

Mark schemes

Q1.

- (a) 1. Micelles contain bile salts and fatty acids/monoglycerides;
Ignore other correct components of micelles
2. Make fatty acids/monoglycerides (more) soluble (in water)

OR

Bring/release/carry fatty acids/monoglycerides to cell/lining (of the ileum)

OR

Maintain high(er) concentration of fatty acids/monoglycerides to cell/lining (of the ileum);

Accept lipid/fat for fatty acid/ monoglyceride

3. Fatty acids/monoglycerides absorbed by diffusion;
Reject if absorbed by facilitated diffusion
Ignore if micelles themselves are being absorbed
4. Triglycerides (re)formed (in cells);
Accept chylomicrons form
5. Vesicles move to cell membrane;
Accept exocytosis for 'vesicles move'

5

- (b) 1. Structure is determined by (relative) position of amino acid/R group/interactions;
Accept for 'interactions', hydrogen bonds / disulfide bridges / ionic bonds / hydrophobic/hydrophilic interactions
2. Primary structure is sequence/order of amino acids;
3. Secondary structure formed by hydrogen bonding (between amino acids);
Accept alpha helix/ β -pleated sheet for 'secondary structure'
4. Tertiary structure formed by interactions (between R groups);
Accept for 'interactions', hydrogen bonds / disulfide bridges / ionic bonds / hydrophobic/hydrophilic interactions
5. Creates active site in enzymes

OR

Creates complementary/specific shapes in antibodies/carrier proteins/receptor (molecules);

6. Quaternary structure contains >1 polypeptide chain

OR

Quaternary structure formed by interactions/bonds between polypeptides;

Accept for 'interactions', hydrogen bonds/ disulfide bridges/ionic bonds/hydrophobic/hydrophilic interactions

Accept prosthetic (group)

5 max

[10]

Q2.

- (a) 1. (ATP to ADP + Pi) Releases energy;
Reject 'produces/makes/creates energy'.
2. (energy) allows ions to be moved against a concentration gradient

OR

(energy) allows active transport of ions;

For 'ions' accept Na⁺ or K⁺.

Do not accept if this movement is of glucose not ions.

2

- (b) 1. (Maintains/generates) a concentration/diffusion gradient for Na⁺ (from ileum into cell);
Accept '(Maintains/generates) a lower concentration of Na⁺ inside the cell compared with outside the cell'.
2. Na⁺ moving (in) by facilitated diffusion, brings glucose with it

OR

Na⁺ moving (in) by co-transport, brings glucose with it;

Accept 'co-transporter' for 'co-transport'.

2

Q3.

- (a) 1. Triglycerides decrease **because** of the action of lipase
- OR**
- Fatty acids increase **because** of the action of lipase;
2. Triglycerides decrease **because** of hydrolysis (of triglycerides)

OR

Fatty acids increase **because** of hydrolysis (of triglycerides);

3. Triglycerides decrease **because** of digestion of ester bonds (between fatty acid and glycerol)

OR

Fatty acids increase **because** of digestion of ester bonds (between fatty acid and glycerol);

Triglycerides decreasing or fatty acids increasing only need to be stated once.

Accept 'lower/higher/quoted numbers' for 'decrease/increase'.

Only withhold one mark if there is no/incorrect reference to triglycerides decreasing or fatty acids increasing.

3

- (b) 1. To denature the enzymes/lipase;
Accept description of denaturation in terms of change in tertiary structure.
2. So no further digestion/hydrolysis/catalysis occurred;
Accept 'break down' for digestion.

2

- (c) 1. Micelles include bile salts and fatty acids;
Ignore other correct components of micelles.
2. Make the fatty acids (more) soluble in water;
For 'fatty acids' accept fats / lipids.
3. Bring/release/carry fatty acids to cell/lining (of the ileum);
For 'fatty acids' accept fats/lipids.
4. Maintain high(er) concentration of fatty acids to cell/lining (of the ileum);
5. Fatty acids (absorbed) by diffusion;
Reject if absorbed by facilitated diffusion
Ignore if micelles themselves are being absorbed.
Ignore references to monoglycerides.

3 max

[8]

Q4.

- (a) 1. (Reference to) hydrolysis of peptide bonds;
2. Endopeptidase act in the middle of protein/polypeptide
OR
Endopeptidase produces short(er) polypeptides/ increase number of

- ends;
3. Exopeptidases act at end of protein/polypeptide
OR
Exopeptidase produces dipeptides/amino acids;
 4. Dipeptidase acts on dipeptide/between two amino acids
OR
Dipeptidase produces (single) amino acids;
- Accept chain/chain of amino acids/peptide for polypeptide*
Accept digest/breakdown/ break for 'act'
*Mark points 2, 3 and 4 **reject** answers where substrate or product is incorrect eg 'Endopeptidase produces dipeptides'*
Ignore references to source and location of enzymes

4

(b)

Ignore reference to 'significance' unless qualified, eg 'difference'

1. No significant difference (in protein absorption);
2. (because ± 2) SDs overlap;
Accept error bar for SD
3. (So mean) percentage absorbed not affected by percentage in diet;
4. Amount of protein (in diet) is not a limiting fact
OR
Something else is limiting factor eg amount of protease;
5. (But) small range of protein in diet
OR
(Should) Investigate wider range;

3 max

- (c)
1. More/remaining/undigested (protein) broken down;
Accept all (protein) broken down
 2. (So more) amino acids absorbed;
 3. (Because) protein/food passes again through stomach/ileum;

3

[10]

Q5.

(a) Diffusion

Automarker

1

- (b)
1. **Droplets** increase surface areas (for lipase / enzyme action);
 2. (So) faster hydrolysis / digestion (of triglycerides / lipids);
 3. **Micelles** carry fatty acids and glycerol / monoglycerides to / through membrane / to (intestinal epithelial) cell;
 1. *Context is important*
 1. *Reject micelles increase surface area*

2. *Ignore 'breakdown'*
3. *Ignore 'small enough'*
3. *Accept description of membrane*
3. *Reject any movement through membrane proteins*

3

- (c) 1. Golgi (apparatus);
2. Modifies / processes triglycerides;
 3. Combines triglycerides with proteins;
 4. Packaged for release / exocytosis
- OR**
- Forms vesicles;
- Ignore 'processes and packages' unqualified*
2. *Reject synthesises triglycerides*
 3. *Accept 'forms / are lipoproteins'*

4

[8]

Q6.

- (a) 1. Sodium ions actively transported from ileum cell to blood;
2. Maintains / forms diffusion gradient for sodium to enter cells from gut (and with it, glucose);
 3. Glucose enters by facilitated diffusion with sodium ions;

3

(b)

Biochemical test	Liquid from beaker	Liquid inside Visking tubing
Biuret reagent		✓
I ₂ /KI		✓ or blank
Benedict's	✓	✓

1 mark for each correct row

3

- (c) 1. Biuret: protein molecules too large to pass through tubing;
Neutral: enzyme molecules
2. Iodine in potassium iodide solution: starch molecules too large to pass through tubing;
If no tick in 04.2, allow no starch hydrolysed
 3. Benedict's: starch hydrolysed to maltose, which is able to pass through tubing.
Reject: glucose

3

