St Mary's Science Department

A level Biology

Homework Book

Biological Molecules 1

Name: _____

Class: _____

Teacher : _____

Question	Date given	Date due	Mark
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
Total Score		Grade	

Q1.

The equation shows the breakdown of lactose by the enzyme lactase.

(a) (i) Name the type of reaction catalysed by the enzyme lactase.

_____

(1)

(ii) Name monosaccharide **X**.

_____

(1)

(b) (i) Describe how you would use a biochemical test to show that a reducing sugar is present.

_____

_____

_____

_____

_____

(2)

(ii) Lactose, galactose and monosaccharide **X** are all reducing sugars.
After the lactose has been broken down there is a higher concentration of reducing sugar. Explain why.

_____

(1)

(c) A high concentration of galactose slows down the breakdown of lactose by lactase.
Use your knowledge of competitive inhibition to suggest why.

_____

_____

_____

_____

_____

(2)

(Total 7 marks)

Feedback	Mark (out of)	Score
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q2.

(a) Describe how you would test a piece of food for the presence of lipid.

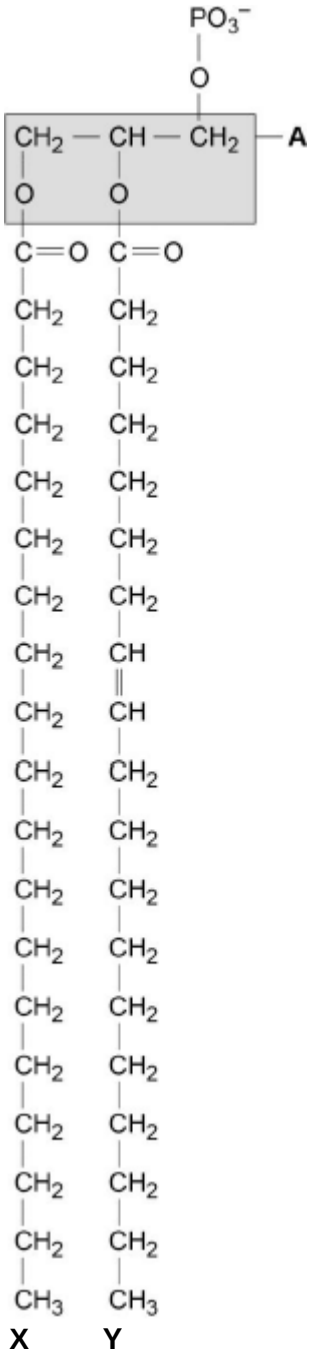
_____

_____

_____

(2)

The figure below shows a phospholipid.



(b) The part of the phospholipid labelled **A** is formed from a particular molecule. Name this molecule.

_____

(1)

(c) Name the type of bond between **A** and fatty acid **X**.

_____

(1)

(d) Which of the fatty acids, **X** or **Y**, in the figure above is unsaturated? Explain your answer.

_____

_____

_____

_____

(1)

Scientists investigated the percentages of different types of lipid in plasma membranes from different types of cell. The table shows some of their results.

Type of lipid	**Percentage of lipid in plasma membrane by mass**		
	Cell lining ileum of mammal	**Red blood cell of mammal**	**The bacterium *Escherichia coli***
Cholesterol	17	23	0
Glycolipid	7	3	0
Phospholipid	54	60	70
Others	22	14	30

(e) The scientists expressed their results as **Percentage of lipid in plasma membrane by mass**. Explain how they would find these values.

_____

_____

_____

_____

(2)

Cholesterol increases the stability of plasma membranes. Cholesterol does this by making membranes less flexible.

(f) Suggest **one** advantage of the different percentage of cholesterol in red blood cells compared with cells lining the ileum.

_____

_____

_____

(1)

(g) *E. coli* has no cholesterol in its cell-surface membrane. Despite this, the cell maintains a constant shape. Explain why.

_____

_____

_____

_____

(2)

(Total 10 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q3.

(a) Describe how the structures of starch and cellulose molecules are related to their functions.

(5)

(b) Describe the processes involved in the transport of sugars in plant stems.

(5)

