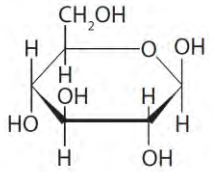
Pearson Edexcel Level 3 Advanced Level GCE in Biology A (Salters-Nuffield)
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Question Number	Acceptable Answer	Additional guidance	Mark
1(a)	C **(**  **)**		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
1(b)(i)	B (Krebs cycle)		**(1)**

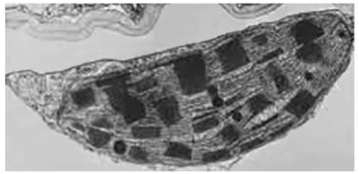
Question Number	Acceptable Answer	Additional guidance	Mark
1(b)(ii)	B (5%)		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
1(b)(iii)	A description that makes reference to the following: • glucose is phosphorylated using ATP (1) • this product is converted into glycerate 3-phosphate (GP) (1) • GP converted to pyruvate producing reduced NAD (NADH) and ATP (1)		**(3)**

(Total for Question 1 = 6 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
2(a)	An explanation that makes reference to the following: • electron carrier components are on chloroplast membranes (1) • detergents disrupt the phospholipid bilayer in the membranes (1) • therefore electrons can no longer move along the chain (1)		**(3)**

Question Number	Acceptable Answer	Additional guidance	Mark
2(b)	An explanation that makes reference to the following: • drying evaporates the solvent (1) • so that a small concentrated spot of extract can build up (1) • in order to prevent extract spreading out (1)		**(3)**

Question Number	Acceptable Answer	Additional guidance	Mark
2 (c)	**A** ()		**(1)**

(Total for Question 2 = 7 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
3(a)	An explanation that makes reference to the following: • *Salmonella* food poisoning can spread easily (1) • therefore early identification means quicker treatment and containment of infection (1) • so that the correct antibiotic can be used to help prevent spread of infection and prevent antibiotic resistance if wrong antibiotic used (1)		**(3)**

Question Number	Acceptable Answer	Additional guidance	Mark
3(b)	An explanation that makes reference to the following: • because public health workers could become infected with *Salmonella* (1) • because cross-contamination could lead to false identification of bacteria (1)		**(2)**

Question Number	Answer	Additional guidance	Mark
3(c)	**A** (lipopolysaccharide in the cell wall membrane)		**(1)**

(Total for Question 3 = 6 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
4(a)	A description that makes reference to the following: • they are mice which have been genetically modified (1) • *Tpl2*-KO refers to a gene involved with inflammation of the spinal cord (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
4(b)(i)	An answer that makes reference to the following: • no significant difference in the damage to lung tissue between the two mice (1) • liver tissue in wild type mice is more likely to be damaged (1) • colon and kidney have the highest probability of damage in the knockout mice (1) • significant effect on heart tissue but lower probability than colon or kidney in the knockout mice (1)		**(4)**

Question Number	Acceptable Answer	Additional guidance	Mark
4 (c)(i)	An answer that makes reference to the following: • percentage calculated (1) • answer given to two significant figures (1)	<u>Example of calculation</u> (1 ÷ 275) × 100 = 0.36%	**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
4 (c)(ii)	An answer that makes reference to the following: • PEG can stimulate the cell membrane because cell wall has been removed (1) • therefore recombinant DNA can be taken up by endocytosis (1) • and therefore microinjection is not needed so the cell does not die (1)		**(3)**

(Total for Question 4 = 11 marks)

Question Number	Indicative content	
***5(a)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • no evidence of replicates, so data may not be valid • water potential = turgor pressure + osmotic potential and at 50% plasmolysis, there is no turgor pressure so water potential = osmotic potential of cells • data for 1200 s suggest that osmotic potential of cell is equivalent to 0.3 M sucrose and more cells are plasmolysed at 1200 s • graphs are different suggesting that water is still moving in and out of the cells, data for 900 s suggests that the osmotic potential of cells is equivalent to less than 0.3 M • cannot be certain that osmotic potential is equivalent to 0.3 M sucrose unless cells are left in sucrose longer than 1200 s • the estimate is changing as time goes by so the cells would need to be left in solution until there is no further increase in the number of plasmolysed cells	
Level	**Marks**	
Level 0	**0**	No awardable content
Level 1	**1-2**	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	**3-4**	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.
Level 3	**5-6**	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

Question Number	Answer	Additional guidance	Mark
5(b)(i)	C (the strength of the middle lamella between cells)		**(1)**

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	A (active transport)		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
5(c)(i)	An answer that makes reference to the following: percentage increase calculated (1)	<u>Example of calculation</u> % increase = 1.85 x 100 / 0.9 = 205.555% = 206%	**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
5(c)(ii)	An explanation that makes reference to the following: • because tissue fluid accumulates and prevents gas exchange (1) • therefore less oxygen uptake and carbon dioxide removal makes patient feel breathless (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
5(c)(iii)	A description that makes reference to the following: • excess tissue fluid is absorbed by the lymphatic system (1) • lymphatic system drains into the veins (1)		**(2)**

(Total for Question 5 = 13 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(i)	An explanation that makes reference to the following: • the three antibodies in Zmapp each bind to a specific part of the viral glycoprotein (1) • therefore the protein cannot change shape and fuse the cell membrane (1) • therefore Ebola RNA cannot enter the cell and the virus cannot replicate (1)		**(3)**

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(ii)	An explanation that makes reference to the following: • if mutation causes a change in the shape of the glycoprotein, Zmapp may not bind and will not be effective (1) • if mutation occurs in one of the other genes, the shape of the glycoprotein will not be affected and Zmapp will still be effective (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
6(a)(iii)	An explanation that makes reference to the following: • it had not been shown to be safe or effective in humans (1) • however, scientists wanted to collect more data on drug thera (1) for Ebola • it was ethical because Ebola has a very high death rate so its u (1) could be justified as a last resort		**(3)**

