

1)

(a)	<p>1. A: phospholipid (layer);</p> <p>2. B: pore/channel/pump/carrier/transmembrane/intrinsic/transport <u>protein</u>;</p>	2	<p>1. Reject hydrophobic / hydrophilic phospholipid</p> <p>2. Ignore unqualified reference to protein</p>
(b)(i)	Condensation (reaction);	1	
(b)(ii)	<p>Organelle named; Function in protein production/secretion;</p> <p>eg</p> <p>1. Golgi (apparatus);</p> <p>2. Package/process proteins;</p> <p>OR</p> <p>3. Rough endoplasmic reticulum/ribosomes;</p> <p>4. Make polypeptide/protein/forming peptide bonds;</p> <p>OR</p> <p>5. Mitochondria;</p> <p>6. Release of energy/make ATP;</p> <p>OR</p> <p>7. Vesicles;</p> <p>8. Secretion/transport of protein;</p>	2	<p>Function must be for organelle named</p> <p>Incorrect organelle = 0</p> <p>1. Accept smooth endoplasmic reticulum</p> <p>3. Accept alternative correct functions of rough endoplasmic reticulum. ER/RER is insufficient</p> <p>3. Accept folding polypeptide/protein</p> <p>6. Reject produce/make energy</p> <p>6. Accept produce energy in the form of ATP</p>

2)

(a)	<p>1. (Enzyme has) <u>active site</u>;</p> <p>2. Only substrate fits (the active site);</p>	2	<p>1. Reject active site is same shape as substrate</p> <p>1. Reject active site is on the substrate</p> <p>1. Accept active site forms during induced fit</p> <p>2. Accept converse statement</p>
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(b)	<ol style="list-style-type: none"> 1. (Allopurinol) is a similar shape to xanthine; 2. (Allopurinol) enters active site / is a competitive inhibitor; 3. Less xanthine binds/fewer e-s complexes/fewer uric acid crystals formed/less uric acid formed; 	3	<p>Assume "it" = allopurinol</p> <ol style="list-style-type: none"> 1. Reject <u>same</u> shape. Accept similar structure 2. Ignore e-s complexes in relation to inhibitor 2. Reject non-competitive inhibitor in the context of binding to the active site 2. Ignore complementary/fits 3. Reject <u>no</u> e-s complexes/xanthine <u>cannot</u> enter active site, <u>no</u> uric acid 3. Can award in context of non-competitive inhibition
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3)

(a)	<ol style="list-style-type: none"> 1. Toxin (produced by bacterium) causes (chloride) ions to move into (lumen of) intestine; 2. <u>Water potential</u> (of intestine contents) falls / water moves by <u>osmosis</u> into intestine/out of cells; 	2	<ol style="list-style-type: none"> 1. Reject incorrect ion 1. Direction of ion movement must be clear 2. Ignore movement of water from blood (rather than cells)
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(b)	<ol style="list-style-type: none"> 1. Both show little/no increase/remains constant in January/February; 2. (Up to May) sea temperature rises more quickly/before increase in cholera; 3. Both reach a peak in/decline after April/May; 	2 max	<p>Ignore references to correlation</p> <p>Accept May to June</p>
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(c)	<ol style="list-style-type: none"> 1. Positive correlation from January to September/October (between sea temperature and cholera cases); 2. Only records people in hospital with cholera / may be people with cholera not in hospital; 3. Negative correlation/cases rising as sea temperature falls in October/November; 	2 max	<ol style="list-style-type: none"> 1. Ignore as sea temperature rises, cholera cases rise, as in stem 1. Accept any two months within range 3. 'At end of year' insufficient
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(d)	Suitable suggestion with explanation;; 1. Have produced memory cells; 2. After previous infection/vaccination; OR 3. Different forms of cholera; 4. Some don't produce much/any toxins; OR 5. Few bacteria ingested; 6. Not enough toxin to produce symptoms; OR 7. Some people naturally resistant to bacterium; 8. Because of structure of cell membranes / amount of secretions eg bile/pancreatic juices;	2	1. 'Have become immune' is not enough 2. Accept 'produces secondary response' 3. Accept types /strains /variety
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4)

(a)	1. To allow comparison; 2. Because different number of cells in samples / different times for incubation / numbers become easier to manipulate;	2	
(b)	203.7(%);;	2	Allow 1 mark for 21.8/10.7 Allow 1 mark for correct answer (203.74) but not correctly to 1 dp 204= 1 mark
(c)(i)	1. (At every concentration) uptake is faster at 37°C/at higher temperature; 2. Due to faster respiration/ATP production;	2	
(c)(ii)	1. Uptake at 37°C only small increase /levelling off/almost constant; 2. As carrier proteins full; 3. Concentration of imatinib is not the limiting factor;	2 max	Accept 'no (significant) change' Ignore use of numbers

5)

(a)	<ol style="list-style-type: none"> 1. Add iodine/potassium iodide solution to the food sample; 2. Blue/black/purple indicates starch is present; 	2	<ol style="list-style-type: none"> 1. Allow 'iodine' 2. Must be in the context of the correct reagent
(b)	<ol style="list-style-type: none"> 1. Starch digested to maltose/by amylase; 2. Maltose digested to glucose/by maltase; 3. Digestion of sucrose is a single step/only one enzyme/sucrase; 	3	<p>Ignore 'hard to digest/easily digested'</p> <ol style="list-style-type: none"> 3. Accept converse for starch 3. Do not accept digestion of sucrose is faster