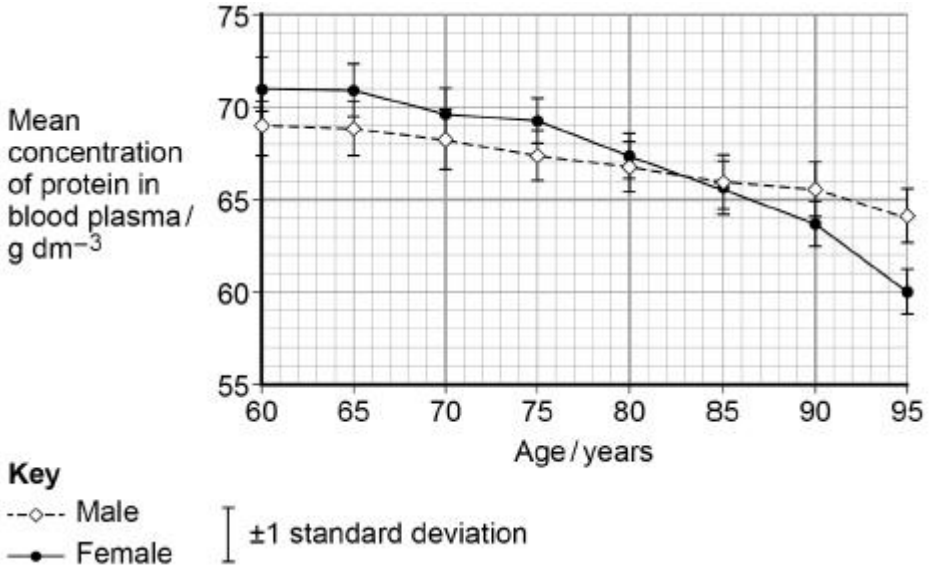
(Total 10 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q4.

Scientists investigated how the concentration of protein in blood plasma changes in people between the ages of 60 and 95.

The graph shows the scientists' results. The bars show ±1 standard deviation.



(a) What is the difference between males and females in the fall in mean concentration of protein in blood plasma between 60 and 95 years?

Answer = _____ g dm^{-3}

(1)

(b) Use the graph above to calculate the rate of change of the mean concentration of protein in the blood plasma of males between the ages of 60 and 95.

Show your working.

Answer = _____ g dm^{-3} $year^{-1}$

(2)

(c) What can you conclude from the graph above about the effect of ageing on the mean concentration of protein in the blood plasma in males and females?

(2)

(d) The scientists measured the absorption of each sample of blood plasma using a colorimeter. They used a calibration curve to find the concentration of protein in samples of blood plasma.

Describe how the scientists could obtain data to produce a calibration curve and how they would use the calibration curve to find the concentration of protein in a sample of blood plasma.

(3)

(e) Older people are more likely to suffer from infectious diseases.

Suggest how this may be linked to the decrease in the mean concentration of protein in the blood as people get older.

(1)

(Total 9 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q5.

(a) Most blood glucose comes from starch and disaccharides in the diet.
Describe a test you could use to check if food in the diet contained starch.

(2)

(b) Explain how digestion of starch in the gut (small intestine) leads to an increase in the concentration of glucose in the blood. Details of co-transport are **not** required.

(3)

(c) Suggest a method you could use to estimate the concentration of glucose in several different solutions that all turned brick red with Benedict's reagent in 3 minutes.

(1)

(Total 6 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q6.

Glucose is a monosaccharide. Two glucose molecules join together to form a disaccharide.

(i) Name the products of this reaction.

_____

(2)

(ii) Name the type of reaction that joins the glucose molecules together.

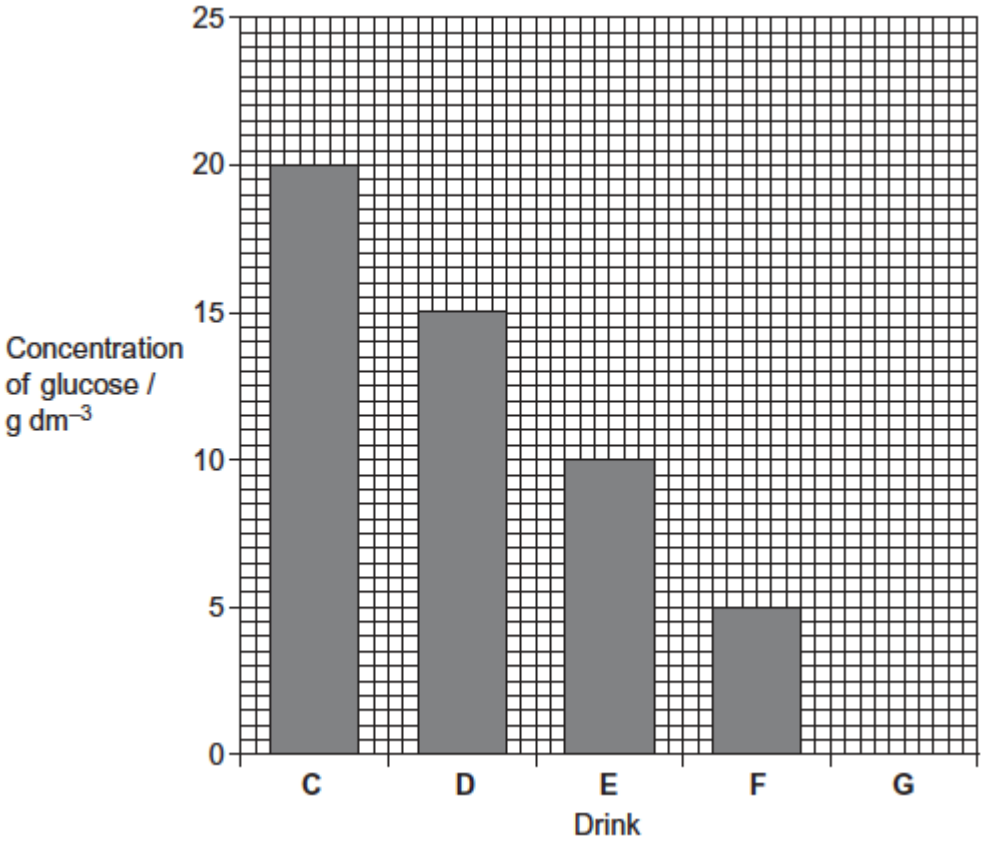
_____

(1)

(Total 3 marks)

Q7.

