

BY1 January 2014

Question	Marking details	Marks Available
1 (a)	Base clearly circled;	1
(b)	(The pentose in) RNA is ribose <u>and</u> in DNA is deoxyribose; the base thymine is only found in DNA <u>and</u> the base uracil is found in RNA; NOT: ref. helix/strands/uracil and thymine unqualified	2
(c)	Adenine with thymine <u>and</u> cytosine with guanine; Appropriate use of {data/ratios} for {human/sea urchin/wheat}; Need data on both A T and C G NOT 'they are the same' or reference to ratio the same in all organisms	2
Question 1 total		[5]

Question	Marking details	Marks Available
2	(a) (i) B, D, C, F, E;	1
	(ii) Cytokinesis;	1
	(b) (i) 4 cells are produced compared with 2 / cells are haploid as oppose to diploid/only contain one set of chromosomes compared with two sets of chromosomes; NOT 2 chromosomes (can be neutral) As a result of two (consecutive) divisions;	2
	(ii) (Meiosis produces haploid gametes which) allows the diploid state to be restored {at fertilisation/in the zygote} / prevents doubling of the chromosome number at fertilisation; Meiosis produces <u>genetically</u> different {gametes/cells} / results in <u>genetic</u> variation (in the offspring);	2
Question 2 Total		[6]

Question	Marking details	Marks Available
3	(a) (i) Ester;	1
	(ii) Hydrolysis;	1
	(iii) Glycerol and fatty acid drawn correctly; Glycerol and fatty acid named;	2
	(iv) Glycerol and fatty acids have different structures / OWTTE; (not just reference to monomers)	1
(b)	(i) (Oleic acid is) unsaturated; It contains at least one C=C double bond (in the hydrocarbon chain) / is not fully saturated with hydrogen (atoms); NOT hydrogen bonds/ fewer hydrogens	2
	(ii) Any 2 protection of internal organs against impact; <u>thermal</u> insulation; buoyancy; waterproofing skin/fur; source of metabolic water;	Max 2
Question 3 total		[9]

Question	Marking details	Marks Available
4	(a) (i) Activation energy;	1
	(ii) Line starting and finishing at the same point but with a lower activation energy;	1
(b)	The <u>active site</u> (of succinate dehydrogenase) has a <u>specific shape</u> ; Succinate has a <u>complementary</u> shape; (and therefore) {fits/ binds/ bonds to} into the active site; NOT attaches	Max 2
(c)	(i) I The concentration of succinate/ substrate;	1
	II As the concentration of the {succinate/substrate} increases {the rate of reaction/production of fumarate increases};	1
(ii)	The concentration of succinate dehydrogenase/ enzyme; all of its active sites are occupied (at any given moment);	2
(d)	(i) Malonate has a similar {shape/structure} to {succinate/ substrate} / malonate has a complementary {shape/structure} the active site; NOT same shape Malonate {binds/ competes} to the active site; Prevents succinate binding / fewer enzyme-substrate complexes are formed; (MP3 must be in context of competitive inhibition)	3
	(ii) Curve rising at a lower rate and plateaus at the max rate at a higher concentration; Accept max rate may not be reached	1
Question 4 Total		[12]

Question Marking details Marks Available

5 (a)

Organelle	Name	Function
K	nucleus;	contains <u>DNA</u> which {codes for / controls} <u>protein synthesis</u> ;
L	ribosomes ;	synthesise proteins;
M	Golgi apparatus/body;	packaging of proteins (for secretion from the cell) / (chemically) modifies proteins / produces glycoproteins / produces lysosomes;

6

(b) (i) They have been cut in different plane/ angle;

1

(ii) (Loop of) DNA;
(70S) ribosomes;

Max 2

Both possess plasma membranes; NOT double membrane

(iii) Mitochondria: (statements should be comparative)

Max 2

Has a double membrane;

No cell wall;

No capsule;

No flagellum/ pili;

No mesosome;

No plasmids;

Question 5 Total

[11]

