A-level
BIOLOGY
7402/1

Paper 1

Mark scheme

June 2022

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Mark scheme instructions to examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information in the 'Comments' column is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for the same mark are indicated by the use of **OR**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of errors / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (often prefaced by 'Ignore' in the 'Comments' column of the mark scheme) are not penalised.

3.2 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can usually be gained by correct substitution / working and this is shown in the 'Comments' column or by each stage of a longer calculation.

3.3 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward, consequential marking and arithmetic errors

Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ECF or consequential in the mark scheme.

An arithmetic error should be penalised for one mark only unless otherwise amplified in the mark scheme. Arithmetic errors may arise from a slip in a calculation or from an incorrect transfer of a numerical value from data given in a question.

3.5 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.6 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.7 Ignore / Insufficient / Do not allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Question	Marking Guidance	Mark	Comments
01.1	**Structure** 1. Nuclear envelope **and** pores **OR** Double membrane **and** pores; 2. Chromosomes/chromatin **OR** DNA with <u>histones</u>; 3. Nucleolus/nucleoli; **Function** 4. (Holds/stores) genetic information/material for polypeptides (production) **OR** (Is) code for polypeptides; 5. DNA replication (occurs)~~;~~ 6. Production of mRNA/tRNA **OR** Transcription (occurs); 7. Production of rRNA/ribosomes;	4 max (4 x AO1)	Max 2 for structure or function 1. Ignore porous for pores 2 Ignore genetic material/information 2. Accept nucleoplasm 2. Ignore promoter regions OR genes OR alleles Accept regulation of gene expression 4. Accept protein OR amino acid sequences OR primary structure for polypeptides 6 Ignore mRNA leaves nucleus

Question	Marking Guidance	Mark	Comments
01.2	Cellulose (plants) **and** Chitin (fungi);	1 (AO1)	For fungi, accept N-acetylglucosamine

Question	Marking Guidance	Mark	Comments
01.3	Individual organisms could not be identified/separated **OR** Too small/numerous to count individuals **OR** Too time consuming;	1 (AO2)	Ignore too difficult to identify/distinguish different species Ignore too difficult to count unless qualified Accept reference to fungi for plants

Question	Marking Guidance	Mark	Comments
01.4	Correct answer for 2 marks, 0.7– 0.71;; Accept for 1 mark, 0.29 – 0.3 (correct calculation not subtracted from 1) **OR** 120 (correct total shoot biomass)	2 (2 x AO2)	A common correct answer is 0.707 Accept numbers rounding down to 0.71

Question	Marking Guidance	Mark	Comments
01.5	1. **Plant** (bio)diversity is lower on (previously used) crop land **OR** **Plant (**bio)diversity is higher on land not used (previously to grow crops); 2. Farming reduces (bio)diversity of **fungi** **OR** Farming reduces **fungal** species richness;	2 (2 x AO3)	Assume index of diversity refers to plants If no context is given assume answer refers to land previously used to grow crops 1. Accept farming reduces **plant** (bio)diversity 2. Accept farming reduces number of **fungal** species

Question	Marking Guidance	Mark	Comments
02.1	1. (Some bacteria have) alleles for resistance; 2. (Exposure to) antibiotics is the selection pressure **OR** Non-resistant bacteria die **OR** Resistant bacteria survive/reproduce; 3. More antibiotics used in hospital (compared with elsewhere) **OR** Patients have weakened immune systems **OR** (So) high frequency of resistance allele (in bacterial population);	3 (3 x AO1)	1 and 2 Reject reference to immunity only once 1. and 3. Accept gene for allele 1. Reject if antibiotics cause production of resistance gene/allele 2. Accept strain for bacteria 3. Ignore antibiotics prescribed when not needed OR antibiotic course is not finished 3. Ignore defence system, for immune system 3. Accept proportion/percentage for frequency

Question	Marking Guidance	Mark	Comments
02.2	Maltose;	1 (AO1)	Reject maltase Accept phonetic spelling eg moltose/maltosse/maltoze/moltoes/maltoez