A student investigated the glucose concentration in five different drinks.
His results are shown below.



(a) Using the data, calculate how many grams of glucose would be in 220 cm^3 of drink **F**.

Answer = _____ g

(1)

(b) Calculate how much more glucose is in drink **C** than in drink **F**. Show your answer as a percentage.

Answer = _____ %

(1)

(Total 2 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

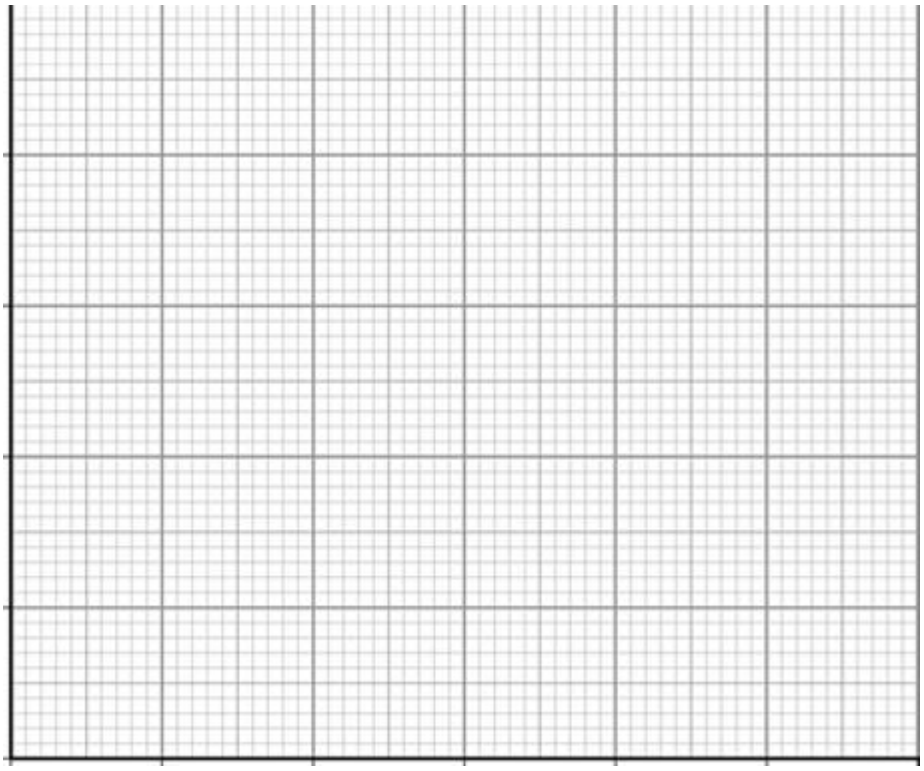
Q8.

A biochemist isolated a protease from a bacterium. He investigated the effect of temperature on the rate of hydrolysis of a protein by this protease. He measured the mass of protein hydrolysed in **5 minutes** at each temperature.

The results are shown in the table below.

Temperature / °C	**Mass of protein hydrolysed / g**	**Rate of hydrolysis /** _____
5	0.48	
10	1.11	
15	1.23	
20	1.05	
30	0.78	
45	0.12	

(a) Process the data in the table. Plot the processed data on the graph paper.



(4)

(b) A student concluded from a graph of the data in the table that the bacterium lives at 15 °C.

Does the data support the student's conclusion? Give reasons for your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(c) Suggest **two** variables the biochemist controlled when investigating the effect of temperature on the rate of breakdown of a protein by the protease.

1. _____

2. _____

(1)

(Total 9 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q9.

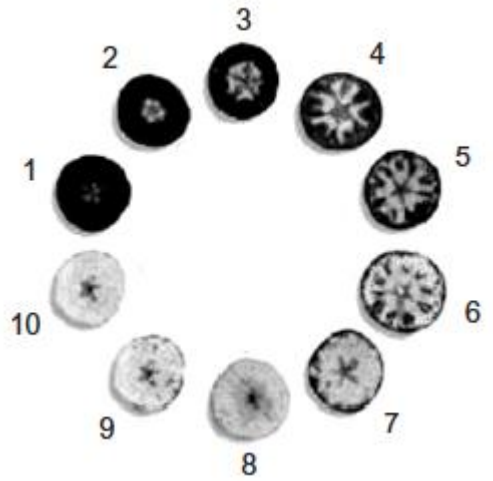
Apple farmers want to harvest their fruit when it is ripe enough for eating but also when it can be stored to sell later.

