Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/53**

Paper 5 Practical Test **May/June 2020**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].

For Examiner's Use	
1	
2	
Total	

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

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1 You are going to investigate the effect of concentration on the rate of diffusion in model cells.

Cubes of agar jelly containing universal indicator will represent the model cells.

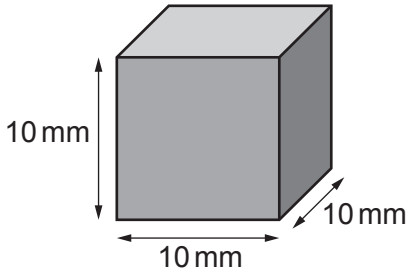
Read all the instructions but DO NOT CARRY THEM OUT until you have drawn a table for your results in the space provided in 1(a)(iii).

You should use the gloves and eye protection provided while you are carrying out the practical work.

(a) You are provided with a piece of agar that is approximately 30 mm × 30 mm × 10 mm in size.

Step 1 Cut four identical cubes from the large piece of agar. Each cube should have the dimensions shown in Fig. 1.1.

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 2 Label four test-tubes **A**, **B**, **C** and **D**.

Step 3 Use the information in Table 1.1 and the syringes provided to add the appropriate volumes of 1.0 mol per dm^3 hydrochloric acid (HCl) and water to each labelled test-tube.

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

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(ii) Complete Table 1.1 by:

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

[2]

Step 4 Place one agar cube into each of the labelled test-tubes.

Step 5 Start the stop-clock.

Step 6 Immediately observe any colour change in the agar cubes. You may want to use the hand lens provided.

Continue observing until the cubes change from green to completely pink, as shown in Fig. 1.2.

If the green colour remains visible in a cube after seven minutes, stop observing and record the time as **>420** for that cube.

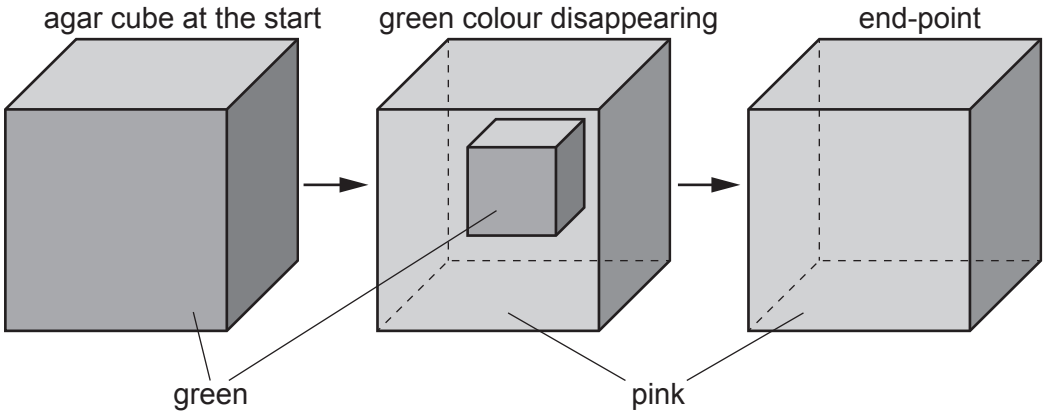

Fig. 1.2

Step 7 Record in your table in **1(a)(iii)** the time taken, in seconds, for the cube in each test-tube to turn completely pink.

(iii) Prepare a table to record your results.

[4]

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(iv) State a conclusion for your 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]

(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]

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(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.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 19]

View solution

2 **(a)** You are provided with a bean. You should use the gloves and eye protection provided while you are carrying out the practical work.

View solution

Step 1 Crush the bean in the Petri dish using a spatula.

Step 2 Put a few drops of iodine solution onto the crushed bean.

Step 3 Observe any colour change in the iodine solution.

(i) Record your observations in Table 2.1.

Table 2.1

	observation
initial colour of the iodine solution	
colour of the iodine solution after putting it onto the crushed bean	

[1]

(ii) State a conclusion for the result in Table 2.1.

View solution

.....

.....

..... [1]

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

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

Fig. 2.1

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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.

(i) State which **two** substances in Fig. 2.1 will enable the student to determine if the food sample is from a bean or a nut.

1 .....

2 .....
[1]

(ii) State the name of the food test you would use for **one** of the substances you identified in **2(b)(i)** and give the result for a positive test.

food test .....

result .....
[2]

View solution

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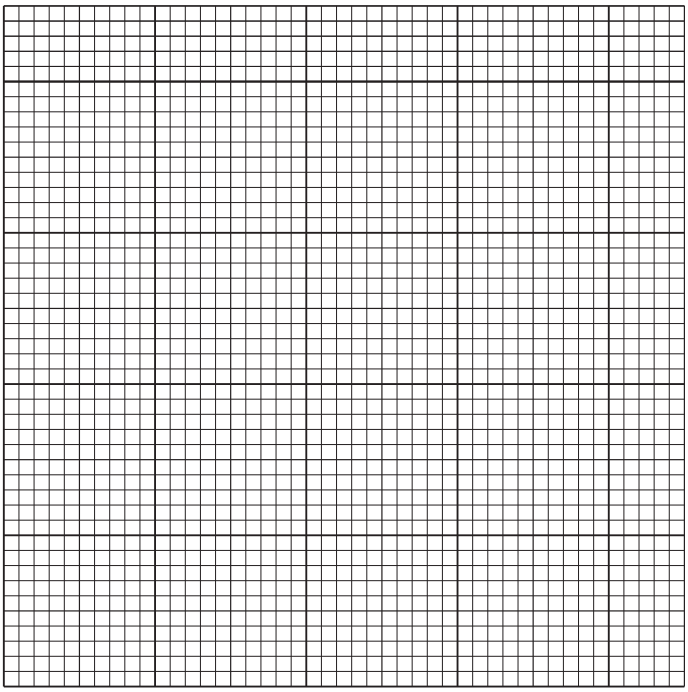
(i) Plot a line graph on the grid of the data in Table 2.2.

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.

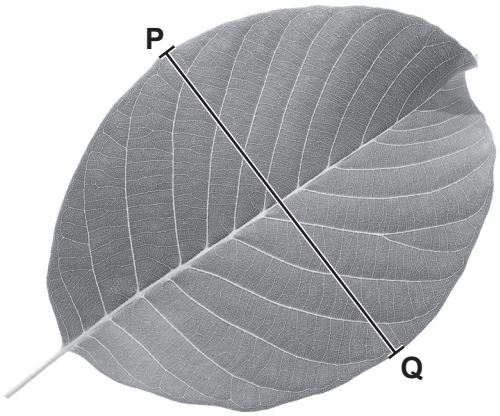
.....

.....

..... [1]

(d) 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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