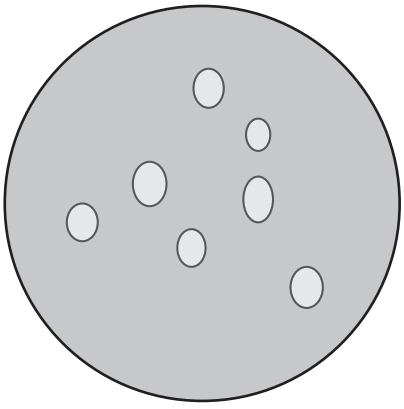
1 A student adds oil (lipid) to water.

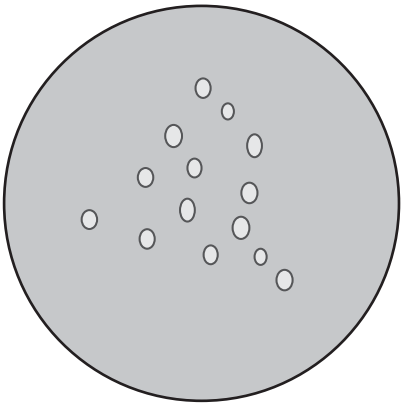
He then puts drops of the mixture onto a microscope slide.

The diagram shows oil droplets floating on the water, as seen using a microscope.

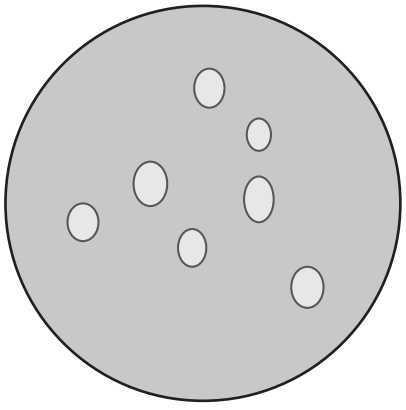


The student then adds different solutions to four separate samples of oil droplets floating on the water.

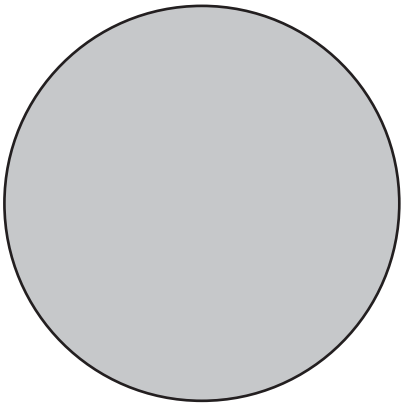
Diagrams A, B and C show the possible appearance of the oil droplets after each solution is added.



A



B



C

(a) (i) The table lists the solutions added to the oil and water mixture.

Complete the table to show which diagram the mixture would look like after each solution is added.

You may use each letter once, more than once or not at all.

One has been done for you.

(3)

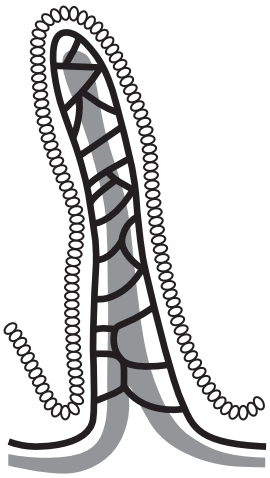
Solution added	Diagram
bile	
bile and lipase	C
boiled lipase	
bile and protease	

(ii) Explain why no droplets are seen after bile and lipase solution is added to the oil and water mixture.

(4)

(b) Starch is digested in the small intestine. The small intestine contains many structures that absorb glucose.

The diagram shows one of these structures.



(i) Name this structure.

(1)

.....

(ii) Explain how this structure is adapted to absorb glucose.

(5)

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(Total for Question = 13 marks)

2 A student investigates the effect of temperature on the rate of starch digestion by amylase. He carries out the first trial of his investigation at a room temperature of 20 °C.

He carries out the following steps in his investigation.

1 He puts one drop of iodine suspension into each of 12 wells on a spotting tile.

2 He then takes up 10 cm^3 of 10% starch suspension into a syringe.

3 He adds one drop of the starch suspension from the syringe to the first well in the spotting tile and records the colour change.