One method apple farmers use to decide when to harvest their fruit is to determine the starch content. As apples ripen, starch in the apple is converted into soluble sugars that make them taste sweet.

Scientists investigated the best time to harvest apples for storage before being sold.

To determine the starch content, they picked samples of apples. They cut each apple in half and covered the cut surface with iodine solution. They left it for 1 minute and then compared it with the diagram below to give it a starch index score between 1 and 10.

Figure 1

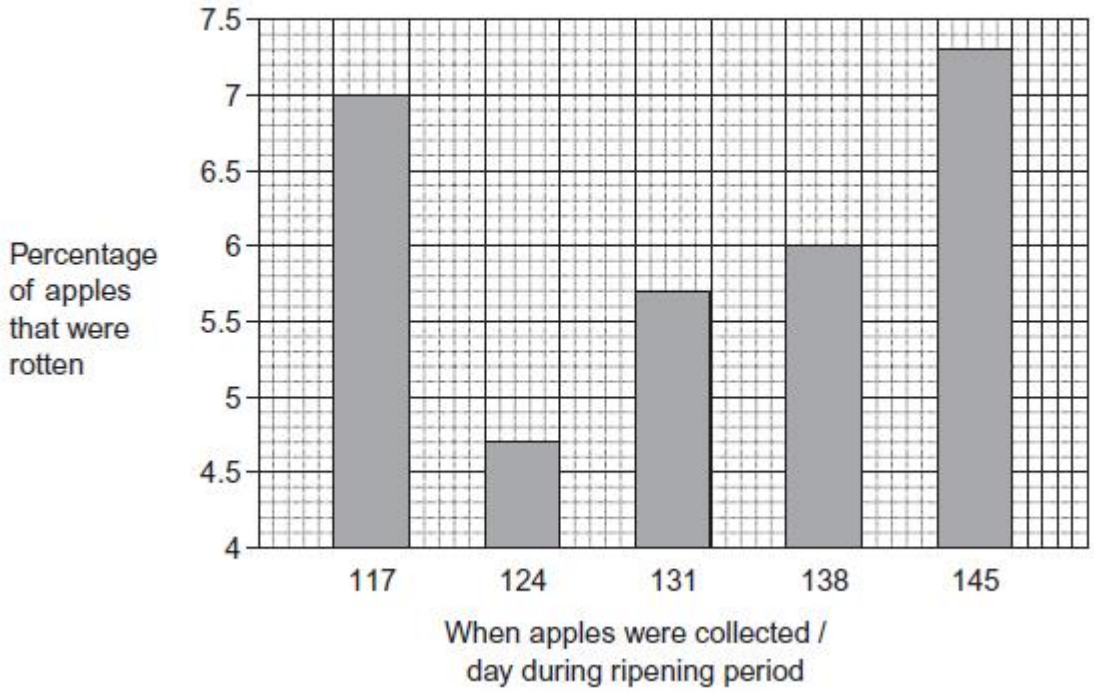


They collected samples of apples at 5 different days during the ripening period and tested them for starch content. These results are shown in the table below.

When apples were collected / day during ripening period	Mean starch index
117	3.7
124	4.4
131	6.3
138	7.7
145	8.2

The scientists stored samples of apples from each collection day for 180 days. They then determined the percentage of apples that were rotten. These results are shown in the graph below.

Figure 2



(a) The cut surface of the apple covered with iodine solution is left for 1 minute before being compared to **Figure 1**.
Explain why each apple must be left for the same length of time.

(2)

(b) Describe and explain the change in appearance of the cut surface of the apple when treated with iodine solution from underripe (starch index 1) to overripe (starch index 10).

(3)
(Total 5 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

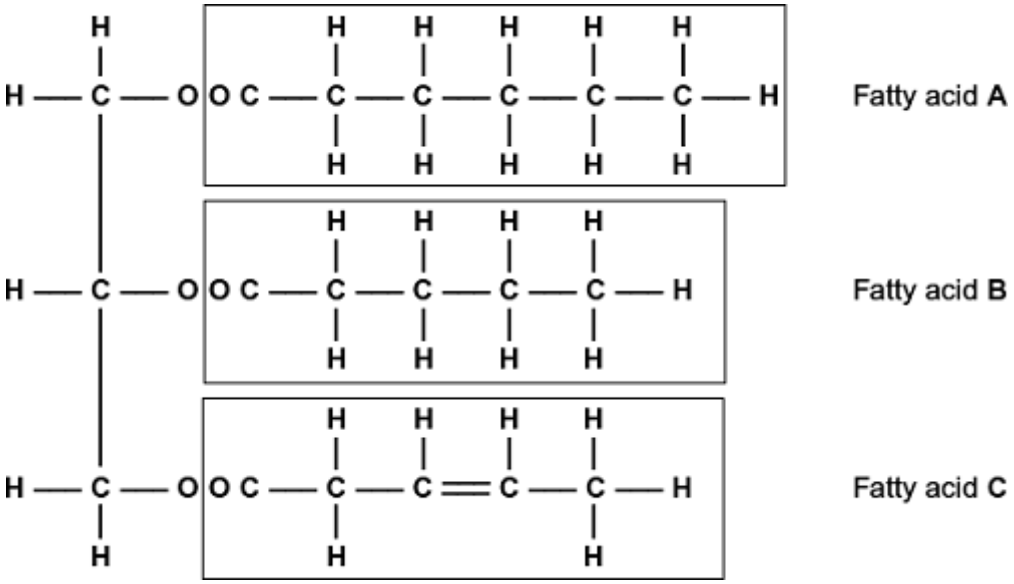
Q10.