Question	Marking details	Marks Available
6	(a) (i) Allows the <u>glucose</u> molecules to pass through (to the enzyme layer); Prevents the passage of other solutes ; so they can't {affect results / affect enzyme / reduce enzyme activity};	2 max
	(ii) glucose broken down by <u>enzyme</u> ; the {hydrogen peroxide/oxygen} is {detected/absorbed} by electrode; an electric signal is generated/ changes chemical to electrical signal; the greater the concentration of {glucose/hydrogen peroxide/oxygen} the greater the signal;	3 max
	(b) (i) The enzyme converts glucose into it's <u>isomer fructose</u> / glucose and <u>fructose are isomers</u> ;	1
	(ii) Add Biuret solution / sodium hydroxide solution & copper sulphate; (reject if reference to heat) The solution would remain blue / no colour change would occur;	2
	(iii) can be re-used; has greater stability/denature at higher temperatures; can catalyse reactions/greater stability over a wider range of pH; More than one enzyme can be used/enzymes added or removed easily/ greater control over process/ can be used in a continuous process; (Reference to cost is neutral)	2 max
Question 6 Total		[10]

Question	Marking details	Marks Available
7	(a)	
	(i) -700(kPa);	1
	(ii) I arrows drawn from F to G, F to E and from G to E; (allow ecf)	1
	II Water molecules move down a water potential gradient / from a{higher /less negative} water potential to a{lower /more negative} water potential; By osmosis; (in correct context)	2
	(b)	
	(i) 50% of the cells were plasmolysed;	1
	(ii) -430kPa; (At incipient plasmolysis) {the pressure potential equals zero/ the solute potential = water potential};	2
	Question 7 Total	[7]

Question	Marking details	Marks Available
8 (a)	<p>A polysaccharides {are polymers/ formed during condensation reactions};</p> <p>B (monomers are) joined by glycosidic bonds;</p> <p>C starch is made up from <u>alpha</u> glucose;</p> <p>D starch is composed of amylose and amylopectin / contains both 1,4 & 1,6 bonds;</p> <p>E glycogen is made from (alpha) glucose;</p> <p>F {Starch/glycogen} are insoluble and therefore osmotically inert/ OWTTE;</p> <p>G {Starch/glycogen} are storage molecules because {glucose can be added or removed easily / they have a compact structure};</p> <p>H cellulose is composed of <u>beta</u> glucose;</p> <p>I alternate glucose molecules are rotated by 180°/ head up head down structure;</p> <p>J this form long <u>straight</u> chains (of beta glucose)/ only contains 1-4 bonds;</p> <p>K {hydrogen bonds / cross links} form between the chains;</p> <p>L forming microfibrils;</p> <p>M cellulose provides {strength/rigidity} to <u>plant</u> cell walls / cellulose prevents osmotic lysis in plant cells;</p> <p>N in chitin some OH groups are replaced with amino acids / amine groups / glucose amine;</p> <p>O chitin provides strength to <u>fungal</u> cell walls / (arthropod) exoskeletons;</p>	10 max

Question	Marking details	Marks Available
8 (b)	<p>A globular proteins show tertiary / quaternary structure;</p> <p>B they have a {specific/precise} 3D shape;</p> <p>C their shape is maintained by bonds between (atoms within the) R-groups;</p> <p>D disulphide bridges / ionic bonds / hydrogen bonds / Van der Waals forces / hydrophobic interactions; (any 2) NOT peptide</p> <p>E intrinsic proteins span the membrane;</p> <p>F extrinsic proteins are {embedded in one half of the membrane / on the surface of the membrane};</p> <p>G correct reference {made to the distribution of charge / polar and non-polar groups} on the {intrinsic/extrinsic} proteins;</p> <p>H channel proteins have a hydrophilic pore;</p> <p>I this allows {polar molecules/ions} to pass through the membrane;</p> <p>J by (facilitated) diffusion; NOT active transport</p> <p>K carrier proteins allow the passage of molecules {with a complementary shape/ by the protein changing shape} ;</p> <p>L by (facilitated diffusion and) <u>active transport</u>;</p> <p>M Glycoproteins contain a carbohydrate chain attached to a protein;</p> <p>N {Glycoproteins/ extrinsic proteins} act as hormone receptors / are involved in cell recognition;</p> <p>O enzymes may be located in the membrane / catalyse reactions / carry out digestion / synthesise ATP;</p>	
	Question 7 Total	[10]