



# **2014 Biology**

## **Higher**

### **Finalised Marking Instructions**

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## Part One: General Marking Principles for: Biology Higher

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.
- (b) Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

### GENERAL MARKING ADVICE: Biology Higher

The marking schemes are written to assist in determining the “minimal acceptable answer” rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates’ evidence, and apply to marking both end of unit assessments and course assessments.

1. There are no **half marks**. Where three answers are needed for two marks, normally one or two correct answers gain one mark.
2. In the mark scheme, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.
3. In the mark scheme, words separated by / are **alternatives**.
4. If two answers are given which contradict one another the first answer should be taken. However, there are occasions where the second answer negates the first and no marks are given. There is no hard and fast rule here, and professional judgement must be applied. Good marking schemes should cover these eventualities.
5. Where questions in data are in two parts, if the second part of the question is correct in relation to an incorrect answer given in the first part, then the mark can often be given. The general rule is that candidates should not be penalised repeatedly.
6. If a numerical answer is required and units are not given in the stem of the question or in the answer space, candidates must supply the units to gain the mark. If units are required on more than one occasion, candidates should not be penalised repeatedly.

7. Clear indication of understanding is what is required, so:
- if a description or explanation is asked for, a one word answer is not acceptable
  - if the question asks for **letters** and the candidate gives words and they are correct, then give the mark
  - if the question asks for a word to be **underlined** and the candidate circles the word, then give the mark
  - if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
  - **chemical formulae** are acceptable eg CO<sub>2</sub>, H<sub>2</sub>O
  - contractions used in the Arrangements document eg DNA, ATP are acceptable
  - words not required in the syllabus can still be given credit if used appropriately eg metaphase of meiosis
8. Incorrect **spelling** is given. Sound out the word(s),
- if the correct item is recognisable then give the mark
  - if the word can easily be confused with another biological term then **do not** give the mark eg ureter and urethra
  - if the word is a mixture of other biological words then **do not** give the mark, eg mellum, melebrum, amniosynthesis
9. **Presentation of data:**
- if a candidate provides two graphs or bar charts (eg one in the question and another at the end of the booklet), mark both and give the higher score
  - if question asks for a line graph and a histogram or bar chart is given, then do not give the mark(s). Credit can be given for labelling the axes correctly, plotting the points, joining the points either with straight lines or curves (best fit rarely used)
  - if the x and y data are transposed, then do not give the mark
  - if the graph used less than 50% of the axes, then do not give the mark
  - if 0 is plotted when no data is given, then do not give the mark (ie candidates should only plot the data given)
  - no distinction is made between bar charts and histograms for marking purposes. (For information: bar charts should be used to show discontinuous features, have descriptions on the x axis and have separate columns; histograms should be used to show continuous features; have ranges of numbers on the x axis and have contiguous columns)
  - where data is read off a graph it is often good practice to allow for acceptable minor error. An answer may be given  $7.3 \pm 0.1$
10. **Extended response questions:** if candidates give two answers where this is a choice, mark both and give the higher score.
11. **Annotating scripts:**
- put a 0 in the box if no marks awarded – a mark is required in each box
  - indicate on the scripts why marks were given for part of a question worth 3 or 2 marks. A ✓ or x near answers will do
12. **Totalling scripts:** errors in totalling can be more significant than errors in marking:
- enter a correct and carefully checked total for each candidate
  - do not use running totals as these have repeatedly been shown to lead to more errors

## Part Two: Marking Instructions for each Question

### Section A

Question			Expected Answer(s)	Max Mark	Additional Guidance
1			D		
2			D		
3			A		
4			B		
5			B		
6			B		
7			D		
8			A		
9			C		
10			D		
11			B		
12			D		
13			B		
14			A		
15			A		
16			B		

Question			Expected Answer(s)	Max Mark	Additional Guidance
17			C		
18			C		
19			C		
20			A		
21			B		
22			D		
23			D		
24			A		
25			C		
26			D		
27			C		
28			C		
29			A		
30			A		