(a) Some seeds contain lipids. Describe how you could use the emulsion test to show that a seed contains lipids.

(*Extra space*)

(3)

(b) A triglyceride is one type of lipid. The diagram shows the structure of a triglyceride molecule.



(i) A triglyceride molecule is formed by condensation. From how many molecules is this triglyceride formed?

(1)

(ii) The structure of a phospholipid molecule is different from that of a triglyceride. Describe how a phospholipid is different.

_____

_____

_____

_____

_____

(2)

(iii) Use the diagram to explain what is meant by an unsaturated fatty acid.

_____

_____

_____

_____

_____

(2)

(Total 8 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q11.

(a) In humans, the enzyme maltase breaks down maltose to glucose. This takes place at normal body temperature.

Explain why maltase:
- only breaks down maltose
- allows this reaction to take place at normal body temperature.

(5)

(b) Scientists have investigated the effects of competitive and non-competitive inhibitors of the enzyme maltase.

Describe competitive and non-competitive inhibition of an enzyme.

(5)

(Total 10 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q12.

Read the following passage.

Alzheimer's disease leads to dementia. This involves small β-amyloid proteins binding together to form structures called plaques in the brain.

Nerve cells in the brain produce a large protein called amyloid-precursor protein that has a complex shape. This protein is the substrate of two different enzymes, α-secretase and β-secretase. These enzymes are normally produced in the brain. One product of the reaction catalysed by β-secretase is a smaller protein that can lead to β-amyloid protein formation. Many people with Alzheimer's disease have mutations that decrease α-secretase production, or increase β-secretase production.

One possible type of drug for treating Alzheimer's disease is a competitive inhibitor of β-secretase. When some of these types of drugs were trialled on patients, the trials had to be stopped because some patients developed serious side effects.

Use information from the passage and your own knowledge to answer the following questions.

(a) Suggest how amyloid-precursor protein can be the substrate of two different enzymes, α-secretase and β-secretase (lines 3–5).

_____

_____

_____

_____

_____

(2)

(b) One product of the reaction catalysed by β-secretase is a smaller protein (lines 6–7).

Describe what happens in the hydrolysis reaction that produces the smaller protein from amyloid-precursor protein.

_____

_____

_____

_____

_____

(2)

(c) Many people with Alzheimer's disease have mutations that decrease α-secretase production, or increase β-secretase production (lines 8–9).

Use the information provided to explain how these mutations can lead to

Alzheimer's disease.

(3)

(d) One possible type of drug for treating Alzheimer's disease is a competitive inhibitor of β-secretase (lines 10–11).

Explain how this type of drug could prevent Alzheimer's disease becoming worse.

(2)

(e) When some of these types of drugs were trialled on patients, the trials were stopped because some patients developed serious side effects (lines 11–13).

Using the information provided, suggest why some patients developed serious side effects.

(1)

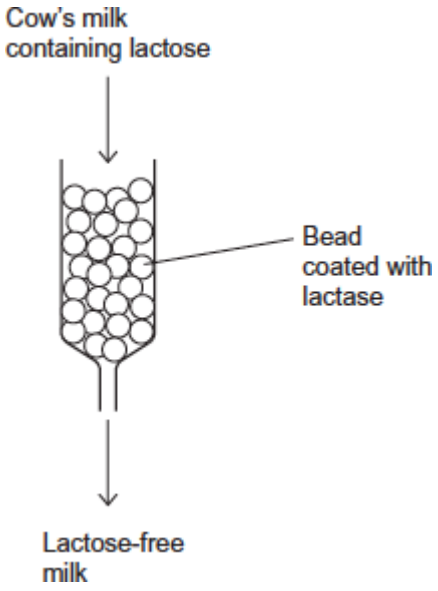
(Total 10 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q13.

Cow's milk contains the sugar lactose. Many cats are unable to digest cow's milk because they are lactose intolerant.

Cow's milk can be made suitable for these cats by treating it with the enzyme lactase to hydrolyse lactose. This makes the cow's milk lactose-free. Beads are coated with lactase and placed in a tube, as shown in the diagram below. Cow's milk flows over the beads and the lactose is hydrolysed.



