Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

9683650458

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2014**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **10** printed pages and **2** blank pages.

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1 The enzyme lipase digests fats into fatty acids and glycerol.

Some students investigated how temperature affects the break down of the fats in milk using lipase.

A pH indicator called bromothymol blue was used and the colour change was observed and recorded every two minutes for a total time of 20 minutes.

Table 1.1 shows the colour changes of this indicator.

Table 1.1

pH	6	7	8
colour	yellow	green	blue

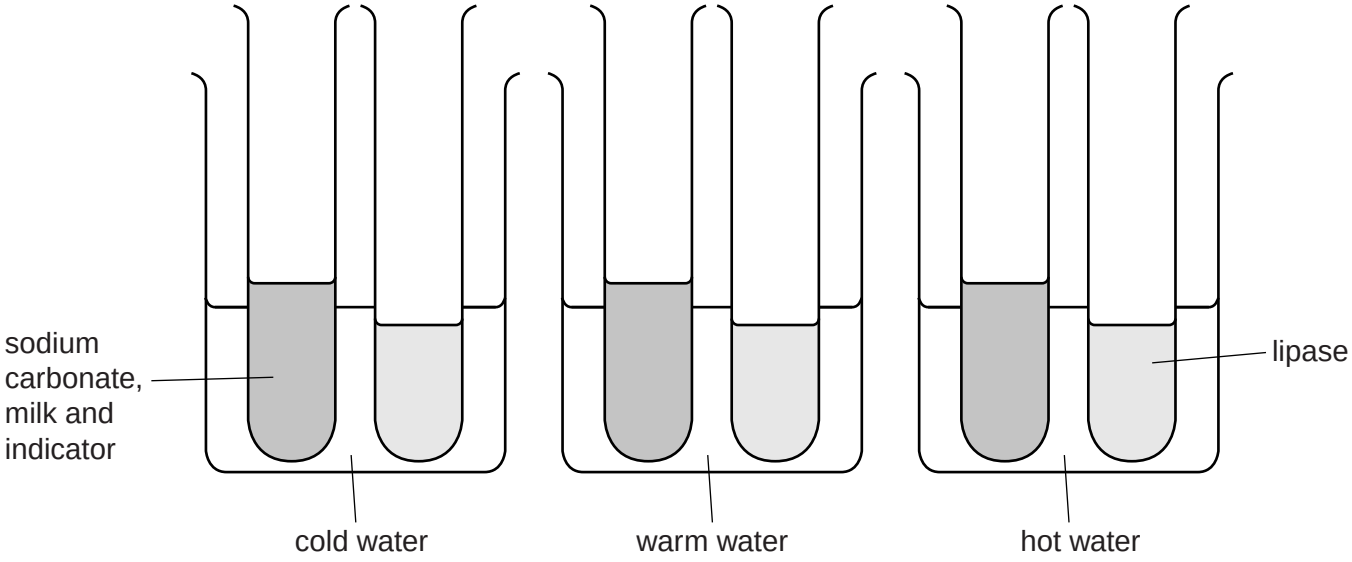


Fig. 1.1

Three beakers were labelled: **cold**, **warm** and **hot**. One test-tube was placed in each of the labelled beakers. Three drops of bromothymol blue indicator were put into each test-tube. 2 cm^3 of sodium carbonate solution was added to each test-tube and then 2 cm^3 of milk was added to each test-tube. Finally, one test-tube containing 3 cm^3 of lipase was put into each of the three beakers. The temperature in each beaker was measured and recorded.

The experiment was left for 5 minutes, as shown in Fig. 1.1.

After 5 minutes, the lipase was poured from the test-tube labelled **lipase** in the **cold** beaker into the other test-tube in the **cold** beaker.

This process was repeated for the **warm** beaker and the **hot** beaker.

The mixtures were stirred and the colour of the bromothymol blue indicator in each test-tube was recorded at 0 (start), 2, 4, 6, 8,10, 12, 14, 16, 18 and 20 minutes.

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Fig. 1.2 shows the students' results.