Question	Marking Guidance	Mark	Comments
02.3	1. Wash hands with soap **OR** Disinfect surfaces; 2. Use sterile pipette/syringe (to transfer bacteria); 3. (Remove bottle lid and) flame neck of bottle; 4. Lift lid of (agar) plate at an angle; 5. Work close to upward air movement; 6. Use sterile spreader; 7. Place pipette/spreader into disinfectant (immediately after use);	3 max (3 x AO1)	1. Ignore sterilise hands OR surfaces 1. Accept sanitise for disinfect 1. Accept antiseptic /antimicrobial/alcohol (wipes) 1. and 7 Accept a named type of disinfectant 2. Reject loop 2. Accept use unopened pipette/syringe for sterile 4. Accept lift lid slightly OR keep lid over plate 4. Ignore work quickly with lid off 5 Reject air movements sterilise air 5 Accept convection current for air movement 6. Accept loop for spreader 6. Examples of sterilising technique eg, flame OR dip in alcohol and flame OR dip in disinfectant and rinse (in sterile water)

Question	Marking Guidance	Mark	Comments
02.4	**For** 1. Resistant bacteria grow faster with trehalose; 2. (So) resistant bacteria (likely to) increase in frequency in the population/people; 3. Resistant bacteria (likely to) outcompete non-resistant bacteria; **Against** 4. In laboratory not in people; 5. Other disaccharides (in the diet) might affect bacteria; 6. Other bacterial species (in the body) might affect bacteria; 7. No stats test to see if difference/increase is significant; 8. No data for both resistant and non-resistant bacteria growing together; 9. No data for different concentrations of trehalose;	3 max (3 x AO3)	Max 2 if only 'For' or only 'Against' marks 1, 2, 3 ,4 and 5 Accept *C. difficile*/strain for bacteria 2. Accept 'percentage/ proportion' for 'frequency' 5. Accept carbohydrate OR polysaccharide OR sugar, for disaccharide 7. Accept 'is not due to chance' for 'is significant' 7. Ignore standard deviation/SD (as not a stats test) 7 Reject 'to see if results are significant'

Question	Marking Guidance	Mark	Comments
03.1	For 1 mark, accept any **two** from Prokaryotes have No membrane-bound organelles/correct example **OR** (Single,) circular/loop DNA (in cytoplasm) **OR** DNA free in cytoplasm **OR** DNA not associated with proteins/histones **OR** Murein/peptidoglycan (in) cell wall;	1 (AO1)	Apply list rule Accept (prokaryotes) only have smaller ribosomes /60S/70S Accept mesosome Accept no introns Accept nucleoid for single, circular DNA Reject nucleosome Reject plasmid Reject (bacterial) chromosome Reject capsule/slime layer Reject flagellum

Question	Marking Guidance	Mark	Comments
03.2	Hydrogen ☑	1 (AO1)	

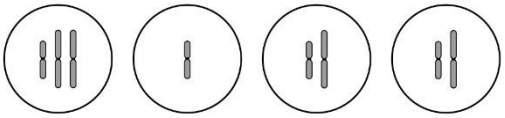
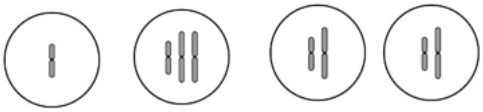
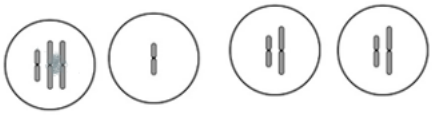
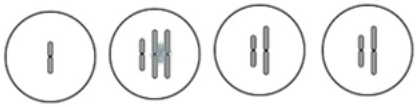
Question	Marking Guidance	Mark	Comments
03.3	1. Hydrophobic side next to/in/face fatty acids/tails **OR** Hydrophobic side next to/in/face hydrophobic (part of) phospholipid/bilayer; 2. Hydrophilic sides allow ion movement through membrane **OR** Hydrophilic sides form a channel;	2 (2 x AO2)	1 and 2 Accept 'part/region/bit/half' for side 2. Accept water OR charged/polar molecules/substances OR water-soluble substances for ions