(a) Attaching lactase to the beads is a more efficient use of lactase than adding the lactase directly to cow's milk.

Suggest **three** reasons why it is more efficient to attach lactase to the beads.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(b) Monosaccharides and disaccharides taste sweet.
The lactose-free milk made after hydrolysis with lactase tastes sweeter than the cow's milk containing lactose.
Suggest why.

_____

_____

_____

(2)

(Total 5 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q14.

(a) The table shows some statements about three carbohydrates. Complete the table with a tick in each box if the statement is true.

Statement	Starch	Cellulose	Glycogen
Found in plant cells			
Contains glycosidic bonds			
Contains β-glucose			

(3)

(b) Name the type of reaction that would break down these carbohydrates into their monomers.

_____

(1)

(c) Give **one** feature of starch and explain how this feature enables it to act as a storage substance.

Feature _____

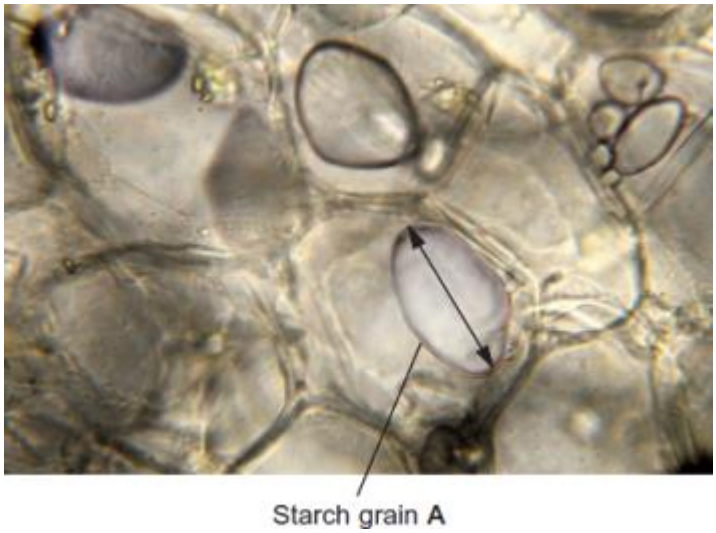
Explanation _____

_____

_____

(2)

(d) The picture shows starch grains as seen with an optical microscope. The actual length of starch grain **A** is 48 μm. Use this information and the arrow line to calculate the magnification of the picture. Show your working.



Magnification _____ times

(2)

(Total 8 marks)

Feedback	Mark (out of)	%
Skill	**Strength**	**Could improve**
Knowledge		
Understanding		
Evaluation		
Application		
Calculation		
Data analysis		
How science works		
To improve		
Student response		

Q1.

(a) (i) Hydrolysis;

Accept phonetic spelling.

Ignore reaction.

1

(ii) (Alpha) glucose;

Accept α glucose.

Reject β glucose / beta glucose

1

(b) (i) Add Benedict's (reagent) and heat / warm;

Red / orange / yellow / green (colour);

Reject Add HCl

Accept brown, reject other colours

2

(ii) 2 products / 2 sugars produced;

*Look for idea of **two***

Accept named monosaccharides produced.

"More" insufficient for mark

Neutral if incorrect products named

Neutral "lactose is a polysaccharide"

Neutral "lactose is not a reducing sugar"

Neutral: Reference to surface area.

1

(c) 1. Galactose is a similar shape / structure to lactose / both complementary;

Q Reject: Same shape / structure

2. (Inhibitor / Galactose) fits into / enters / binds with active site (of enzyme);

Accept blocks active site

3. Prevents / less substrate fitting into / binding with (active site) / fewer or no E-S complexes;

Look for principles:

1. Shape

2. Binding to active site

3. Consequence

2 max

[7]

Q2.

(a) 1. Dissolve in alcohol, then add water;

2. White emulsion shows presence of lipid.

2

(b) Glycerol.

1

(c) Ester.

1

(d) **Y** (no mark)
Contains double bond between (adjacent) carbon atoms in hydrocarbon chain.

1

(e) 1. Divide mass of each lipid by total mass of all lipids (in that type of cell);
2. Multiply answer by 100.

2

(f) Red blood cells free in blood / not supported by other cells so cholesterol helps to maintain shape;

Allow converse for cell from ileum – cell supported by others in endothelium so cholesterol has less effect on maintaining shape.

1

(g) 1. Cell unable to change shape;
2. (Because) cell has a cell wall;
3. (Wall is) rigid / made of peptidoglycan / murein.

2 max

[10]

Q3.

(a) Starch (max 3)

1. Helical/ spiral shape **so** compact;
2. Large (molecule)/insoluble **so** osmotically inactive;

Accept: does not affect water potential/ψ.

3. Branched **so** glucose is (easily) released for respiration;

Ignore: unbranched.