## Section B

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
1	(a)		Glycolysis	1		
1	(b)		Pyruvic acid – 3 <b>OR</b> 2x3C <b>OR</b> (2x)3 Substance Q – 4 Citric acid – 6  <b>3 = 2, 1 or 2 = 1</b>	2	2x3 alone	Additional other numbers
1	(c)		Substance R – hydrogen/H/H <sub>2</sub> (NAD) - ignore  Carrier – NAD/NADH/NADH <sub>2</sub> /FAD/FADH/FADH <sub>2</sub> <b>OR</b> reduced NAD/FAD <b>Both = 1</b>	1	Reversed answers	
1	(d)	(i)	Substance S – oxygen/O/O <sub>2</sub> /O <sub>2</sub> /O <sup>2</sup>	1		
1	(d)	(ii)	Role – final/ultimate/last acceptor of hydrogen <b>OR</b> Joins/combines/bonds/fixes with hydrogen to form water/H <sub>2</sub> O	1	Final hydrogen carrier/receptor Forms with/ converts hydrogen to water	

Question		Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
1	(e)	<p><b>Difference</b> More cristae</p> <p><b>OR</b> crista/cristae/inner membrane</p> <p>have a larger surface area/ more (highly) folded/more densely packed/longer/larger</p> <p>in muscle cell <i>reference to muscle could be in explanation</i></p> <p><b>OR</b> converse for skin cell      <b>1</b></p> <p><b>Explanation</b> releases/produces/provides/ needs/requires more energy/ ATP/power</p> <p><b>OR</b> produces ATP faster for (muscle) contraction/ movement/activity      <b>1</b></p> <p><i>relax not negating</i></p>		<p>Many cristae</p> <p>More respiration</p> <p>For muscle cell alone Muscle function</p> <p>Not converse for skin here</p>	Mention of matrix
2	(a)	Transmitted/passes through <b>OR</b> reflected/bounces back	1		Other wrong answers
2	(b)	<p>Pigment – X</p> <p><b>Justification</b> Absorbs blue and red (light)</p> <p>best/better/more/mainly/at a higher percentage/greater/ higher/more efficiently (than pigment Y/than green)</p> <p><b>OR</b> Converse for green</p> <p><b>Both</b></p> <p><i>Violet not negating</i></p>	1	<p>Absorbs red and blue light alone</p> <p>Absorbs very little green light</p> <p>High absorption of red and blue light</p>	

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
2	(c)	(i)	As wavelength/nm increases to 550 nm absorption also increases <b>1</b>  As wavelength/nm increases further/over 550 nm absorption decreases  <i>nm needed at least once</i> <i>550 needed at least once</i>  <i>no units = 1</i> <b>1</b>	<b>2</b>	Description of pigment X  Drops at 680nm  Colours instead of wavelengths  Increases then decreases	
2	(c)	(ii)	Would allow absorption/use of Light/wavelengths/colours  Not absorbed by/reflected from/transmitted through/not used by/passing through/filtered through/transmitted by  Larger plants/the canopy/ trees/ sun plants/higher leaves/leaves above  <b>1</b>	<b>1</b>	Gets light  Absorbs green light alone Blocked by By-passes Shines through  Leaves alone Plants alone	
3	(a)		True False messenger/mRNA False nucleotides  <b>All lines = 2, 1 or 2 = 1</b>	<b>2</b>	RNA alone	tRNA
3	(b)	(i)	400	<b>1</b>		
3	(b)	(ii)	132	<b>1</b>		
3	(c)		(rough) ER/endoplasmic reticulum <b>OR</b> vesicles from ER  <i>Smooth not negating</i>	<b>1</b>	Vesicles alone	
3	(d)		globular – 1, 3 and 4 <b>OR</b> names fibrous – 2 <b>OR</b> name  <b>All correct = 2, one in wrong column = 1</b>	<b>2</b>		



Question		Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
4	(a)	1.75 g per litre	1		
4	(b)	10 – 20 hours	1		
4	(c)	15.75 - 16 hours	1		
4	(d)	20 g	1		
5	(a)	<p>Have a common/the same ancestor <b>OR</b> evolved/started/came from a single/the same species      <b>1</b></p> <p>petals/tube/flower length/shape/size</p> <p>adapted to/suitable for/changed to fit/made it easier for/varied to suit/evolved to suit/changed to accommodate</p> <p>specialised/specific/each/different pollinators</p> <p><b>OR</b> correctly described all three flowers and their pollinators      <b>1</b></p>	<b>2</b>	<p>Different petals/tube/flowers</p> <p>Encourage/attract</p> <p>Nectar feeding animals</p> <p>Animals alone</p>	
5	(b)	Interspecific	1	interspecies	
5	(c)	Energy from nectar/food/pollen must exceed/be greater than/outweigh/> that used in foraging <b>OR</b> searching for/obtaining/gaining/finding nectar/food/it	1	<p>Net energy gain alone</p> <p>Energy gain from food must not be less than energy lost foraging</p> <p>Predators/prey</p>	

