

Biology BY1

Question		Mark Scheme												
1	<table border="1"> <thead> <tr> <th>Feature</th> <th>Bacterium</th> <th>Virus</th> </tr> </thead> <tbody> <tr> <td>Possess nucleic acid</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Surrounded by a protein coat</td> <td>X</td> <td>✓</td> </tr> <tr> <td>Ribosomes in cytoplasm</td> <td>✓</td> <td>X</td> </tr> </tbody> </table> <p>(not: hybrid ticks ✕)</p>	Feature	Bacterium	Virus	Possess nucleic acid	✓	✓	Surrounded by a protein coat	X	✓	Ribosomes in cytoplasm	✓	X	3
Feature	Bacterium	Virus												
Possess nucleic acid	✓	✓												
Surrounded by a protein coat	X	✓												
Ribosomes in cytoplasm	✓	X												
2	<p>(a)</p> <p>(i) Fibrous;</p> <p>(ii) Polypeptide chains; (not: proteins) Three chains; (not: strands) (Three) alpha helices; Tightly/closely bound; Held together by hydrogen bonds:</p> <p>(iii) Structural/relevant example e.g. tendons or named tissue strengthened. (not: strength or name of tissue unqual./tensile strength)</p> <p>(b) (i) Four chains vs. three; Iron/prosthetic/haem group vs. none; Compact vs. non-compact/long fibres vs spherical; 3 polypeptide chains the same vs 2 different polypeptide chains; Secondary structure vs. quaternary structure: (not: more complex)</p> <p>(ii) Hormones/enzyme/ antibodies/plasma proteins. (not: specific examples)</p>	<p>1</p> <p>(3 max)</p> <p>1</p> <p>(3 max)</p> <p>1</p>												

9 MARKS

Question		Mark Scheme
3	(a) (i)	At higher temperature/60° enzyme/substrate has more kinetic energy/vibrates more; (not: ref. movement) More Enzyme substrate complexes formed/ more <u>successful</u> collisions; More product formed/greater rate of reaction.
	(ii)	At 60°C enzyme reacts rapidly; (Gradual) denaturation of enzyme occurs or description; All substrate not reacted;
	(b)	All substrate converted to product. (not: active sites full)
	(c)	Lower temperature, less kinetic energy/fewer vibrations; Fewer enzyme substrate complexes formed/fewer <u>successful</u> collisions; Some substrate remains after 60 minutes; (not: reaction has not ended) Maximum product formation not yet achieved.

10 MARKS

Question	Mark Scheme
<p>4 (a) (i) Can be re-used; Greater stability; Despite variations in temperature/pH; Easy to remove product/product not contaminated with enzyme; More than 1 enzyme can be used/enzymes added or removed easily. Can be used in a continuous production system</p> <p>(ii) Colour change only/can only indicate if its present or absent; Subjective nature of judgement of colour/qualitative rather than quantitative.</p> <p>(b) (i) Measures metabolite/named substance; By converting chemical signal/energy into an electrical signal/energy.</p> <p>(ii) Combines with substrate/glucose; At active site; To produce product.</p> <p>(iii) Glucose from blood diffuses into gel; Acted on by glucose oxidase; Amount of product released proportional to glucose concentration; Electrode activated by product; Generates electrical potential/signal; Size of potential directly proportional to mass of product.</p>	<p>(2 max)</p> <p>2</p> <p>2</p> <p>(2 max)</p> <p>(4 max)</p>

12 MARKS

Question				Mark Scheme
5	(a)	Cell X	Cell Y	(3 max)
		Large number of vesicles (not: lysosomes)	No/small number vesicles;	
		Large amount of RER/ribosomes	Little RER/ribosomes;	
		Few mitochondria	Large number of mitochondria;	
		No microvilli	Microvilli; (not: villi /membrane folds)	
		More nuclear pores (not: ref. cell size)	Fewer nuclear pores.	
	(b)	A = Transport substances to plasma/cell membrane; B = Protein synthesis; C = <u>ATP</u> synthesis (not: produce energy/ref. respiration).		3
	(c)	Exocytosis; Transport vesicle fuses with plasma membrane; Break in membrane to allow expulsion of secretion.		(2 max)

8 MARKS

Question			Mark Scheme
6	(a)	Mitochondrion.	1
	(b)	(i) Advantage: *Higher energy yield <u>per unit mass</u> /higher yield <u>per g</u> . Disadvantage: More oxygen required for respiration.	2
		(ii) Heat/thermal/electrical insulation; (not: insulation unqual.) *Better source of metabolic water; Buoyancy; Protection against knocks (not: protection unqual.) (points marked * are interchangeable and could be credited in either (i) or (ii) but not credited in both)	(2 max)
	(c)	(i) New tissue manufacture/growth qualified/repair; Enzyme manufacture.	2
		(ii) Breaking a bond; (not: molecule broken down) Insertion of a molecule of water/chemical addition of water (not: adding water)	2
		(iii) Glucose; (not: beta glucose) Amino acids.	2

11 MARKS

Question			Mark Scheme
7	(a)	(i) Blood clots/infection.	1
		(ii) Water has highest water potential/0 compared with -476/-896kPa; Water passes down water potential gradient/from high to low water potential; Passes into cell by osmosis. (not: ref. water concentration)	3
	(b)	Diagram showing <u>crinkled</u> cells; (not: showing plant cell or nucleus) Higher water potential inside cell; Water passes out of cell (causing shrinkage/distortion).	3

7 MARKS

Question	Mark Scheme
8 (a)	<p>A Interphase, replication of DNA; (not: DNA doubles)</p> <p>B Also replication of organelles;</p> <p>C Synthesis of rRNA/proteins/ATP; (not: metabolic activity)</p> <p>D Prophase chromosomes appear as two chromatids/ ref, condensation;</p> <p>E Joined at centromere;</p> <p>F Nuclear membrane disappears;</p> <p>G Chromosomes line up at equator during metaphase;</p> <p>H Spindle formation;</p> <p>I Centromere divides at anaphase;</p> <p>J Chromatids/chromosomes to opposite poles at anaphase;</p> <p>K Contraction/shortening of spindle fibres;</p> <p>L Nuclear membrane reforms during telophase;</p> <p>M Cytokinesis/cell division occurs by furrowing of membrane/cleavage;</p> <p>N Cytoplasm splits/divides;</p> <p>O Centrioles replicate / move to poles.</p>

Note: ref. to each event must take place in correct stage

10 MARKS

Question	Mark Scheme
8 (b)	<p>A Both contain the elements CHON;</p> <p>B Both can link to form larger molecules/polymers/ref. monomers;</p> <p>C Nucleotides consist of nitrogenous base;</p> <p>D plus pentose and phosphate; (not: 5C sugar)</p> <p>E bases are pyrimidines and purines;</p> <p>F Amino acids possess an amine/NH_2 group/carboxylic group;</p> <p>G Variable R group;</p> <p>H More/20 types of amino acid;</p> <p>I Amino acids link together by peptide bond formation/sugar phosphate backbone;</p> <p>J Five different bases in nucleotides/5 named; (not: letters only)</p> <p>K Bases can undergo <u>complementary</u> base pairing;</p> <p>L Adenine with thymine or uracil and guanine with cytosine;</p> <p>M By hydrogen bonds;</p> <p>N Nucleotides carry genetic information;</p> <p>O Sulphur containing vs. phosphate containing.</p>

10 MARKS