

CHERRY HILL AQA BIOLOGY AS PAPER 3 MARK SCHEME (U2:
/1/3/5/9.JA10+U2:3/4/5/9a&b.JUN12)

1)

(a)	Differentiation/specialisation	1	
(b)(i)	(cellulose) Cell wall;	1	
(b)(ii)	Two marks for correct answer 2350– 2500;; One mark for a measured length divided by real length;	2	Accept measured and real lengths in different units for one mark.
(b)(iii)	Chloroplasts absorb light; Large vacuole pushes chloroplasts to edge (of cell); Thin/permeable (cell) wall to absorb carbon dioxide;	1 max	Q Do not accept chlorophyll as alternative to chloroplasts

2)

(a)(i)	Deoxyribose;	1	pentose / 5C sugar = neutral
(a)(ii)	Phosphate/Phosphoric acid;	1	phosphorus/P = neutral
(b)	Hydrogen (bonds);	1	
(c)	381/384/387;	1	
(d)	(Gln) Met Met Arg Arg Arg Asn;	1	
(e)	Change in (sequence of) amino acids/primary structure; Change in hydrogen/ionic/disulfide bonds; Alters tertiary structure/active site (of enzyme); Substrate cannot bind / no enzyme-substrate complexes form;	3 max	Q Reject = different amino acids are formed

3)

(a)	Single layer of cells / few layers of cells; So that light that can pass through / cells absorb light;	2	
(b)	Method of determining area of field of view/area seen using microscope; Count number of stomata in field of view; Repeats and calculation of mean;	3	
(c)	Water vapour accumulates / increased humidity/ reduced air movement (around stomata); Water potential/diffusion gradient reduced;	2	

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4)

(a)	Given only saline; Otherwise treated exactly the same way;	2	
(b)	Ethical consideration, e.g., leads to death/suffering of mice; Large number to improve reliability / reduce sampling error; Number of mice related to cost/space available/animal husbandry;	2 max	
(c)	Vary in shape / do not grow uniformly;	1	Q Allow descriptions of variation in shape.
(d)	7.44 and 1.74;; 7.42 and 1.72;; (Ratio) 4.28 : 1;; (Ratio) 4.31 : 1;; (Percentage decrease) 76.6%;; (Percentage decrease) 76.8%;;	2 max	Any of the answers shown gain two marks. An answer of 23.4% or 23.2% Percentage decrease gains one mark. Correct method of calculating rate/ratio/percentage increase with an incorrect answer gains one mark.
(e)	Reference to <u>Mitosis</u> ; As chromosomes cannot attach (to spindle)/ chromatids cannot separate (on spindle); Cell division/cell cycle slows down;	3	Q Do not penalise confusion between chromosomes and chromatids in second marking point Q Mitosis slows down = 2 marks Q Mitosis stopped = 1mark Q Mitosis must be spelt correctly
(f)(i)	(Degree of) spread/variation from the mean;	1	
(f)(ii)	Both chemicals (on their own) slow down growth/are effective; Taxol is more effective than OGF; Combined treatment (seems) most effective; <u>SD overlap</u> for OGF with taxol and taxol (on its own) so not conclusive/could be chance/both treatments could be equally effective;	4	Q Ignore all references to significance

5)

(a)(i)	β /Beta glucose;	1	Accept b / B Reject any reference to alpha/ α												
(a)(ii)	Glycosidic;	1	Reject references to α (1-4) glycosidic bond, but allow beta 1-4, or unspecified reference to 1-4 (1,4)												
a)(iii)	OH / hydroxyl / HO;	1	Reject hydroxide Reject OH/HO molecule Ignore alcohol												
(b)(i)	<table border="1"> <thead> <tr> <th>Starch</th> <th>Cellulose</th> </tr> </thead> <tbody> <tr> <td>1. (1,4 and) 1,6 bonds/contains 1,6 bonds /branching</td> <td>1. 1,4 bonds / no 1,6 bonds / unbranched / straight;</td> </tr> <tr> <td>2. All glucoses/ monomers same way up</td> <td>2. Alternate glucoses/monomers upside down;</td> </tr> <tr> <td>3. Helix/coiled/compact</td> <td>3. Straight;</td> </tr> <tr> <td>4. Alpha glucose</td> <td>4. Beta glucose;</td> </tr> <tr> <td>5. No (micro/macro) fibrils/fibres</td> <td>5. Micro/macro fibrils/fibres;</td> </tr> </tbody> </table>	Starch	Cellulose	1. (1,4 and) 1,6 bonds/contains 1,6 bonds /branching	1. 1,4 bonds / no 1,6 bonds / unbranched / straight;	2. All glucoses/ monomers same way up	2. Alternate glucoses/monomers upside down;	3. Helix/coiled/compact	3. Straight;	4. Alpha glucose	4. Beta glucose;	5. No (micro/macro) fibrils/fibres	5. Micro/macro fibrils/fibres;	2 max	1 mark per pair of contrasts, both starch and cellulose required Accept other comparable differences eg hydrogen bonds within starch but between cellulose molecules
Starch	Cellulose														
1. (1,4 and) 1,6 bonds/contains 1,6 bonds /branching	1. 1,4 bonds / no 1,6 bonds / unbranched / straight;														
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5. No (micro/macro) fibrils/fibres	5. Micro/macro fibrils/fibres;														
(b)(ii)	<ol style="list-style-type: none"> H-bonds / micro/macro fibrils /fibres; Strength / rigidity / inelasticity; 	2	Reject strong hydrogen bonds 'Strong hydrogen bonds' = 0 but 'Strong hydrogen bonds give strength (to the molecule)' = 1												