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
6	(a)	(i)	Increases from 0.12 g per 100 g to 0.14 in/by 2006. Decreases to 0.02 in/by 2011. Remains constant (until 2012).  <b>OR</b> using differences but must have a correct reference point  <b>All 3 = 2, 2 = 1, units required only once</b> <b>All figures correct but no units = 1</b> <i>Extra data not negating</i>	<b>2</b>		
6	(a)	(ii)	8 : 1	<b>1</b>		
6	(a)	(iii)	2.5 kg	<b>1</b>		
6	(b)	(i)	80%	<b>1</b>		
6	(b)	(ii)	Plants/they produce/contain/ have (Bt)-toxin/poison <b>OR</b> a toxin/poison is produced  so (leaf eating) insects deterred/harmed/killed/damaged/repelled  so more photosynthesis/energy  <b>OR</b> greater surface area (of leaves) for photosynthesis/energy  for increased yield <b>OR</b> growth <b>OR</b> seed production <b>OR</b> reproduce more	<b>1</b>      <b>1</b>  <b>2</b>	Substance Has a gene to produce toxin  Stops/prevents insects eating leaves	
6	(b)	(iii)	25.6 kg	<b>1</b>		

Question		Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
7	(a)	<p>Many/some/<i>E. coli</i>/bacteria resistant and survive/live/do not die <b>1</b></p> <p>pass on/breed to pass on/multiply to pass on</p> <p>resistance/resistance trait <b>OR</b> favourable/beneficial genes/alleles/characteristics/mutations</p> <p>to offspring/next generation <b>1</b></p>	<b>2</b>	<p>Immune (penalise once)</p> <p>Selective advantage alone</p> <p>replicating</p> <p>Strong/better/best/good</p>	
7	(b)	<p><b>Antibiotic – A</b></p> <p><b>Justification</b> – there were more/greater percentage of resistant (bacteria)</p> <p><b>OR</b> higher resistance</p> <p>at the start/initially/0 months/already</p> <p><b>Antibiotic and justification both correct</b></p>	<b>1</b>	<p>It begins higher</p> <p>A reached a higher resistance quicker</p> <p>Many/large percentage</p> <p>Higher resistance throughout</p> <p>After first injection/exposure</p>	

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
8	(a)		<p>Dominant/vigorous/fast-growing/aggressive/more competitive</p> <p>grasses/plants/species</p> <p>grazed/eaten/removed/kept down/kept in check <b>1</b></p> <p>allows others <b>OR</b> less dominant/less vigorous/slower-growing/less aggressive/less competitive</p> <p>to survive/grow/thrive/flower/gain light for photosynthesis <b>1</b></p>	<b>2</b>	<p>Stronger/larger/taller</p> <p>More abundant</p> <p>Killed/kept back/kept at bay</p> <p>More species to grow</p> <p>Weaker/smaller/delicate/fragile</p> <p>compete more successfully</p>	
8	(b)	(i)	<p>There are survivors/ is diversity the graph does not reach zero</p> <p>at 5-6 (units) of grazing/high grazing intensities/intense grazing</p> <p><b>OR</b> as grazing (intensity) increases diversity/graph never reaches zero</p>	<b>1</b>	<p>The graph levels off at high grazing intensity</p> <p>Extreme grazing intensity</p>	
8	(b)	(ii)	<p>Low/underground/basal/deep meristems/growing points/ regions of mitosis</p> <p><b>OR</b> underground stems</p> <p><b>OR</b> deep roots</p> <p><b>OR</b> high powers of regeneration</p>	<b>1</b>	<p>Long roots</p>	
8	(c)	(i)	<p>spines/thorns/stings</p>	<b>1</b>	<p>Spikes/prickles/ Needles</p> <p>Descriptions</p>	
8	(c)	(ii)	<p>tannins/nicotine/(hydrogen) cyanide</p>	<b>1</b>	<p>alkaloids</p>	<p>resin</p>

