Cambridge Assessment International Education

# Cambridge IGCSE™

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**BIOLOGY** **0610/51**

Paper 5 Practical Test **October/November 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** The enzyme lipase catalyses the break-down of fats into fatty acids and glycerol.

You are going to investigate how the concentration of lipase affects the break-down of fat in milk. An increase in the concentration of fatty acids will change the pH of the milk.

You are going to use the pH indicator bromothymol blue to determine the pH of the milk and lipase solution during the investigation.

Table 1.1 shows the colour of bromothymol blue indicator at different pH values.

**Table 1.1**

| pH | 6 | 7 | 8 |
|---|---|---|---|
| colour | yellow | green | blue |

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

You should use the safety equipment provided while you are carrying out the practical work.

View solution

**(a)** Step 1 Label four test-tubes **L1**, **L2**, **L3** and **L4**.

Step 2 Make solutions containing different concentrations of lipase.

Use the volumes of **2% lipase** solution and **distilled water** as shown in Table 1.2.

**Table 1.2**

| test-tube | volume of 2% lipase / $cm^3$ | volume of distilled water / $cm^3$ | percentage concentration of lipase solution |
|---|---|---|---|
| **L1** | 3.00 | 0.00 | 2.0 |
| **L2** | 1.50 | 1.50 | 1.0 |
| **L3** | 0.75 | 2.25 | |
| **L4** | 0.00 | 3.00 | 0.0 |

**(i)** Calculate the percentage concentration of lipase solution in test-tube **L3** using the information in Table 1.2.

Space for working.

.....% [1]

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Step 3 Label another four test-tubes **M1**, **M2**, **M3** and **M4**.

Step 4 To each of test-tubes **M1**, **M2**, **M3** and **M4** add:

- 5 drops of bromothymol blue indicator
- 2 $cm^3$ of sodium carbonate solution
- 2 $cm^3$ of milk.

Step 5 Raise your hand when you are ready for warm water to be put into the beaker labelled **water-bath**.

Step 6 Put all eight test-tubes into the water-bath and leave for five minutes.

Step 7 After five minutes remove test-tubes **M1** and **L1** from the water-bath and place in a test-tube rack.

Step 8 Pour the solution in test-tube **M1** into test-tube **L1**. Start a stop-clock.

Step 9 Observe the colour of the bromothymol blue indicator in test-tube **L1** and record the time at which it becomes yellow.

If the colour has not changed to yellow in five minutes, stop observing and record the result as **>300**.

Step 10 Repeat steps 7, 8 and 9 for test-tubes **M2** and **L2**, **M3** and **L3**, **M4** and **L4**.

Record your results in the table you have prepared in **1(a)(ii)**.

You should record your results **in seconds**.

**(ii)** Prepare a table to record your results.

View solution

[4]

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**(iii)** State a conclusion for your results.

View solution

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.....

..... [1]

**(b) (i)** Identify the control in this investigation and explain why a control was used.

View solution

control .....

explanation .....

.....

.....

[2]

**(ii)** Using the information in Table 1.1 and your results, estimate the pH values in test-tube **L1** and test-tube **L4** at the end of the investigation.

**L1** .....

**L4** .....

[1]

**(iii)** State **two** variables that were kept constant in this investigation.

1 .....

.....

2 .....

.....

[2]

**(iv)** Suggest why all of the test-tubes were placed into a water-bath for five minutes, in step 6, before mixing their contents.

.....

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..... [1]

**(v)** State the potential source of error in step 9.

.....

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..... [1]

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**(c)** Describe how you would safely test lipase for the presence of protein and state the result of a positive test.

method .....

.....

.....

positive result .....

.....

safety precaution .....

.....

[3]

**(d)** The average temperature of the human body is 37 °C. Humans produce lipase for fat digestion. A student thought that lipase would work best at human body temperature.

Plan an investigation to find out if 37 °C is the optimum (best) temperature for lipase activity.

