** **Balance 2 marks** **Coherence 2 marks** **(15)**

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