4 He rinses the outside of the syringe with water from a tap.

5 He then takes up exactly 5 cm^3 of 5% amylase suspension into the same syringe containing the 10% starch suspension.

6 He starts a stopwatch.

7 He then rocks the syringe containing the mixture gently backwards and forwards for one minute.

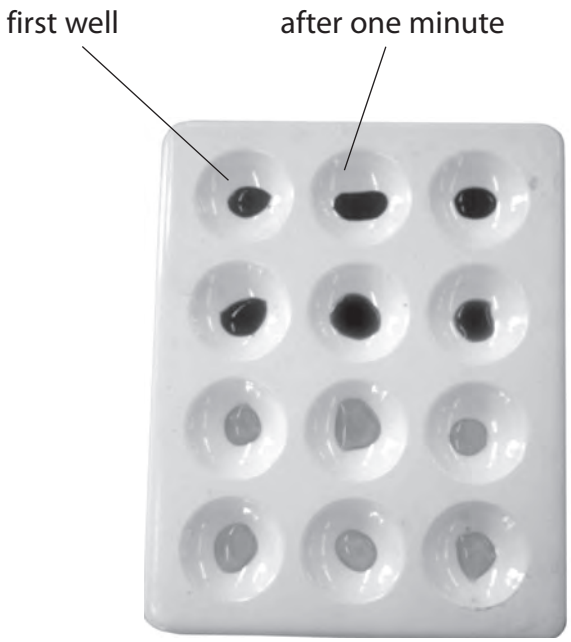
8 He adds one drop of the mixture from the syringe to the next well in the spotting tile and records the colour change.

9 He repeats this at intervals of one minute until he has added starch and amylase mixture to all of the wells.

10 He then repeats steps 1–9 but this time he uses iodine, amylase and starch suspension that have been stored in a water bath at 40 °C.

11 He also keeps the syringe containing the mixture in the water bath at 40 °C between drops.

The photograph shows his results for 20 °C at the end of the experiment when all the wells have mixture added.



(a) (i) Give one safety precaution the student should take when carrying out this investigation.

(1)

.....

(ii) How many minutes do the samples of mixture added to the spotting tile in the photograph represent?

(1)

.....

(b) Explain the purpose of the following steps in the student's experiment.

(i) step 4

(1)

.....

.....

(ii) step 7

(1)

.....

.....

(iii) step 11

(1)

.....

.....

(c) (i) Identify two variables that the student controls in his experiment.

(2)

1 .....

2 .....

(ii) Name the independent variable that the student is investigating.

(1)

.....

(d) Using the photograph, explain how many minutes it took for the reaction to be completed at 20 °C.

(3)

(e) The results for the spotting tile at 40 °C would be different from the trial carried out at 20 °C.

(i) Describe how the appearance of the results will be different.

(2)

(ii) Explain the difference in the appearance of the results.

(2)

(Total for Question = 15 marks)

3 In digestion large food molecules are broken down into small food molecules by enzymes.

(a) Use this information to complete the table.

(5)

Large food molecule	Enzyme involved in digestion	Small food molecule produced
starch	amylase	
	protease	
lipid		

(b) The small food molecules can be absorbed into the blood by villi in the small intestine.

Give three ways in which villi are adapted to absorb small food molecules.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(Total for Question = 8 marks)

4 The photograph shows a variegated leaf. The dark (green) part of the leaf has cells that contain chloroplasts. The white part of the leaf has cells that do not contain chloroplasts.

(a) Describe the role of chloroplasts in leaf cells.

(2)

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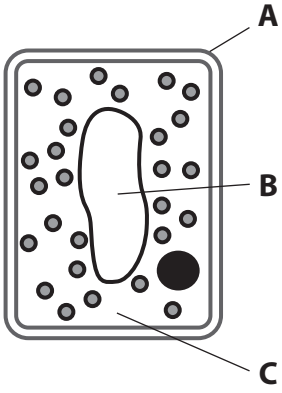
(b) The diagram shows a leaf cell from the green part of the leaf.



Name the parts labelled **A**, **B** and **C**.

(3)

A .....

B .....

C .....

