Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/63**

Paper 6 Alternative to Practical **May/June 2020**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

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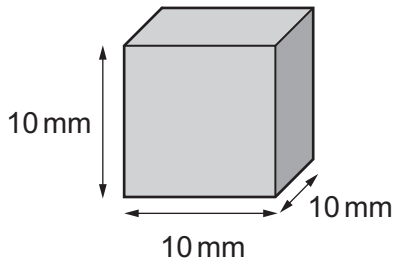
1 A student investigated the effect of concentration on the rate of diffusion in model cells.

Cubes of agar jelly containing universal indicator were used to represent the model cells.

(a) A student used a scalpel to cut four identical cubes from a large piece of agar. Each cube had the dimensions shown in Fig. 1.1. Each agar cube was green in colour at the start of the investigation.

View solution



not to scale

Fig. 1.1

(i) Calculate the surface area and volume for the cube shown in Fig. 1.1.

surface area ..... mm^2

volume ..... mm^3

[2]

Step 1 The student used the information in Table 1.1 to add the appropriate volumes of 1.0 mol per dm^3 hydrochloric acid (HCl) and water to four test-tubes labelled **A**, **B**, **C** and **D**.

Table 1.1

test-tube	volume of 1.0 mol per dm^3 HCl / cm^3	volume of water / cm^3	final concentration of HCl / .....
A	5.0	0.0	1.0
B	2.5	2.5	.....
C	0.5	4.5	0.1
D	0.0	5.0	0.0

(ii) Complete Table 1.1 by:

- stating the unit for the final concentration of HCl
- calculating the missing concentration for test-tube **B**.

[2]

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Step 2 One green agar cube was put into each of test-tubes **A**, **B**, **C** and **D**.

Step 3 A stop-clock was started.

Step 4 The student observed the colour change in the agar cubes. The agar cubes changed colour from green to red, as shown in Fig. 1.2, in test-tubes **A**, **B** and **C**.

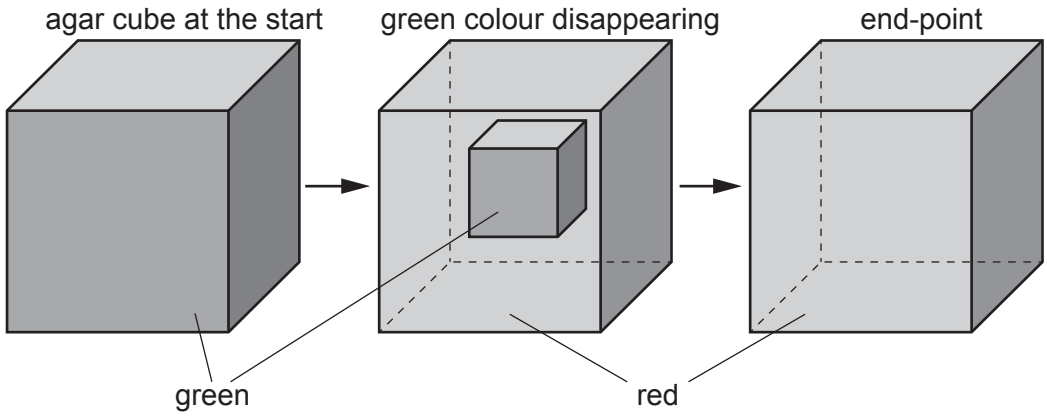

Fig. 1.2

Step 5 After six minutes the agar cube in test-tube **D** had not changed colour. The student stopped observing the agar cubes and stopped the stop-clock.

The times taken for the agar cubes in test-tubes **A**, **B** and **C** to change colour and the time at which the student stopped the stop-clock in step 5 are shown in Fig. 1.3.

test-tube **A**	test-tube **B**	test-tube **C**	test-tube **D**
			

Fig. 1.3

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(iii) Convert the times in Fig. 1.3 to seconds.

Prepare a table and record these results.

If the time taken is greater than six minutes, record the time as **>360** for that cube.

[4]

(iv) State a conclusion for these results.

.....

.....

..... [1]

(v) Describe the purpose of test-tube **D**.

.....

.....

..... [1]

(vi) Identify **one** safety hazard when carrying out this investigation and describe how the risk of this hazard could be reduced.

safety hazard .....

.....

method of reducing the risk .....

.....

.....

[2]

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(b) (i) A student calculated the rate of diffusion of acid into an agar cube.

View solution

The student observed that the acid travelled 2 mm in 120 seconds.

Suggest **how** the student could calculate the **rate** of diffusion.

.....

.....

..... [1]

(ii) Plan an experiment to investigate the **relationship** between the size of the agar cubes and the time taken for the agar to change colour.

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..... [6]

[Total: 19]

View solution

2 **(a)** Fig. 2.1 shows a comparison of the nutrient content of beans and nuts.