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[6]

View solution [Total: 22]

**2** **(a)** Fig. 2.1 is a labelled diagram of the parts of a flower.

View solution

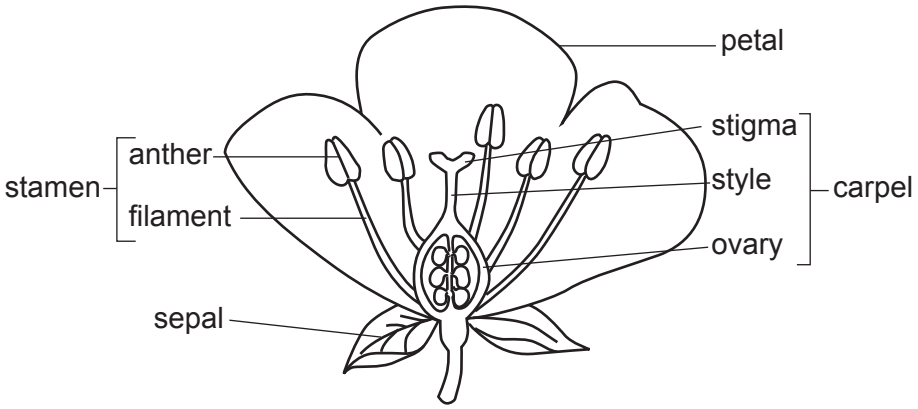


**Fig. 2.1**

Fig. 2.2 is a photograph showing the parts of a flower that have been separated.

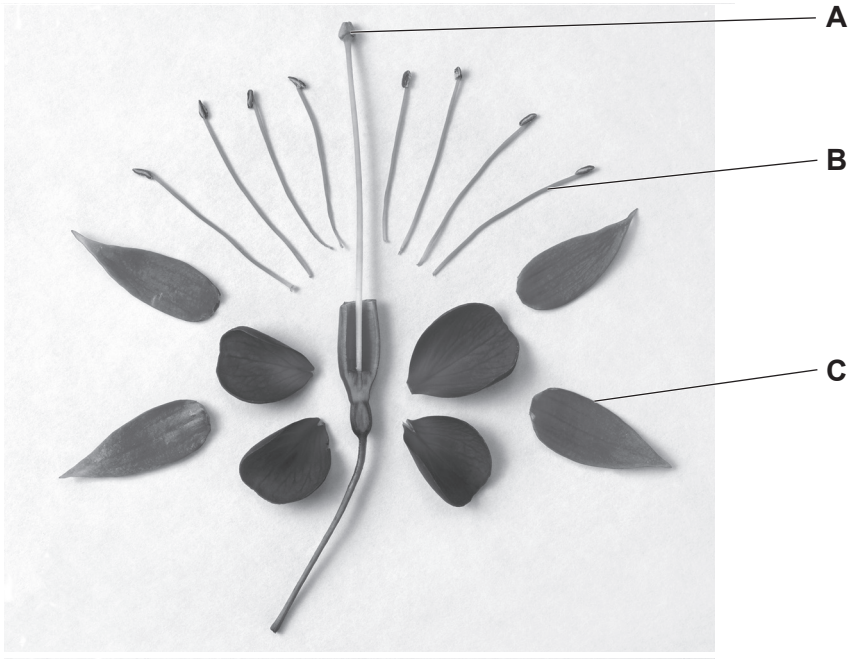


**Fig. 2.2**

Complete Table 2.1 using the information in Fig. 2.1 and Fig. 2.2 by stating the:
- names of flower parts **A**, **B** and **C**
- number of each of the flower parts **A**, **B** and **C** visible in Fig. 2.2.

**Table 2.1**

| letter on Fig. 2.2 | name of flower part | number visible |
|---|---|---|
| **A** | | |
| **B** | | |
| **C** | | |

[3]

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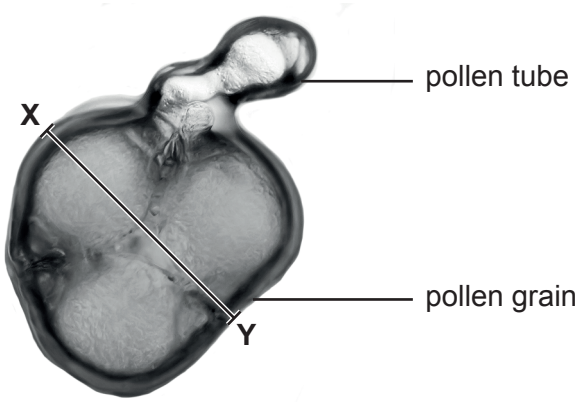
**(b)** Fig. 2.3 shows a photograph of a germinating pollen grain.