4. Large (molecule) **so** cannot leave cell/cross cell-surface membrane;

Cellulose (max 3)

5. Long, straight/unbranched chains of β glucose;
6. Joined by hydrogen bonding;

Note: references to 'strong hydrogen bonds' disqualifies this mark point.

7. To form (micro/macro)fibrils;
8. Provides rigidity/strength;

5 max

(b) 1. (At source) sucrose is actively (transported) into the phloem/sieve element/tube;

Accept: 'sugar/s' for sucrose but reject other named sugars e.g. glucose.

Accept: co-transport (with H^+ ions).

2. By companion/transfer cells;
3. Lowers water potential in phloem/sieve element/tube **and** water enters by osmosis;
4. (Produces) high (hydrostatic) pressure;

Accept: pressure gradient.

5. Mass flow/transport towards sink/roots/storage tissue;

Accept: sieve element/tube.

6. At sink/roots sugars are removed/unloaded;

Accept: at sink/roots sugars are used in respiration/stored.

5 max

[10]

Q4.

(a) 6 (g dm^{-3});

1

(b) Correct answer of (−)0.14;
1 mark for correct difference in concentration (5) divided by 35 / (69 − 64) ÷ 35 / 1 ÷ 7

Ignore +/- sign

Ignore additional d.p.

Accept 0.31(4) for 1 mark if female data used

2

(c) 1. Protein content decreases with age and decreases more in females;
2. Difference (between sexes) only significant at 95 years because SDs do not overlap;
OR
Differences not significant because 2 × SD would overlap;

2

(d) 1. Produce known concentrations of protein;
2. Measure absorbance of each concentration
OR
Measure each concentration with colorimeter;
3. Plot a graph of absorbance on y-axis against concentration (on x-axis) and draw curve;
4. Use absorbance of sample to find protein concentration from curve;

1. Idea of known concentrations required.

Accept % transmission / absorption for absorbance

3 max

(e) 1. (Lower plasma protein concentration suggests) fewer antibodies;

Ignore ref. to other proteins.

Reject answers which refer to white blood cells as proteins.

1

[9]

Q5.

(a) 1. Add iodine / potassium iodide solution;

Reject if heated

2. Blue-black colour (with starch);

Accept black

Ignore purple

2

(b) 1. Hydrolysed by enzymes / hydrolysed by amylase / maltase;

If named enzyme given, it must relate to the correct substrate

2. Produces glucose (in the gut);

3. Small enough to cross the gut wall (into the blood) / monomers / monosaccharides (can) cross the gut wall (into the blood);

Accept cell membranes / epithelium / cells for 'gut wall'

3

(c) 1. Time how long it takes to go brick red;

2. Weigh precipitate;

3. Dilute glucose samples / use smaller volume of glucose samples / use greater volume of Benedict's reagent;

Ignore references to colorimeter

1 max

[6]

Q6.

(i) 1. Maltose;
2. Water;

Accept H_2O

2

(ii) Condensation;

1

[3]

Q7.

(a) 1.1 (g);

1

(b) 300(%);

1

[2]

Q8.

(a) 1. IV on x axis and DV on y axis **and** both axes on linear scales;

2. Axes labelled clearly and with correct units separated from variable by solidus or in brackets;

3. All rates calculated correctly;

4. Points plotted correctly **and** joined by ruled lines and no extrapolation;

4

(b) Yes:

1. Expect optimum temperature of enzyme to be same

OR

Similar to temperature where bacterium lives;

2. Optimum temperature for enzyme (appears to be around) 15 °C;

No:

3. Need data from more temperatures (between 10 °C and 20 °C);

4. Data for only isolated enzyme

OR

Isolation may affect activity;

4

(c) 1. Initial / starting substrate concentration

2. Enzyme concentration

3. pH.

*Any **2** for **1** mark*

1 max

[9]

Q9.

(a) 1. Allow equal (time for) diffusion of iodine into apple cells;

2. For comparison between apples / between harvest dates;

1. Accept equal time for reaction / colour change to occur

2. For comparison alone is insufficient.

Ignore unqualified references to fair test, controlling a variable, standardising the method.

2

(b) 1. Starch lost from the centre first / area with no starch gets bigger as it ripens;

2. (Less starch / blue / black as the) starch is converted to sugars / maltose;

3. (Less starch) as it is <u>hydrolysed</u>;

4. By amylase;

Less starch as it is hydrolysed into sugars scores MP2 and MP3.

3. For '<u>hydrolysed</u>' accept 'as a result of <u>hydrolysis</u>' or 'broken down by <u>hydrolysis</u>'.

3 max

[5]

Q10.

(a) 1. Crush / grind;

2. With ethanol / alcohol;

3. Then add water / then add to water;

2. Water must be added <u>after</u> ethanol for third mark.

4. Forms emulsion / goes white / cloudy;

4. Do not accept carry out emulsion test.

3

(b) (i) 4 / four;

1

(ii) 1. Phosphate / PO_4;

"It" refers to phospholipid.