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
9	(a)		no/lack of sweat glands <b>OR</b> does not sweat <b>OR</b> dry mouth/nasal passages  Behavioural/behaviour  physiological  long/large surface area of tubules/loops of Henle  <b>OR</b> more/high ADH  <b>All 4 = 2, 2 or 3 = 1</b>	<b>2</b>	Few/less sweat glands Sweat ducts Dry nose  Structural  References to glomeruli Big loops of Henle  Tubules more permeable Increased ADH	
9	(b)	(i)	B, C and F  <b>All = 1</b>	<b>1</b>		
9	(b)	(ii)	A and D  <b>Both = 1</b>	<b>1</b>		
10	(a)	(i)	<b>Letter</b> – A <b>Reason</b> – wider <b>OR</b> larger diameter/bore/lumen	<b>1</b>	Thin walls Larger alone	
10	(a)	(ii)	Cambium	<b>1</b>	Lateral meristem	Other incorrect answers
10	(a)	(iii)	Annual (growth) ring	<b>1</b>		Other incorrect answers
10	(b)		Particular/some/required/certain/specific genes are switched on/activated  <b>AND</b> others are switched off/not switched on/remain switched off <b>OR</b> correct description of genes which are switched on and those which are switched off in a named cell	<b>1</b>	Different genes switched on and/or off Unused genes Some are on and some are off Expressed not equivalent to on	

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
11	(a)		Regulator (gene)  switches on/turns on/activates structural gene/gene 2 (and off)  Structural (gene)  <b>All 3 = 2, 2 or 1 = 1</b>	<b>2</b>	Controls structural gene Switches off structural gene Binds to repressor/Y	
11	(b)		Translation	<b>1</b>	Protein synthesis	
11	(c)	(i)	Lactose	<b>1</b>		
11	(c)	(ii)	Saves/conserves/does not waste/makes efficient use of resources/energy/ATP/amino acids/materials	<b>1</b>	Only makes enzyme when needed Enzyme not wasted Energy preserved/reserved Does not use up resources/energy/ATP/amino acids/materials	

Question		Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
12	(a)	<p>Scales including origin point and enclosing <b>AND</b> labels from table including units (accept seconds and sec for s) <b>1</b></p> <p>Plots <b>AND</b> straight line connection <b>1</b></p> <p><i>Ignore prediction extension line</i></p>	<b>2</b>	Duration of exercise (s)	
12	(b) (i)	<p>Rate/speed/intensity of pedalling <b>OR</b> resistance/gear/effort <b>OR</b> volume of water intake <b>OR</b> clothing/area of exposed skin <b>OR</b> method of measuring sweat production (or description) <b>OR</b> length of recovery period</p> <p><b>Any 2 each from a different category</b></p>	<b>2</b>	Bike Person Food intake Air flow Hydration levels Oxygen levels Activity during recovery period Water intake alone	
12	(b) (ii)	<p>Repeat (experiment) with more subjects/people/humans/ different sexes</p> <p><i>at least one other person suggested</i></p>	<b>1</b>	Repeat alone Repeat experiment Repeat at each duration of exercise	
12	(c)	<p>Same (surface) area of skin <b>OR</b> per cm<sup>2</sup> of skin used measured/used/taken <b>AND</b> size/height/mass/skin surface/build (of subject) does not matter/could be different</p>	<b>1</b>	Different subjects to be compared alone	
12	(d)	0.48mg	<b>1</b>		
12	(e)	Any value from 0.45 – 0.48mg	<b>1</b>		

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
12	(f)	(i)	Enzymes have an optimum temperature/temperature at which they work best/are denatured by high temperatures/work slowly at low temperatures	1	Enzymes are temperature dependent/are controlled/affected by temperature/work within a range of temperatures/work at a specific temperature/would be denatured	
12	(f)	(ii)	Endotherms/homeotherms endothermic	1	endoterm	



Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
13	(a)	(i)	Repeat exactly/same set up/ same experiment/description  but include/with/add magnesium/all elements/all minerals/all macro-elements <b>OR</b> without lacking magnesium	1	Same set up but use magnesium	
13	(a)	(ii)	oxygen for respiration  respiration releases/ provides/ produces energy/ATP  ATP/energy needed for active uptake/active transport <b>OR</b> uptake against concentration gradient  <b>All 3 = 2, 2 or 1 = 1</b>	2	Breakdown of glucose Aerobic respiration alone Air/it for respiration	
13	(a)	(iii)	Chlorosis <b>OR</b> yellow/chlorotic leaves <b>OR</b> lack of chlorophyll	1	Seedling/plants	
13	(b)		Haemoglobin/cytochrome/ enzymes	1	Hydrogen carriers Prevents anaemia	