6)

(a)	1. Growth / increase in cell number; 2. Replace cells / repair tissue / organs /body; 3. Genetically identical cells; 4. Asexual reproduction /cloning;	2 max	Ignore growth of cells Ignore repair cells Reject bacteria 3. 'Produces 2 genetically identical cells' does not reach MP1 as well as MP3 4. Allow example or description
b)(i)	(Ensures) representative (sample);	1	Accept find some cells in mitosis/not in interphase. Accept 'more reliable' only if linked to percentage (of cells). 'Improves reliability' on its own does not gain this mark Neutral: Large sample
b)(ii)	1. A = metaphase; 2. Chromosome / chromatids lie on equator; 3. B = anaphase; 4. Chromatids /chromosomes separating / moving apart / moving to poles;	4	2. Reject homologous chromosomes Allow centre/middle 4. Reject homologous chromosomes
(c)	2 hours / 120 minutes;;	2	Allow 1 mark if working shows candidate understood that mitosis would take 10%

7)

(a)(i)	Repeating units / nucleotides / monomer /molecules;	1	Allow more than one, but reject two										
a)(ii)	1. C = hydrogen bonds; 2. D = <u>deoxy</u> ribose; 3. E = phosphate;	3	2. Ignore sugar 3. Ignore phosphorus, Ignore molecule										
a)(iii)	<table border="1"> <thead> <tr> <th>Name of base</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Thymine</td> <td>34</td> </tr> <tr> <td>Cytosine / Guanine</td> <td>16</td> </tr> <tr> <td>Adenine</td> <td>34</td> </tr> <tr> <td>Cytosine / Guanine</td> <td>16</td> </tr> </tbody> </table>	Name of base	Percentage	Thymine	34	Cytosine / Guanine	16	Adenine	34	Cytosine / Guanine	16	2	Spelling must be correct to gain MP1 First mark = names correct Second mark = % correct, with <u>adenine as 34%</u>
Name of base	Percentage												
Thymine	34												
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(b)(i)	153;	1											
b)(ii)	Some regions of the gene are non-coding / <u>introns</u> / start/stop code/triplet / there are two DNA strands;	1	Allow <u>addition</u> mutation Ignore unqualified reference to mutation Accept reference to introns and exons if given together Ignore 'junk' DNA/multiple repeats										

8)

(a)(i)	Fastest rate of growth/division / enzymes don't denature / optimum temperature for enzymes / at or close to body temperature;	1	Do not accept optimum temperature if not qualified
(a)(ii)	Same amount / number of bacteria / only one variable in the investigation;	1	Reject 'same volume of bacteria' Allow doesn't change concentration of antibiotic
(a)(iii)	To show that only the antibiotic has an effect (on the bacteria);	1	Allow 'to see the effect without the antibiotic', 'reference point'
(b)(i)	1. Falls steeply then levels out / less steep; 2. Fall is less steep after 5-10 $\mu\text{g cm}^{-3}$ / levels out at / after 50 $\mu\text{g cm}^{-3}$;	2	Principles = trend, value Allow values from y axis (48-58) / levels off 38 / 39
(b)(ii)	1. 50 ($\mu\text{g cm}^{-3}$) reduced bacterial growth more (than lower concentrations); 2. Trial did not use people; 3. Very little / no effect after 50 ($\mu\text{g cm}^{-3}$); 4. Other concentrations not tested;	3	1. 'Allow 50 ($\mu\text{g cm}^{-3}$) kills the most bacteria' NB '50 is most effective' is in stem so do not credit 2. Allow references to not being as effective in humans