Temperatures	times and colours
ice and water = 4,	0 – blue, 2 – blue, 4 – blue, 6 – blue, 8 – blue, 10 – blue, 12 – blue, 14 – blue, 16 – blue, 18 – blue, 20 – blue
room temp = 21,	0 – blue, 2 – blue, 4 – blue, 6 – blue, 8 – green, 10 – blue, 12 – green, 14 – green, 16 – yellow, 18 – yellow, 20 – yellow
hot water = 50,	0 – blue, 2 – blue, 4 – blue, 6 – green, 8 – green, 10 – green / yellow, 12 – green / yellow, 14 – yellow, 16 – yellow, 18 – yellow, 20 – yellow

Fig. 1.2

(a) Complete Table 1.2 to record the students' results.

Table 1.2

time / min	colour of indicator		
	cold .....°C	warm .....°C	hot .....°C
0			

[3]

(b) (i) Sodium carbonate solution has a pH of 8. Suggest why sodium carbonate solution was added to the milk in this investigation.

.....

.....[1]

(ii) State why the two test-tubes in each of the labelled containers were left for 5 minutes before mixing their contents.

.....

.....[1]

(iii) Explain why the colour of the bromothymol blue indicator changed during the investigation.

.....

.....

.....

.....[2]

(iv) Predict the colour that you would observe if the experiment had been repeated using water at 80 °C.

Explain your answer.

.....

.....[2]

(v) Suggest a result that may be anomalous. Give a reason for your answer.

anomalous result .....

reason .....

.....[2]

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(c) State **two** variables that have been controlled in this investigation.

For each of these variables, describe how it has been controlled.

1 variable .....

how has it been controlled .....

.....

2 variable .....

how has it been controlled .....

.....[4]

(d) Suggest **two** ways to modify this investigation to find the optimum (best) temperature for the enzyme lipase to break down the fats in milk.

1 .....

.....

2 .....

.....[2]

[Total: 17]

2 **(a)** The species of plant *Musa acuminata* produces banana fruits.

Fig. 2.1 shows a section cut from a banana.



Fig. 2.1

(i) Make a large drawing of the cut surface of the banana in Fig. 2.1 to show:

- the number of layers;
- the thickness of the layers.

Label the region where seeds may develop.

[4]

(ii) Draw a line across the diameter of the cut slice of banana in Fig. 2.1.

Measure the distance and record your result. Include the unit.

diameter of the banana .....

Draw a line across the diameter of your drawing, measure it and record your result.

diameter of the drawing of the banana.....[3]

(iii) Calculate the magnification of your drawing.

Show your working.

magnification × .....[2]

(b) The student then added iodine solution to the cut surface of the banana.

Fig. 2.2 shows the colour of the iodine in the different regions of the banana.

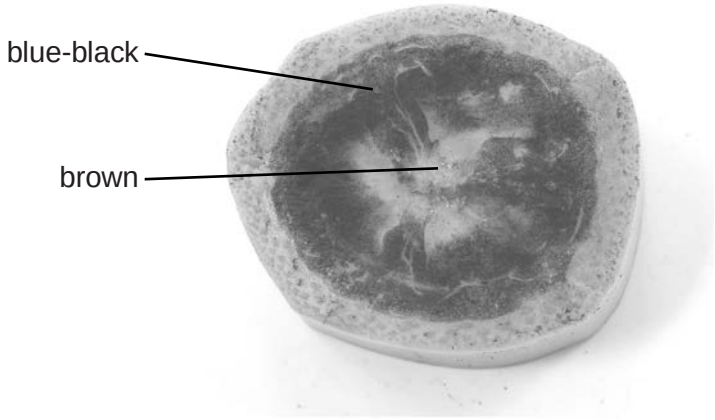


Fig. 2.2

Use the information in Fig. 2.2 to state where starch is stored in the banana.

.....