Question			Acceptable answer(s)	Max Mark	Unacceptable answer	Negates
14	(a)	(i)	12 hours (of light in 24 hours)	1		
14	(a)	(ii)	Young/offspring/calves/babies/ fawns born in spring/summer <b>AND</b> when more/sufficient/ enough food/grass available <b>OR</b> weather favourable <b>OR</b> temperature warmer/ favourable/higher <b>OR</b> to avoid unfavourable weather/temperature/lack of food in winter	1	Children/bambis  Months when  Resources Conditions/climate	
14	(b)	(i)	Phototropism	1	phototrophism	
14	(b)	(ii)	(Shoot grown in) darkness / absence of light/ lacking light	1	Low light	
15	(a)		succession	1		
15	(b)		climax (community)  <i>climax vegetation not negating</i>	1		
15	(c)		Final/climax community has more complex/stable food webs  <b>OR</b> larger/higher increased biomass  <b>OR</b> greater species diversity/ biodiversity/ number of species/ range of species  <b>OR</b> converses must be comparative  <b>Any 1</b>	1	Larger food webs References to soil  Larger mass Larger plants  Higher diversity Increased plant diversity Greater variety of life  Dynamic equilibrium Climax would not be succeeded	

## Section C

### 1A

(i)	1	occurrence is random <b>and</b> at low frequency/rare/not frequent	1
	2	mutagenic agents increase/speed up the rate/frequency/likelihood of/chance of/ occurrence of mutation <b>NOT</b> cause/induce mutation alone	1
	3	they include chemical (agent)s/colchicine/mustard gas/benzene <b>NOT</b> tars/petrochemicals/cigarette smoke etc	1
	4	Radiation <b>OR</b> X-rays <b>OR</b> UV light/radiation	1
		Any 3 <span style="float: right;"><b>Max 3 (from 4)</b></span>	
(ii)	5	include inversion/substitution/deletion/insertion ( <b>any 2</b> ) <b>NOTE</b> - accept phonetic endings eg sion for tion	1
	6	the other two	1
	7	description of <b>one</b> named mutation in terms of bases/nucleotides eg inversion – bases/nucleotides rotate through 180°/swivel/flip round eg substitution – base/nucleotide/named bases substituted/ swapped/replaced by another eg – insertion base/nucleotide/named base inserted/placed into sequence eg – deletion base/nucleotide/named base deleted/removed <b>NOTE</b> - could be shown in diagrams but note that bases/nucleotides must be labelled as such or named	1
	8	another description	1
	9	inversion <b>and</b> substitution change/affect one/two/a few bases/nucleotides <b>OR</b> one/two codons/triplets <b>OR</b> are point mutations	1
	10	deletion <b>and</b> insertion change/affect all/every/each codon/triplet after mutation/from the mutation on <b>OR</b> are frame-shift mutations	1
	11	point mutations/inversion/substitution change one/two amino acids	1
	12	point mutations/inversion/substitution cause minor changes to the protein structure/function	1
	13	frame shift/deletion/ insertion change all amino acids after the mutation	1
	14	frame shift/deletion/insertion cause major changes to protein structure/function	1
		Any 7 <span style="float: right;"><b>Max 7 (from 10)</b></span>	
			<b>Total 10</b>

**1B**

- (i) 1 xerophytes live in arid/dry places/habitats **OR** in deserts/places with water shortage/places where transpiration rates are high **NOT** windy/hot 1
- 2 xerophytes are adapted to reduce water loss/transpiration/evaporation **NOT** stops/prevents water loss/transpiration/evaporation **OR** low water availability 1
- 3 one adaptation, ie reduced surface area/small leaves/few leaves/leaves reduced to spines/few stomata/thick (waxy) cuticle/reversed stomatal rhythm **OR** description of reversed stomatal rhythm 1
- 4 and its explanation, ie reduction of evaporation/transpiration **NOT** stops/prevents water loss/transpiration/evaporation 1
- 5 second adaptation, ie sunken stomata **OR** stomata in pits **OR** rolled/hairy leaves 1
- 6 and its explanation, ie reduces air movements/effect of wind **OR** traps moist/damp air **OR** traps water vapour **NOT** moisture/water **OR** traps/increases humidity 1
- 7 third adaptation, ie root (system) superficial/shallow/near the surface **OR** deep roots **NOT** long roots alone **NOTE** long roots to reach deep water = 7 and 8 **OR** succulent tissues 1
- 8 and its explanation, ie superficial/shallow collects water when available/after rain **OR** before water evaporates/drains **OR** deep roots collect water from deep in ground/water table **OR** succulent tissue to store water 1
- Any 6 **Max 6 (from 8)**
- (ii) 9 hydrophytes are plants adapted for life/growth (submerged) in water **OR** hydrophytes live in water/ponds/lochs/etc 1
- 10 one adaptation, floating leaves/air spaces in leaves/air bladders **OR** stomata on upper surface 1
- 11 and its explanation, ie keep leaves in light/air/on surface **OR** keeps stomata in the air 1
- 12 allowing photosynthesis/gas exchange **OR** allowing gas exchange (10, 11 and 12 must match up) 1
- 13 a second adaptation, ie flexible stems **OR** flexible petioles/leaf stalks **OR** central(ly located) xylem vessels **OR** divided/dissected/feathery/ribbon-like leaves 1

