

1. (a) Digestion/hydrolysis/breakdown of a disaccharide into monosaccharides;
OR
(glucose and galactose form lactose) glucose is a monosaccharide; max 1
- (b) (i) Dipeptidase / disaccharidase / named disaccharidase; 1
(ii) Enzymes not lost (with gut contents) / more effective absorption
of products formed by these enzymes; 1
- (c) No ATP formed / no energy released by respiration; [*reject "making" energy*]
Link ATP to active transport (of galactose) into cells; 2
- [5]**
2. (i) Lack of ATP;
Pump = active transport / requires energy / ATP provides energy /
transport is up
concentration gradient; 2
- (ii) Concentration of Na⁺ inside cell no longer less than concentration in
gut lumen /no longer a concentration gradient;
No (facilitated) diffusion of NA⁺ ions possible / amino acid absorption
requires diffusion of Na⁺ ions into cell; 2
- (iii) Diffusion / facilitated diffusion; 1
- [5]**
3. (a) Two marks for correct answer of 64.285/64.3/64; 2
(allow 1 mark for (8100/100 × 30) / 37.8)
- (b) dissolve in / add ethanol then mix with water; 2
emulsion / white colour indicates triglycerides present;

- (c) (i) increase the surface area for absorption; 1
(ignore wrong ref. to name)
- (ii) **R** = tissue fluid/interstitial fluid/extracellular fluid/intercellular space; 2
S = lymph(atic) vessel/lymph capillary/lacteal;
- (iii) proteins are synthesised by **U**;
involvement of ribosomes;
protein isolation / transport (inside RER);
vesicle formation; 2 max
- (iv) exocytosis / description of;
because of size / too large to leave by other methods; 2

[11]

4. (a) use of water; *must be above arrowhead*
OH drawn correctly in place of glycosidic bond on each monosaccharide; 2
- (b) water potential made lower / more negative;
less water absorption / water enters gut – by osmosis / by diffusion; 2

[4]

5. (a) extracellular/secreted enzymes;
reference to diffusion (of enzyme into agar);
starch digested;
to maltose/glucose;
smaller molecules absorbed into fungus/ do not react iodine solution;
B must have greater production of enzyme/more active enzyme; max. 4
- (b) does not produce amylase/enzyme able to hydrolyse starch/mutation causes
production of an inactive enzyme; 1

[5]

6. (a) (i) villi;
microvilli;
longer intestine; max. 2
- (ii) more time in intestines 1

- (b) Principles:
 diffusion into capillaries;
 active transport/facilitated diffusion involved;
 ATP used by active transport;
 Detail:
 disaccharidases/enzymes in cell surface membrane;
 glucose /monomers/monosaccharides actively transported **into** epithelial cells;
 via protein carriers/channels (in membranes);
 facilitated diffusion **from** epithelial cell / towards blood; max. 4
- [7]**

7. large surface area provided by villi / microvilli;
 long / folds increase surface area / time for absorption;
 thin epithelium;
 short diffusion pathway;
 capillary network absorbs amino acids / sugars;
 lacteal for absorption of digested fats;
 mitochondria supply ATP / energy for active transport;
 carrier proteins (in membranes); max 6
- [6]**

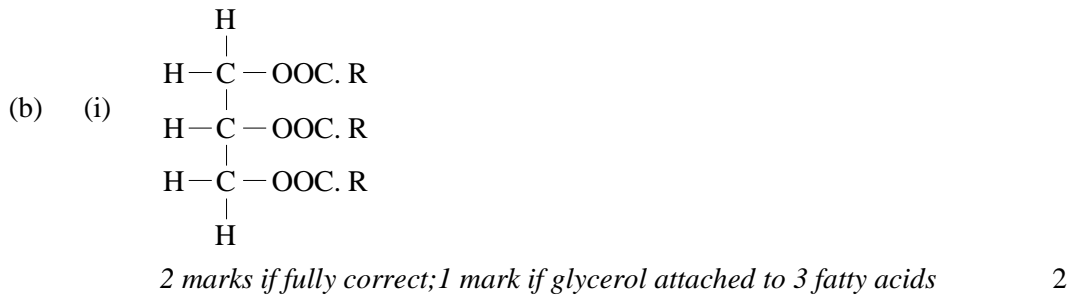
8. Hydrolysed by maltase;
 Maltase enzymes in membranes of epithelial cells of small intestine;
 Glucose absorption involves diffusion;
 Associated with uptake of sodium ions;
 Involves active transport/energy dependent;
 Requires carrier molecules;
 Role of villi/microvilli in increasing surface area;
 Transported in solution/in plasma;
 To liver via hepatic portal vein; max 7
- [7]**