Question Number	Acceptable Answer	Additional guidance	Mark
6(b)(i)	U U U U U U G U G U G U C C A		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
6(b)(ii)	An explanation that makes reference to the following: • poly U gives only phenylalanine, poly A gives only lysine, therefore UUU codes for phenylalanine and AAA for lysine and therefore one triplet can only code for one amino acid (1) • in the mixture, more U is linked to higher % of cysteine and valine, therefore UGU and GUU are likely triplets (1) • there are more combinations of U and G in a triplet than four, therefore one amino acid could have more than one code (1)		**(3)**

(Total for Question 6 = 12 marks)

Question Number	Answer	Additional guidance	Mark
7(a)	A (inhibiting peptidoglycan cross-link formation in the cell wall)		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
7(b)	An answer that makes reference to the following: • mutation rates in bacteria are very high because bacteria divide frequently (1) • resistant bacteria have a selective advantage (1) • rapid asexual reproduction causes large numbers of antibiotic-resistant bacteria (1) • therefore there is a need for new antibiotics that bacteria are not resistant to (1) • this is a slow process because research and testing takes time (1)		**(5)**

Question Number	Indicative content	
***7(c)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. For vaccination: • vaccination does protect against influenza and vulnerable groups will need protection • there are many strains of influenza • the World Health Organisation may not have had time to create vaccines against the latest virus type • the vaccine will protect against other varieties of influenza which may also be circulating • vaccinating as many people as possible will help to develop herd immunity • alarmist headlines will put people off being vaccinated for other diseases Against vaccination: • anti-viral drugs could also be used • influenza viruses are always mutating • most of the deaths will be in older people • vaccination programmes are not cost effective • vaccination programmes ineffective unless everyone immunised	
Level	**Marks**	
Level 0	0	No awardable content
Level 1	1-2	Limited scientific judgement made with a focus on mainly just one method, with a few strengths/weaknesses identified. A conclusion may be attempted, demonstrating isolated elements of biological knowledge and understanding but with limited evidence to support the judgement being made.
Level 2	3-4	A scientific judgement is made through the application of relevant evidence, with strengths and weaknesses of each method identified. A conclusion is made, demonstrating linkages to elements of biological knowledge and understanding, with occasional evidence to support the judgement being made.
Level 3	5-6	A scientific judgement is made which is supported throughout by sustained application of relevant evidence from the analysis and interpretation of the scientific information. A conclusion is made, demonstrating sustained linkages to biological knowledge and understanding with evidence to support the judgement being made.

(Total for Question 7 = 12 marks)

Question Number	Answer	Additional guidance	Mark
8(a)	C (present, present, absent, absent)		**(1)**

Question Number	Answer	Additional guidance	Mark
8(b)	D (proteins that activate T killer cells)		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
8(c) (i)	An answer that makes reference to the following: • correct reading from graph for IL-10 (1) • correct calculation of increase (1)	<u>Example of calculation</u> IL-10 is 3.4 − 2.0 = 1.4 Allow 3.3 to 3.5 (1.4×100)÷2.0 = 70% Allow 65% to 75%	**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
8(c) (ii)	An explanation that makes reference to the following: • although the difference is significant, the p value for IL-10 is higher than the others (1) • because the control data for IL-10 shows more variability (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
8(c) (iii)	An explanation that makes reference to the following: • PAH gradually results in {atherosclerosis / narrowing } of the pulmonary artery (1) • therefore higher blood pressure in pulmonary artery causes extra strain on right ventricle causing damage (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
8(c) (iv)	An answer that makes reference to the following: • survival rates read off the graph (1) • calculation carried out (1)	survival rate of highest IL-10 levels is 14% compared to 78% for the lowest IL-10 levels 78÷14 = 5.57 Allow 5.6 times worse	**(2)**

(Total for Question 8 = 10 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
9(a)(i)	An explanation that makes reference to the following: • mutation had removed defective gene but the cell continued to multiply (1) • therefore functioning white blood cells produced and immune system was restored to normal functioning (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
9(a) (ii)	An explanation that makes reference to the following: • fetal stem cells will be pluripotent (1) • therefore they are able to develop into a wider range of cell types (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
9(b)	An explanation that makes reference to the following: • demethylation might result in a gene being activated (1) • therefore transcription of the gene takes place, producing protein that causes change in the fibroblast cells (1)		**(2)**

(Total for Question 9 = 6 marks)

Question Number	Acceptable Answer	Additional guidance	Mark
10 (a)(i)	An explanation that makes reference to the following: • correct calculation of UK population 90 and over (1) • correct calculation of number of people with mutations (1)	<u>Example of calculation</u> 0.8% of 64 million = (0.8 ÷ 100) × 64 000 000 = 512 000 1 in 5 of 512 000 = 102 400 Correct answer with no working gains full marks	**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
10 (a)(ii)	An explanation that makes reference to the following: • radioactive { thymine / thymidine / deoxyribose } is used in DNA synthesis (1) • therefore daughter cells having radioactive DNA gives a measure of growth rate (1)		**(2)**

Question Number	Acceptable Answer	Additional guidance	Mark
10 (b)	synthesis of ribosomes		**(1)**

Question Number	Acceptable Answer	Additional guidance	Mark
10 (c)	An explanation that makes reference to one of the following: • interphase because small size of cell shows less growth has taken place (1) • cytokinesis and mitosis are unlikely to occur any faster (1)		**(1)**

(Total for Question 10 = 7 marks)