Mark schemes

Q1.

(a) 1. Amylase;

2. Glycosidic;

3. Peptide;

Reject dipeptide/ polypeptide bond

4. Amino acid(s);

Biological molecule	Enzyme	Name of bond hydrolysed	Product of digestion
	Amylase	Glycosidic	
		Peptide	Amino acid(s)

4

(b) 1. Add biuret (solution);

Reject burette or Beirut

Reject heat

Accept a description of the biuret test: eg copper sulfate and sodium hydroxide or $CuSO_4$ + NaOH or alkaline copper sulfate

Purple (colour produced);

Accept lilac/violet/mauve for purple

2

(c) 1. (Positive because) enzymes are protein;

2. (Because) enzymes not used up (in reactions)

OR

(Because) enzymes still present;

Accept correct answer in any order

Accept enzymes reused for enzymes not used up

Presence of enzyme after reaction must be implied

2

(d) Correct answer of 1.30 = **2 marks**;;

Evidence of correct rearranged equation, for example

Maximum rate of reaction = k_{cat} × Enzyme concentration = **1 mark**

OR

Evidence of 1 or 1.298 or 1.29 or 1.3 (correct answer but incorrect significant figures) = **1 mark;**

2

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Q2.

(a) 1. (Movement of) polar/charged molecules;

*Accept ions **OR** non-lipid soluble for polar*

*Accept named polar molecule, eg glucose **OR** amino acids **OR** nucleotides*

2. (Facilitated diffusion) movement down a concentration gradient via carrier/channel protein;

Reject if ATP used

*Ignore along **OR** with for down*

Ignore diffusion gradient

3. (Active transport) movement against a concentration gradient via carrier protein using ATP;

Reject channel protein

3

(b) (Highly) folded cell(-surface) membrane;

Accept invaginated

OR** projections **OR

extensions for folded

Reject hairs

Ignore brush border

1

(c) 1. Combine/mix/join with bile salts;

2. Make (more) soluble (in water);

3. (Micelles) breakdown close to cells

OR

Maintain high(er) concentration at cell(-surface membrane)

OR

Transport to cells/lining;

Accept 'fuse with' for 'breakdown close to'

4. Diffuses (into cells/ileum);

Ignore facilitated

Ignore micelles are absorbed

*Max 2 if context is related to digestion of vitamin A to phospholipids **OR** monoglycerides **OR** fatty acids*

Ignore emulsification of vitamin A

3 max

[7]

Q3.

(a) 1. Breaking of ester bonds;

2. By addition of water;
Accept 'using', 'with' for addition

2

(b) 1. Emulsify lipids/fats;
Allow descriptions

2. Increases surface area (of lipid/fat) for (increased) lipase activity;

3. Form micelles;
Ignore 'neutralise'/ 'increase the pH'

2 max

(c) 1. Mutation results in (a new) allele;

2. Those with the (new) allele able to digest milk/triglycerides;

3. Individuals with CEL/allele more likely to (survive and) reproduce;
Accept 'pass on allele/characteristic' for reproduce

4. Directional selection;

5. Increase in frequency of (this) allele in population;
Accept description of increasing frequency, eg 'more common', 'higher proportion' but ignore increase in number of allele
*Allow ECF for use of gene rather than allele after not awarding mark in the first instance but **max 3** overall.*
Accept 'mutation' for allele

4 max

[8]

Q4.

(a) 1. Reduced surface area

OR

Fewer co-transport/carrier/channel proteins;

Ignore references to diffusion OR facilitated diffusion OR active transport

Ignore SA

Accept gut for ileum

2. Decreases water potential in ileum/lumen

OR

Increases water potential in cells;

Accept Ψ for water potential

Ignore WP

Accept reduces water potential gradient

3. (So) water moves out of cells/into ileum by <u>osmosis</u>

OR

(So) less/no water moves into cells/out of ileum by <u>osmosis</u>;

Accept lumen for ileum

Accept absorbed for moves

3

(b) 1. Anti-toxins/antibodies cause phagocytosis/ destruction/agglutination/neutralisation (of toxin);

For 'neutralised', accept idea of preventing toxin binding/damaging cells lining the ileum.

2. Anti-toxin/antibody prevents/reduces (chance of) diarrhoea

OR

(*C difficile*) patients with no diarrhoea have high(est) (concentration of) anti-toxin/antibody

OR

(*C difficile*) patients with diarrhoea have low(est) (concentration of) anti-toxin/antibody;

Accept people for patients

Ignore symptoms for diarrhoea

3. (Offered to *C. difficile*) patients with diarrhoea

OR

(Offered to) patients with low (concentrations of) anti-toxin/antibody;

Accept people for patients

Accept 'passive immunity offered' for 'antibody offered'

3

(c) 1. Peptide bonds hydrolysed;

Ignore named structures in the digestive system

2. Endopeptidase(s) break internal (peptide) bonds;

Accept 'bonds within' OR 'bonds in middle' for internal

3. Exopeptidase(s) break terminal (peptide) bonds;

Accept 'external bonds' OR 'bonds at ends' OR 'penultimate bonds' for terminal

4. (Membrane-bound) dipeptidase(s) break dipeptides to amino acids;

2, 3 and 4 Accept 'act on' OR 'affect' OR 'hydrolyse' for break

Accept between 2 amino acids for dipeptides

Ignore stomach acid

3 max

[9]

Q5.

(a) 1. Sucrose actively transported into phloem (cell);
OR
Sucrose is co-transported/moved with H^+ into phloem (cell);
Accept sieve (element/tube/cell) for phloem (cell)

2. (By) companion/transfer cells;

3. Lowers water potential (in phloem) **and** water enters (from xylem) by osmosis;

4. (Produces) high(er) (hydrostatic) pressure;
OR
(Produces hydrostatic) pressure gradient;
Accept description of gradient, eg higher WP

5. Mass flow **to** respiring cells
OR
Mass flow to storage tissue/organ;
Accept transport OR movement for flow
Accept buds/young leaves/fruit/seeds/shoot tip/root tip/ meristems/root

6. Unloaded/removed (from phloem) by active transport;
Accept facilitated diffusion

5 max

(b) 1. Both polysaccharides;
OR
Both are glucose polymers
OR
Both are made of glucose monomers;

2. Both contain glycosidic bonds (between monomers);

3. Both contain carbon, hydrogen and oxygen/C, H and O;

4. Starch made of α-glucose **and** cellulose made of β-glucose;

5. Starch (molecule) is helical/coiled **and** cellulose (molecule) is straight;

6. Starch (molecule) is branched **and** cellulose is not/unbranched;

7. Cellulose has (micro/macro) fibrils **and** starch does not;
Must include 1, 2 OR 3 to achieve 6 marks
All statements must be clearly comparative or linked by the candidate, not inferred from separate statements
Additional mark point
*Starch has 1−6 glycosidic bonds **and** cellulose*

does not

OR

*Starch contains two types of molecule **and** cellulose contains one type of molecule*

OR

*Starch is amylose and amylopectin **and** cellulose is one type of molecule;*

6 max

(c) 1. Hydrolysis;

2. (Of) glycosidic bonds;

3. (Starch) to maltose by amylase;

4. (Maltose) to glucose by disaccharidase/maltase;

5. Membrane-bound (disaccharidase/maltase);

Other than 5., do not penalise incorrect site for digestion or incorrect site of enzyme production

Accept microvilli for membrane

4 max

[15]