Question	Marking Guidance	Mark	Comments
03.4	Correct answer for 2 marks, 2.5;; Accept for 1 mark, 2.5434 (Correct answer but 2 or more decimal places) **OR** 10.2 (correct area calculation using diameter, to 1 decimal place) **OR** 6.6 (correct calculation using radius (4 – 1.1) ÷ 2, to 1 decimal place) **OR** 26.4 (correct calculation using diameter, 4 – 1.1, to 1 decimal place)	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments
03.5	1. Cholesterol stabilises (the membrane) **OR** Cholesterol restricts the movement of molecules/phospholipids/fatty acid (tails) (making up the membrane); 2. (So) APs do not make channels in (eukaryotic) membranes **OR** (So) APs cannot enter the (eukaryotic) membrane;	2 (2 x AO3)	1. Accept makes (membrane) less flexible OR less fluid OR stiffer OR rigid OR gives structural support for stabilises 1. Ignore strength 1. Accept holds together for restricts movement 2. Accept fewer for do not 2. Accept cannot fit OR be positioned OR sit in OR form in OR embed OR disrupt for enter

Question	Marking Guidance	Mark	Comments
03.6	1. Antibody binds to AP **OR** Gold (present) where AP located; 2. (As antibody/tertiary structure is) <u>complementary</u> (to AP); 3. Gold interacts with electrons (in TEM); 4. (T)EM (used as it) has a high resolution;	3 max (3 x AO2)	1. Accept attaches OR forms antibody-AP OR antibody-antigen complex, for binds 2. Reject reference to active site 3. For 'interact' accept scattered/deflected/reflected OR blocked/absorbed/ bounced/ interrupted OR a description of these

<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>04.1</td><td>1. Attachment proteins attach to receptors;
2. (Viral) nucleic acid enters cell;
3. Nucleic acid replicated in cell
OR
Reverse transcriptase makes DNA from RNA;
4. Cell produces (viral) protein/capsid/enzymes;
5. Virus assembled and released (from cell);</td><td>3 max
(3 x AO1)</td><td>1. For ‘attachment protein’ accept gp41/gp120/ glycoprotein but ignore ‘receptor protein’ (on virus)
1. Accept bind for attach
2. Accept references to engulfment OR injection for enters
Ignore references to virus DNA/RNA incorporated into cell genome/nucleus/
chromosomes
2. and 3. Accept RNA/DNA/genetic material for ‘nucleic acid’.
4. Accept capsomeres OR reverse transcriptase for protein
5. Accept lysis OR burst OR bud off OR emerge for released</td></tr>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>04.2</td><td>One mark for each correct column;;
<table>
<tr><th rowspan="2">Feature</th><th colspan="2">Cell cycle involving</th></tr>
<tr><th>Mitosis</th><th>Binary fission</th></tr>
<tr><td>Replication of linear DNA</td><td>✓</td><td></td></tr>
<tr><td>Replication of circular DNA</td><td></td><td>✓</td></tr>
<tr><td>Produces 2 daughter cells</td><td>✓</td><td>✓</td></tr>
<tr><td>Produces 4 daughter cells</td><td></td><td></td></tr>
<tr><td>Happens in prokaryotic cells</td><td></td><td>✓</td></tr>
<tr><td>Happens in eukaryotic cells</td><td>✓</td><td></td></tr>
</table></td><td>2
(2 x AO1)</td><td></td></tr>
</table>

Question	Marking Guidance	Mark	Comments
04.3	 **OR**  **OR**  **OR**  1. 2 cells on left correct, ignore differences in chromosome length in drawn cells; 2. 2 cells on right correct, ignore differences in chromosome length in drawn cells;	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments
04.4	(Conclusion not valid because) 1. (MM1) 197/197.1; **and** 2. (MM2) 83/82.8; **OR** Correct answer for 2 marks, 114 – 114.3 (correct difference between MM1 and MM2) Accept for 1 mark, 259.2 **and** 345.6 (using total population size) **OR** MM2 is 86/86.4 bigger (using population totals)	2 (2 x AO3)	