View solution

nutrient facts		
serving size 100 g		
	beans	nuts
calories	333	660
total fat / g	0	54
• saturated	0	9
• trans fat	0	0
starch / g	60	15
sodium / mg	24	21
protein / g	24	26
vitamin C / mg	15	0

Fig. 2.1

A student was given a sample of food and wanted to know if it was from a bean or a nut.

The student decided to test for the presence of two of the substances listed in Fig. 2.1.

The results of the tests would enable the student to determine if the food sample was from a bean or a nut.

Complete Table 2.1 by stating:

- which **two** substances in Fig. 2.1 will enable the student to determine if the food sample is from a bean or a nut
- the food test that would be used to identify each substance
- the positive result for each food test.

Table 2.1

substance in Fig. 2.1	food test	positive result for the food test

[5]

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(b) Fig. 2.2 shows the caterpillar of a codling moth. The codling moth damages walnut trees and reduces the yield of the walnut crop.



Fig. 2.2

To reduce the damage to a walnut crop, scientists released wasps that can kill the codling moth caterpillars. Wasps are flying insects.

The effect of releasing different numbers of wasps on the damage to a walnut crop was investigated.

The results are shown in Table 2.2.

Table 2.2

number of wasps released / $\times 10^5$ per hectare	percentage damage to the walnut crop
0.0	4.0
0.5	3.2
0.9	2.4
1.8	1.2
3.4	1.3
4.0	1.2

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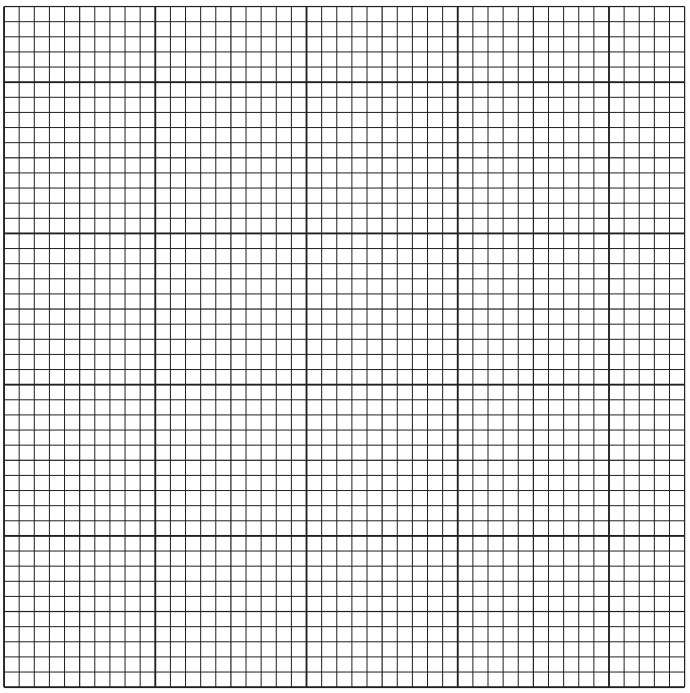
(i) Plot a line graph on the grid of the data in Table 2.2.

View solution



[4]

(ii) Describe the pattern shown by the data on your graph.

.....

.....

.....

.....

..... [2]

(iii) Suggest the number of wasps that should be released into **one** hectare of walnut trees.

State the evidence from your graph that supports your choice.

number of wasps released .....

evidence .....

.....

.....

[2]

(iv) Suggest **one** way the investigation could be modified to give a more accurate estimate of the optimum (best) number of wasps to release into a walnut crop.

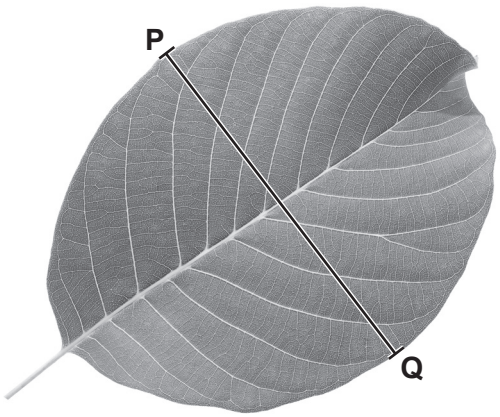
.....

.....

..... [1]

(c) Fig. 2.3 shows a photograph of a walnut tree leaf.

View solution



magnification ×0.5

Fig. 2.3

(i) Make a large drawing of the leaf shown in Fig. 2.3.

[4]

(ii) Measure the length of line **PQ** on Fig. 2.3. Include the unit.

View solution

length of line **PQ** on Fig. 2.3 .....

Calculate the actual width of the leaf on Fig. 2.3 using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ on Fig. 2.3}}{\text{actual width of the leaf}}$$

Space for working.

.....
[3]

[Total: 21]

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