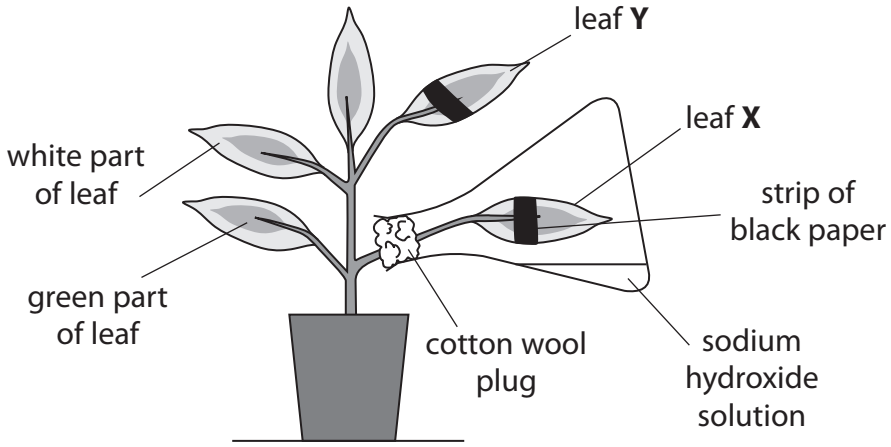
(c) The diagram shows a plant with variegated leaves.

The plant was destarched by leaving it in the dark for 24 hours.

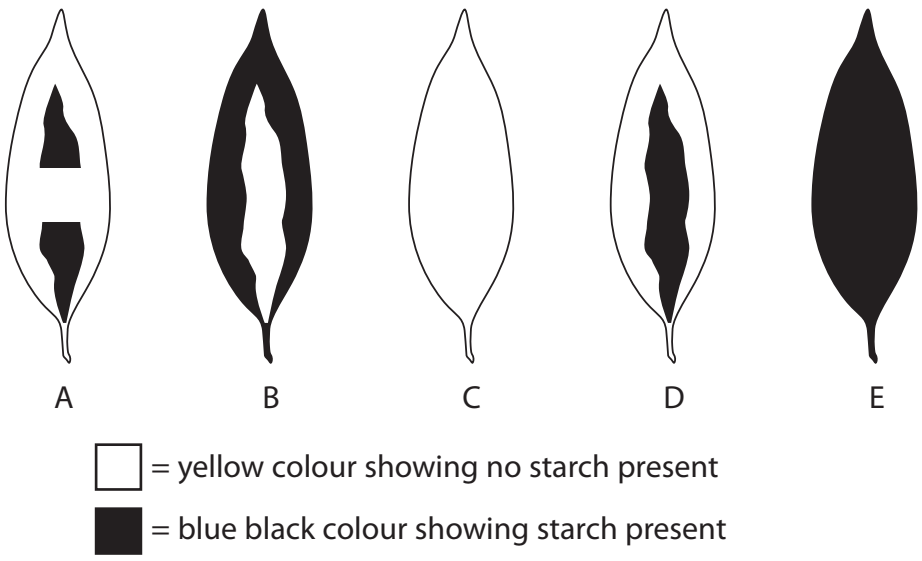
Leaf **X** then had a strip of black paper attached to both the upper and lower surfaces. It was then sealed in a flask containing a solution of sodium hydroxide, a substance that absorbs carbon dioxide.

Leaf **Y** also had a strip of black paper attached to both the upper and lower surfaces.

The plant was then placed in the light for 24 hours and then a starch test was carried out on leaf **X** and leaf **Y**.



The five leaves, A to E, show the possible appearance of leaf **X** and leaf **Y** after the starch test.



(i) Which of the leaves A to E matches the result you would obtain after testing leaf **X** and leaf **Y** for starch?

(2)

leaf **X** .....

leaf **Y** .....

(ii) Explain what happens in a leaf when it is destarched.

(2)

(iii) Describe how the green pigment in leaf cells is removed safely before testing a leaf for the presence of starch.

(3)

(iv) Name the chemical used to test for starch.

(1)

(Total for Question = 13 marks)

5 (a) A student is given two samples of carbohydrates.

He tests to see if one is glucose and the other one is starch.

Describe the two chemical tests he should use to identify each carbohydrate.

(4)

(b) Different groups of organism store carbohydrate as different molecules.

Complete the table to show an example from each group of organisms and the molecule they use to store carbohydrate.

(4)

Group	Example from the group	Molecule used to store carbohydrate
animals	cat	
plants	maize	
fungi		

(Total for Question = 8 marks)

6 Cholesterol is a fatty substance found in the blood that can increase the risk of heart disease.

Statins are drugs thought to lower blood cholesterol levels.

Design an investigation to find out the effect of statins on blood cholesterol levels.

Your answer should include experimental details and be written in full sentences and paragraphs.

(6)

(Total for Question = 6 marks)