Question	Marking Guidance	Mark	Comments
05.1	More than 1 polypeptide;	1 (AO1)	Ignore prosthetic group OR named interactions between chains, eg disulfide bridge

Question	Marking Guidance	Mark	Comments
05.2	1. (Both) active sites have similar/identical tertiary structures **OR** (Both) active sites have identical amino acid sequences; 2. (So) form enzyme-substrate complexes (with the same substrate);	2 (2 x AO1)	1. Ignore shape for tertiary structure 1. Accept (both) have active sites that are complementary to different parts of the substrate; 1. Accept attach/bind for complementary 2 Accept E-S for enzyme-substrate

Question	Marking Guidance	Mark	Comments
05.3	1. Same volume of (each) buffer/pH solution; 2. Same concentration/mass of substrate (at start); 3. Same concentration/mass of **denatured** enzyme; If no marks gained, accept for 1 mark, Buffer **and** substrate **and** denatured enzyme **OR** Buffer **and** substrate **and** no enzyme **OR** Buffer **and** substrate **and** water;	3 (3 x AO3)	Ignore temperature Ignore amount for volume, concentration OR mass Accept pH solution for buffer 3. Accept description of denatured, eg boiled

Question	Marking Guidance	Mark	Comments
05.4	1. Both/**P** and **Q** (are) active at pH 8.4; 2. **P** is (equally/most) active at both pHs **OR** **Q** is less active than **P** at both pHs **OR** **P** not affected by pH (change) **OR** **Q** is affected by pH (change); 3. **Q** is denatured/not active at pH 7.5 **OR** **Q** is less active than the control at pH 7.5; 4. Reaction occurs without enzyme(s) **OR** Reaction occurs in the control; 5. All (reactions) reach same end (point) **OR** Substrate is not used up;	3 max (3 x AO3)	Do not mark across all three conclusions Accept catalyse OR breakdown (substrate) OR hydrolyse (substrate) OR digest (substrate) OR cause reaction for active/reaction Ignore works better for active/reaction Ignore reference to optimum 3. Accept description of denatured 5. Accept broken down OR catalysed OR digested OR hydrolysed for used (up) 5. Accept does not reach zero for not used up

Question	Marking Guidance	Mark	Comments
06.1	1. (Rate of) transpiration/evaporation increases due to increased temperature **OR** (Rate of) transpiration/evaporation increases due to increased light intensity **OR** (Rate of) transpiration/evaporation increases due to decreased humidity **OR** (Rate of) transpiration/evaporation increases due to increased wind/air movement; 2. (So) increased kinetic energy (causing more water loss) **OR** (So) increased water potential gradient (so more water lost) **OR** (So) increased (water) diffusion gradient (so more water lost); 3. Stomata open (at sunrise/after 5 am) allowing gas exchange **OR** Stomata open (at sunrise/after 5 am) allowing carbon dioxide to enter; 4. (Some) stomata close at midday/after 11 am (reducing transpiration);	4 (4 x AO2)	Ignore reference to tide 1 and 2 Reject tide affecting transpiration/ water potential/ humidity 1 and 2 Correct link needed between factor affecting transpiration and the explanation 4 Accept at 11 am as the time when stomata close

Question	Marking Guidance	Mark	Comments
06.2	Correct answer for 2 marks, 6.ḋ, 6.67 – 7 (%);; Accept for 1 mark, 0.05 (correct difference in transpiration rate) **OR** 6.6 (correct calculation, but incorrect rounding) **OR** 6.25/6.3 (correct calculation using incorrect denominator) **OR** 666/667 correct number sequence but decimal place in wrong place eg 66.7/0.0667 **OR** 0.75 as denominator	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments
06.3	**Mark in groups, either 1 to 4 OR 5 to 8** 1. Record mass/length before **and** after; 2. Place in sea water for (specified/equal) time; 3. Method to remove surface water; 4. Increase in mass/length shows water has been absorbed by osmosis **OR** Increase in mass/length shows cells have lower water potential; **OR** 5. Put tissue/cells on (microscope/glass) slide; 6. Add seawater (and leave) 7. Observe under (optical) microscope; 8. If cells become flaccid they do not have a lower water potential than seawater **OR** (If cells become) turgid cells show water is absorbed by osmosis **OR** (If cells become) turgid cells show cells have a lower water potential **OR** (If cells are) not flaccid/plasmolysis cells show water is not lost by osmosis **OR** (Determine) percentage plasmolysis;	4 (4 x AO3)	Accept 'weight' for 'mass'. Accept 'diameter' for 'length'. 2. Ignore period of time 2. Accept seawater in a dilution series Ignore blot dry before initial mass measurement Reject 'size' once then allow ECF. 3. Accept eg use tissue paper to dry OR blot dry 4. Accept root/mangrove for cells 8. Accept description of turgid (cells)