14 and its explanation, ie bends with current/prevents damage by/ 1  
breaking in current/waves/water movement  
**OR** keeps leaf in the light when water level changes

Any 4

**Max 4 (from 6)**

**NOTE** – if xerophytes and hydrophytes mixed up, marks 1, 2 and 9 not available but others may be awarded

**Total 10**

2A

1	double membrane <b>OR</b> labelled on diagram	1
2	stroma is liquid filled/a gel containing enzymes <b>OR</b> labelled on diagram	1
3	grana/granum are (stacks of) membranes containing pigments/chlorophyll <b>OR</b> labelled on diagram	1
3a	<b>If neither points 2 nor 3 awarded</b> Award 1 mark for clearly labelled diagram with grana and stroma	
	<b>Max 2 (from 3)</b>	
4	carbon fixation/Calvin cycle in stroma <b>NOT</b> dark reaction/light independent stage	1
5	carbon fixation/Calvin cycle is enzyme-controlled <b>NOT</b> dark reaction/light independent stage	1
6	CO <sub>2</sub> accepted by/joins to/binds to RuBP <b>OR</b> RuBP is CO <sub>2</sub> acceptor	1
7	to form GP (must link to 6)	1
8	H/hydrogen reduces CO <sub>2</sub> to carbohydrate/glucose <b>OR</b> reduces GP	1
9	ATP used as energy source for/transfers energy to this stage/carbon fixation	1
10	GP converted to glucose	1
11	GP used to regenerate/is converted to RuBP <b>NOTE</b> – reference to TP as an intermediate not negating	1
12	carbon atom numbers of GP (3), RuBP (5) and glucose (6) <b>NOTE</b> - Diagrams require arrowheads	1

**Max 6 (from 9)**

C	Information grouped under chloroplast structure and carbon fixation At least 1 mark on chloroplast structure At least 4 marks on carbon fixation At least 5 marks scored <b>All four</b>	1
R	No mention of respiration or mitochondria At least 1 mark on chloroplast structure At least 4 marks on carbon fixation At least 5 marks scored <b>All four</b>	1

**Total 10**

**2B**

1	membrane is a fluid mosaic	1
2	phospholipid double/bi layer <b>OR</b> phospholipid is fluid	1
3	protein distributed in mosaic/patchy pattern <b>OR</b> scattered within phospholipid	1
3a	<b>If neither 2 nor 3 is awarded</b> Award 1 mark for membrane contains phospholipid and protein <b>OR</b> correctly labelled diagram	
4	pores <b>OR</b> channels in protein <b>Not</b> canal	1
5	Pores/channels make the membrane selectively/semi permeable membrane	1
6	Water passes through pores/channels by osmosis	1
7	from high water concentration/HWC to lower water concentration/LWC <b>OR</b> from hypotonic to hypertonic	1
	<b>Max 5 (from 7)</b>	
8	(cell) wall made of cellulose	1
9	cellulose fibres	1
10	(cell) wall fully/freely permeable to water	1
11	prevents cell bursting when water enters/in hypotonic solution <b>OR</b> allows cell to become turgid cell	1
12	provides support for cell/plant	1
	<b>NOTE</b> to gain 3 marks on wall, at least 1 must come from points 8 and 9	
	<b>Max 3 (from 5)</b>	
C	Divided into sections either membrane then wall as above <b>OR</b> structure then function Structure – 1, 2, 3, 4, 8, 9 Function – 5, 6, 7, 10, 11, 12 At least 3 marks on membrane and 2 marks on wall <b>OR</b> 2/3 structure and 2/3 on function 5 marks scored <b>All four</b>	1
R	No mention of details of other organelles or active transport At least 3 marks on membrane and 2 marks on wall <b>OR</b> 2/3 on structure and 2/3 on function 5 marks scored <b>All four</b>	1
	<b>Total</b>	<b>10</b>

[END OF MARKING INSTRUCTIONS]