2. Instead of one of the fatty acids / and two fatty acids;

1. Accept minor errors in formula. Do not accept phosphorus / phosphorus group.

2

(iii) 1. Double bonds (present) / some / two carbons with only one hydrogen / (double bonds) between carbon atoms / not saturated with hydrogen;

Answer refers to unsaturated unless otherwise clearly indicated.

May be shown in appropriate diagram.

2. In (fatty acid) **C** / 3;

2

[8]

Q11.

(a) 1. <u>Tertiary</u> structure / <u>3D</u> shape of enzyme (means);

Accept references to active site

2. Active site complementary to maltose / substrate / maltose fits into active site / active site and substrate fit like a lock and key;

Idea of shapes fitting together

3. Description of induced fit;

4. Enzyme is a catalyst / lowers activation energy / energy required for reaction;

Accept "provides alternative pathway for the reaction at a lower energy level"

5. By forming enzyme-substrate complex;

Accept idea that binding stresses the bonds so more easily broken

Do not award point 5 simply for any reference to E-S complex

5

(b) 1. Inhibitors reduce binding of enzyme to substrate / prevent formation of ES complex;

Max 3 if only one type of inhibition dealt with. Accept maltase and maltose as examples of enzyme and substrate (and others)

Only once, for either inhibitor

(Competitive inhibition),

2. Inhibitor similar shape (idea) to substrate;

3. (Binds) in to active site (of enzyme);

Accept allows max rate of reaction to be reached / max product will eventually be formed

Accept complementary to active site

4. (Inhibition) can be overcome by more substrate;

(Non-competitive inhibition),

5. Inhibitor binds to site on enzyme other than active site;

6. Prevents formation of active site / changes (shape of) active site;

Accept does not allow max rate of reaction to be reached / max product will not be formed

7. Cannot be overcome by adding more substrate;

5 max

[10]

Q12.

(a) 1. Different parts/areas/amino acid sequences (of amyloid-precursor) protein;

Accept APP

2. Each enzyme is specific/fits/binds/complementary to a different part of the APP;

Point 2 subsumes point 1 and is worth 2 marks total.

2

(b) 1. Peptide bond broken;
2. Using water;

Hydrolysis in stem

2

(c) 1. Mutations prevent production of enzyme(s)/functional enzyme;
2. (Increase in β-secretase) leads to faster/more β-amyloid production
OR
(Decrease in α-secretase) leads to more substrate for β-secretase;

'This' must refer to α-secretase

3. (Leads to) more/greater plaque formation;

3

(d) 1. (Inhibitor) binds to/blocks active site of β-secretase/enzyme;
2. Stops/reduces production of β-amyloid/plaque;

2

(e) 1. Some β-amyloid required/needed (to prevent side effects)
OR

(Some) β-secretase needed;

Accept 'Both enzymes needed'

2. Leads to build-up of amyloid-precursor protein (that causes harm)
OR
Too much product of α-secretase (causes harm);

Accept build-up of substrate (leads to harm)

1 max

[10]

Q13.

(a) Accept **three** suitable suggestions:

1. (Lactase / beads) can be reused / not washed away;

1. Accept lactase / beads not wasted

1. Less lactase used is insufficient

2. No need to remove from milk;

2. Accept lactase not present in milk.

3. Allows continuous process;
4. The enzyme is more stable;
5. Avoid end-product inhibition.

Ignore ref to SA

3 max

(b) 1. (Lactose hydrolysed to) galactose and glucose;
2. (So) more sugar molecules;

*2. Idea of **more** sugars essential*

3. (So) more / different receptors stimulated / sugars produced are sweeter (than lactose).

2 max

[5]

Q14.

(a)

Statement	Starch	Cellulose	Glycogen
Found in plant cells	✓	✓	
Contains glycosidic bonds	✓	✓	✓
Contains β-glucose		✓	

One mark for each correct row

3

(b) Hydrolysis;

Accept: if phonetically correct

Do not accept: 'hydration'

1

(c) 1. Coiled / helical / spiral;

Feature = one mark

Explanation = one mark

Note: these are independent marking points

These must be related for <u>both</u> marks but can be in reverse order

2. (So) compact / tightly packed / can fit (lots) into a small space;

3. Insoluble;

4. (So) no osmotic effect / does not leave cell / does not affect <u>water potential</u>;

Accept: prevents osmosis

5. Large molecule / long chain;

6. (So) does not leave cell / contains large number of glucose units;

4. and 6. Accept: can' t cross membranes

7. Branched chains;

8. (So) easy to remove glucose;

2 max

(d) Two marks for correct answer of 479 - 521;

Accept: measured and actual lengths in different but correct units for 1 mark

One mark for incorrect answers in which candidate clearly divides measured length by actual length;

The actual range is 23 - 25mm, If they just divide this by 48 they gain 1 mark

Just writing the formula is insufficient, numbers must be used

2

[8]