Question	Marking Guidance	Mark	Comments
07.1	**DNA v tRNA** 1. Deoxyribose v ribose; 2. Double-stranded v single-stranded; 3. Many nucleotides v few ; 4. Thymine v uracil; 5. Linear v clover leaf (structure) **OR** <u>Double</u> helix v clover (leaf structure); 6. Does not bind to amino acid v does bind to amino acid; 7. No exposed bases v <u>anticodon</u>;	3 max (3 x AO1)	Apply list rule 2. Accept double helix for double stranded 3 Accept longer v shorter 4. Ignore T and U 5. Accept description of clover leaf structure. 5. Accept straight for linear 6. Accept attach/carry/have binding site for 'bind to'

Question	Marking Guidance	Mark	Comments
07.2	1. Use centrifuge/centrifugation at slow/low/increasing (sequence of) speed(s); 2. Large/dense organelles (removed) in (first/early) pellet **OR** Less dense organelles (removed) in supernatant **OR** Small organelles (removed) in supernatant;	2 (1 x AO2, 1 x AO3)	Ignore homogenate OR filtering Ignore cold, isotonic, buffered 2. Accept descriptions of supernatant and pellet, eg liquid and sediment/bottom of tube 2. Accept light for small 2. Accept ribosomes for small organelles 2. Accept more dense OR heavy for large 2 Accept named large organelle in pellet, eg mitochondria

Question	Marking Guidance	Mark	Comments
07.3	(Tube **A**) 1. (Ribosomes bound to) rough endoplasmic reticulum; 2. (Are) denser/heavier **so** move further; (Tube **B**) 3. (Only free ribosomes because) membrane/phospholipids/endoplasmic reticulum dissolved (by detergent);	3 (3 x AO2)	Award marks across A and B 1. and 3 Do not credit ER/rER the first time used if endoplasmic reticulum not given 2. Accept, free ribosomes are lighter so form a band higher in tube OR do not move as far 2. For 'heavier/lighter' accept 'denser/less dense'. 2. Accept settle lower OR are lower down OR at bottom OR in pellet, for move further 3. Accept broken down for dissolved 3. Ignore damaged for dissolved

Question	Marking Guidance	Mark	Comments
08.1	1. (Red blood cells) do not have a nucleus/DNA; 2. Haemoglobin;	2 (2 x AO3)	1. Accept (To distinguish RBCs from other cells as) fish red blood cells have a nucleus Accept haem OR globin Ignore Hb

Question	Marking Guidance	Mark	Comments
08.2	1 mark for each correct row If no marks awarded, accept for 1 mark, 0.3217 (correct ratio calculation not given to 2 significant figures) **OR** Number that can be rounded to 85 000 eg 84615 (correct calculation not given to 2 significant figures)	2 (2 x AO2)	

		Volume / μm^3	**Surface area:volume ratio**
			0.32:1
		8.5×10^4 OR 85 000	

Question	Marking Guidance	Mark	Comments
08.3	**(Difference)** 1. More cells (between water and capillary/ blood) **OR** Wider/thicker filament/lamella; **(Explanation)** 2. Longer diffusion pathway **OR** Longer diffusion distance; 3. (So) slower gas exchange **OR** (So) slower absorption of oxygen **OR** (So) slower release of carbon dioxide **OR** (So) slower rate of diffusion;	3 (3 x AO2)	Accept a correct difference and a correct explanation in either section 1. Accept thicker epithelium for more cells 1. Accept gill plate for lamella 3 Ignore efficiency 3. Ignore less