9. (a) Starch digested to maltose by amylase;
 Found in saliva; Secreted by pancreas;
 Maltase converts maltose to glucose;
 Found in membranes of cells lining small intestine;
 Both reactions involve hydrolysis; 4

- (b) Glucose absorption involves diffusion;
 Associated with uptake of sodium ions;
 Involves active transport/energy dependent;
 Requires carrier molecules;
 Role of villi and microvilli in increasing surface area;
 Transport into capillaries/hepatic portal vein; 4

[8]

10. (a) Cells all the same/similar structure/function. 1



- (ii) Condensation / esterification. 1

- (c) (i) (Unsaturated fatty acids) lower the melting point. 1

- (ii) Triglycerides are oils / melting point below body temperature;
 Explanation of advantage, e.g. prevents hard layer of fat forming
 under skin / mobility of lipid / deposition in arteries. 2

[7]

11. (i) X = Mitochondria;
 Y = Microvilli / brush border; 2

- (ii) X = Provide energy/for active uptake;
 Y = Increase surface area; 2

[4]

12. (allow general points provided correct molecule/particle involved)
- diffusion
- movement along / down concentration gradient;
 monoglycerides / micelles/fatty acids move into epithelial cells;
 monoglycerides move from epithelium into blood;
 chylomicrons move into lacteals / lymph;
- facilitated diffusion
- movement along / down concentration gradient;
 reference to carrier / channel proteins;
 monosaccharides or named / amino acids move into epithelial cells;
- active transport
- movement against concentration gradient;
 energy / ATP required;
 reference to carrier proteins;
 monosaccharides or named / amino acids moved into epithelial cells;
 reference to co-diffusion e.g. glucose and NaCl;
 monosaccharides or named / amino acids move into blood;
 (maximum 5 marks if any one or 4 if any two processes completely omitted) 6 max
- [6]**
-
13. (a) (i) villus; (*reject microvilli*) 1
- (ii) contracts / peristalsis;
 moves/pushes/forces food through gut; 2
- (b) many / projecting villi (X) (*no double penalty for microvilli*);
 large surface area (for absorption);
 large/good blood supply / many capillaries/blood vessels;
 maintains concentration gradients / efficient removal of digested products;
 thin outer layer / blood vessels near to surface;
 short diffusion pathway; 4 max
- [7]**

14. (i) cold - no / reduced enzyme action / e.g. stops autolysis;
(reject "cell activity reduced")
 isotonic - stops osmotic effects / description of effect on cells or organelles;
 buffer - prevents damage to enzymes / proteins; 3
- (ii) break open the cells / release the cell contents; 1
- (iii) supernatant / liquid above the pellet;
 spun at a high(er) speed; 2
(mark as independent points)
- [6]**
15. (i) active sites contain substrate / ethylene glycol;
 all active sites occupied / enzyme is limiting; 2
(reject idea of active sites used up)
- (ii) Ethanol is a similar shape to the substrate (ethylene glycol) /
 complementary to active site;
(reject "same shape")
 ethanol is a competitive inhibitor / reduces enzyme-substrate complexes /
 prevents substrate (ethylene glycol) entering the active site; 2
(reject "decreases rate of reaction")
- [4]**
16. (a) Hydrolysis; 1
- (b) C₁₂;
 H₂₂O₁₁; 2
- (c) (i) One mark for answer that simply refers to increase and
 subsequent decrease
 Two marks for answer that refers to reaching a peak at
 approximately 6.6 mol dm⁻³/45 minutes. 2
*Q Descriptions must refer to concentration of glucose and time
 to gain credit. Do not accept vague references to "It . . ."*
- (ii) No lactase;
 Therefore lactose not digested/glucose not produced;
 No glucose absorbed therefore concentration in blood stays the
 same/does not rise; 3
- [8]**
17. (a) Amylase;

(Starch) to maltose:

Maltase;

Maltose to glucose;

Hydrolysis;

(Of) glycosidic bond;

5 max

Q Do not penalise incorrect site for digestion or incorrect site of enzyme production.

(b) Glucose moves in with sodium (into epithelial cell);

Via (carrier/channel) protein/symport;

Sodium removed (from epithelial cell) by active transport/sodium-potassium pump;

Into blood;

Maintaining low concentration of sodium (in epithelial cell) / maintaining sodium concentration gradient (between lumen and epithelial cell);

Glucose moves into blood;

By (facilitated) diffusion;

5 max

Q Only allow diffusion mark in context of movement of glucose into the blood.

[10]