.....[1]

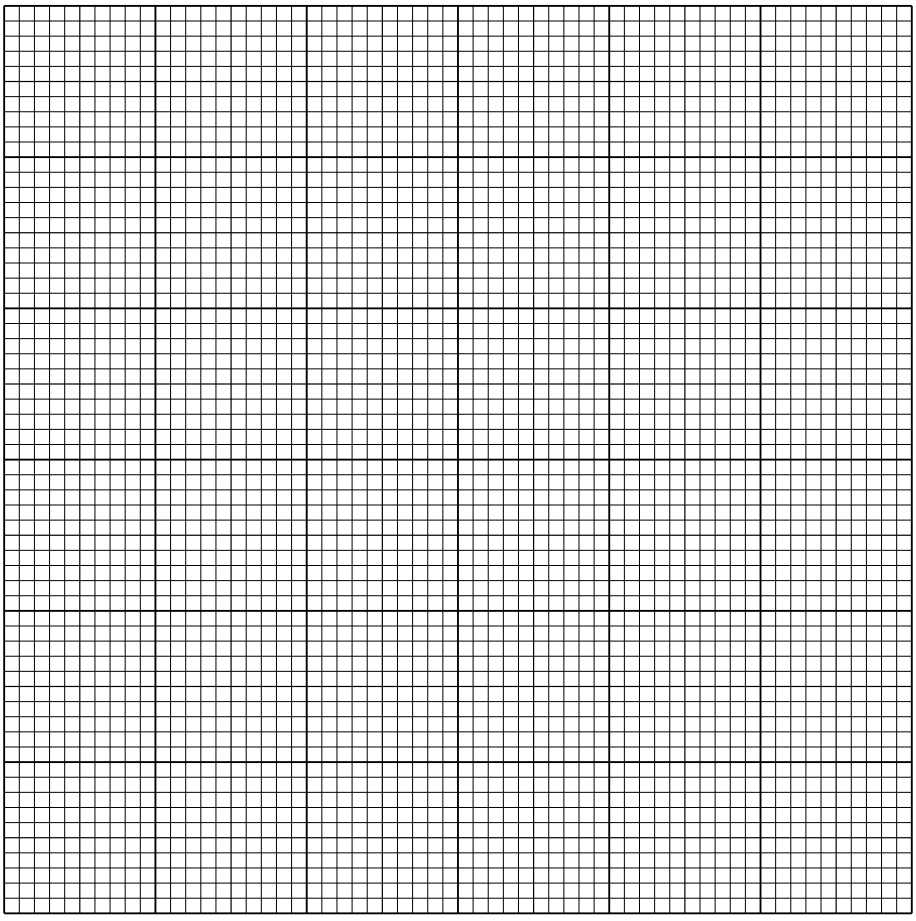
(c) Some students collected food packaging labels to find the nutrients present in bananas.

Table 2.1 is a summary of their findings.

Table 2.1

nutrient	mass / g per 100 g
carbohydrate	22.25
fat	0.25
protein	2.00
fibre	2.50

(i) Plot a bar chart of the data in Table 2.1.



[4]

(ii) The remaining mass of a banana is mostly water, as the mass of vitamins and minerals is very small.

Calculate, to the nearest whole number, the mass of water in 100 g of banana.

Show your working.

.....g [2]

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(d) In another investigation, students kept unripe bananas at room temperature for eight days.

They studied some of the changes during ripening.

Each day the students took one banana and:

- observed the colour of the banana skin;
- removed a sample of the flesh tissue and estimated the reducing sugar content.

Table 2.2 shows the students' results.

Table 2.2

time / days	change during ripening	
	skin colour	reducing sugar content / %
1	green	5
2	green and yellow	12
3	mostly yellow	18
4	all yellow	25
5	all yellow	30
6	yellow, some brown	29
7	yellow and brown	30
8	mostly brown	30

(i) Suggest on which day the bananas became ripe. State one reason for your answer.

day .....

reason .....

.....[2]

(ii) The reducing sugar content increased as the bananas ripened.

Calculate how many times greater was the sugar content on day 5 compared with day 1.

Show your working.

.....[2]

(iii) Suggest the source of the reducing sugar.

.....

.....[1]

(iv) Animals eat wild bananas and spread the seeds in their faeces.

Suggest **two** features of ripe bananas that attracts animals.

.....

.....

.....

.....[2]

[Total: 23]

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