<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>08.4</td><td>1 mark for each correct row
<table>
<tr><th>Difference</th><th>Circulation of blood in fish</th><th>Circulation of blood in mammal;</th></tr>
<tr><td>1</td><td>2 chambers
OR
1 ventricle
OR
1 atrium
OR
2 valves</td><td>4 chambers
OR
2 ventricles
OR
2 atria
OR
4 valves;</td></tr>
<tr><td>2</td><td>Blood does not return to heart after being oxygenated
OR
Blood does not return to heart after passing through gills
OR
Heart contains deoxygenated blood</td><td>Blood returns to heart after being oxygenated
OR
Blood returns to heart after passing through lungs
OR
Heart contains oxygenated and deoxygenated blood;</td></tr>
<tr><td>3</td><td>One vein (carrying blood towards the heart)</td><td>Two veins (carrying blood towards heart)</td></tr>
<tr><td>4</td><td>One artery (carrying blood away)</td><td>Two arteries (carrying blood away)</td></tr>
<tr><td>5</td><td>Single circulation</td><td>Double circulation;</td></tr>
<tr><td>6</td><td>Blood reaching body capillaries at low(er) pressure</td><td>Blood reaching body capillaries at high(er) pressure;</td></tr>
</table></td><td>2 max
(2 x AO2)</td><td>3 and 4 Accept name of relevant blood vessels eg aorta, pulmonary artery/vein, vena cava

5 Accept descriptions of single circulation and double circulation

5 Accept ‘system’ for circulatory system</td></tr>
</table>

Question	Marking Guidance	Mark	Comments
09.1	1. Sucrose actively transported into phloem (cell); **OR** Sucrose is co-transported/moved with H^+ into phloem (cell); 2. (By) companion/transfer cells; 3. Lowers water potential (in phloem) **and** water enters (from xylem) by osmosis; 4. ((Produces) high(er) (hydrostatic) pressure; **OR** (Produces hydrostatic) pressure gradient; **5.** Mass flow **to** respiring cells **OR** Mass flow **to** storage tissue/organ; 6. Unloaded/removed (from phloem) by active transport;	5 max (5 x AO1)	1. Accept sieve (element/tube/cell) for phloem (cell) 4. Accept description of gradient, eg higher WP 5. Accept transport OR movement for flow 5. Accept buds/young leaves/fruit/seeds/shoot tip/root tip/ meristems/root 6 Accept facilitated diffusion

Question	Marking Guidance	Mark	Comments
09.2	1. Both polysaccharides **OR** Both are glucose <u>polymers</u> **OR** Both are made of glucose <u>monomers</u>; 2. Both contain glycosidic bonds (between monomers); 3. Both contain carbon, hydrogen and oxygen/C, H and O; 4. Starch has α-glucose **and** cellulose has β-glucose; 5. Starch (molecule) is helical/coiled **and** cellulose (molecule) is straight; 6. Starch (molecule) is branched **and** cellulose is not/unbranched; 7. Cellulose has (micro/macro) fibr<u>ils</u> **and** starch does not;	6 max (6 x AO1)	Must include 1, 2 OR 3 to achieve 6 marks All statements must be clearly comparative or linked by the candidate, not inferred from separate statements Additional mark point 8. Starch has 1–6 glycosidic bonds **and** cellulose does not **OR** Starch contains two types of molecule **and** cellulose contains one type of molecule **OR** Starch is amylose and amylopectin **and** cellulose is one type of molecule;

Question	Marking Guidance	Mark	Comments
09.3	1. Hydrolysis; 2. (Of) glycosidic bonds; 3. (Starch) to maltose by amylase; 4. (Maltose) to glucose by disaccharidase/maltase; 5. Membrane-bound (disaccharidase/maltase);	4 max (4 x AO1)	Other than 5., do not penalise incorrect site for digestion or incorrect site of enzyme production 5. Accept microvilli for membrane