6)

(a)	<ol style="list-style-type: none"> 1. Microvilli; 2. Carrier proteins/co-transport proteins/membrane-bound enzymes; 3. Many mitochondria; 	2 max	<ol style="list-style-type: none"> 1. Accept large surface area <p>Accept lots of ATP produced</p>
(b)(i)	Substance that causes an immune response/production of antibodies;	1	Ignore foreign/non-self
(b)(ii)	<ol style="list-style-type: none"> 1. Not lipid soluble; 2. Too large (to diffuse through the membrane); 3. Antigens do not have the complementary shape/cannot bind to receptor/channel/carrier proteins (in membranes of other epithelial cells); 	2 max	
(c)	<ol style="list-style-type: none"> 1. (Vaccine contains) antigen/attenuated/dead pathogen; 2. Microfold cells take up/bind and present/transport antigen (to immune system/lymphocytes/T-cells); 3. T-cells activate B-cells; 4. B-cells divide/form clone/undergo mitosis; 5. B-cells produce antibodies; 6. Memory cells produced; 7. More antibodies/antibodies produced faster in secondary response/on reinfection; 	5 max	<ol style="list-style-type: none"> 1. Reject if in context of injection of vaccine 3. Accept T-cells release cytokines 4. Accept plasma cells for B-cells 6. Ignore T/B in reference to memory cells 7. Must be comparative

7)

(a)	<p>1. Separates/unwinds/unzips strands/helix / breaks H-bonds; 2. (So) <u>nucleotides</u> can attach/are attracted / strands can act as templates;</p>	2	<p>1. Q Neutral: strands/helix split 1. Accept: unzips bases 2. Q Neutral: bases can attach 2. Neutral: helix can act as a template</p>																			
(b)	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2" style="width: 15%;">Sample</th> <th colspan="3">Type(s) of DNA molecule present in each tube</th> </tr> <tr> <th style="width: 15%;">¹⁵N/¹⁵N</th> <th style="width: 15%;">¹⁵N/¹⁴N</th> <th style="width: 15%;">¹⁴N/¹⁴N</th> </tr> </thead> <tbody> <tr> <td style="width: 15%;">1</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>3</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>	Sample	Type(s) of DNA molecule present in each tube			¹⁵ N/ ¹⁵ N	¹⁵ N/ ¹⁴ N	¹⁴ N/ ¹⁴ N	1	✓			2		✓		3		✓	✓	3	One mark for each correct row
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(c)(i)	<p>1. Similar shape/structure (to cytosine) / added instead of cytosine / binds to guanine; 2. Prevents (complementary) base pairing / prevents H-bonds forming / prevents formation of new strand / prevents strand elongation / inhibits/binds to (DNA) polymerase;</p>	2	<p>1. Accept: idea that <u>only</u> one group is different 1. Reject: same shape 2. Accept: prevents cytosine binding Neutral: 'prevents DNA replication' as given in the question stem Neutral: 'competitive inhibitor' unqualified Neutral: inhibits DNA helicase</p>																			
(c)(ii)	(Cancer cells/DNA) divide/replicate fast(er)/ uncontrollably;	1	Accept: converse argument for healthy cells																			

8)

(a)(i)	Prevent cell wall formation / cause (cell) lysis / inhibit ribosomes / inhibit protein synthesis / prevent DNA replication / affect function of cell membrane;	1 max	<p>Accept: weaken the cell wall Neutral: damage/break down the cell wall Q Reject: if in context of a cellulose cell wall Accept: bind to ribosomes</p>
(a)(ii)	(Plasmid/genes transmitted through) cell division/reproduction/replication/generations;	1	<p>Accept: multiply Accept: binary fission Reject: within generations Reject: reference to horizontal gene transmission Reject: mitosis Ignore reference to immunity</p>

(b)	Representative/typical/reliable / different types of bacteria;	1	Neutral: accurate Neutral: reference to anomalies Q: Neutral: different strands of bacteria
(c)	<p>(Yes)</p> <ol style="list-style-type: none"> 1. Largest clear zone/diameter/mean (so more bacteria killed); <p>(No)</p> <ol style="list-style-type: none"> 2. Standard deviations of <u>chlorhexidene</u> overlap/share values; 3. (Overlap means difference) is not significant / is due to chance; 	3	<p>Ignore references to methodology</p> <ol style="list-style-type: none"> 2. Neutral: diameters overlap/share values 3. Can still be awarded if SD overlap or non-overlap is correctly interpreted 3. Accept: (difference) is not real/not reliable 3. Neutral: spread is not reliable
(d)	<ol style="list-style-type: none"> 1. <u>Mutation</u> (in bacterium); 2. <u>Gene/allele</u> for resistance; 	2	<ol style="list-style-type: none"> 1. Neutral: different strains 2. Reject: if in the context of 'immunity' 2. Accept: resistant gene/allele