View solution




magnification ×350

**Fig. 2.3**

**(i)** Make a large drawing of the germinating pollen grain shown in Fig. 2.3.

Label the pollen tube.

[5]

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**(ii)** Measure the length of line **XY** on Fig. 2.3.

View solution

length of line **XY** ..... mm

Calculate the actual length of the pollen grain in Fig. 2.3 using the formula.

$$\text{magnification} = \frac{\text{length of } \mathbf{XY} \text{ on Fig. 2.3}}{\text{actual length of } \mathbf{XY}}$$

Include the unit.

Space for working.

.....
[3]

**(c)** Some students collected pollen from the anthers of flowers to investigate the effect of two different solutions, **S1** and **S2**, on the germination of pollen.

Two microscope slides were prepared.

Slide **one** had 210 pollen grains and two drops of solution **S1**.

Slide **two** had 250 pollen grains and two drops of solution **S2**.

Every 10 minutes the students counted and recorded the number of pollen grains that had germinated.

The percentage of pollen grains that had germinated was calculated.

Fig. 2.4 shows a drawing of the pollen grains as seen with a light microscope.

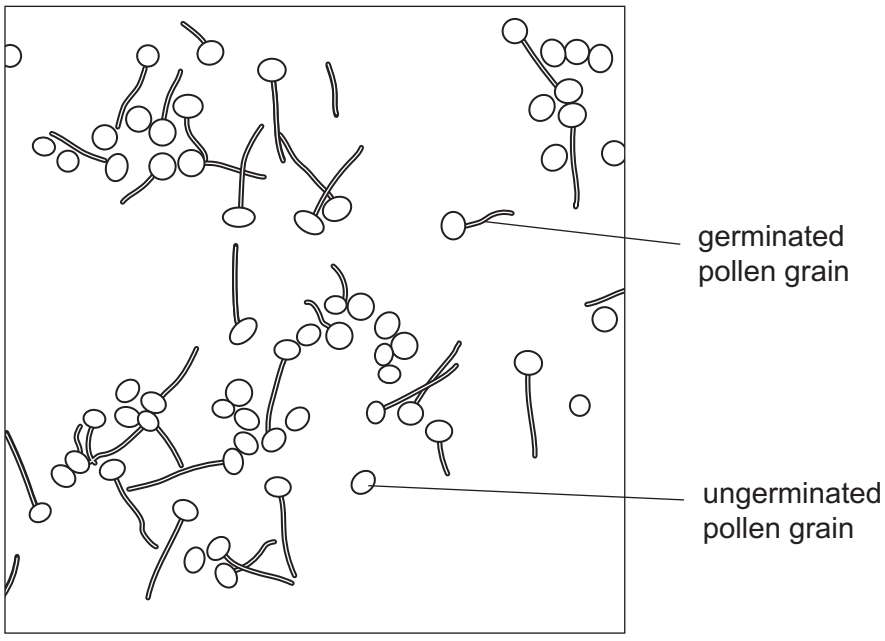


**Fig. 2.4**

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The results of the investigation are shown in Table 2.2.

**Table 2.2**

| | percentage germination | | | | | |
|---|---|---|---|---|---|---|
| time / minutes | 10 | 20 | 30 | 40 | 50 | 60 |
| solution **S1** | 5 | 18 | 26 | 38 | 51 | 51 |
| solution **S2** | 3 | 8 | 18 | 28 | 36 | 51 |

**(i)** State **two** conclusions for these results.

View solution

1 .....

.....

.....

2 .....

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..... [2]

**(ii)** The results in Table 2.2 are shown as percentages rather than as the actual number of germinated pollen grains.

Explain why this enables a valid comparison to be made between the results for **S1** and **S2**.

.....

.....

..... [1]

**(iii)** Describe how the percentage germination in Table 2.2 was calculated.

.....

.....

.....

..... [2]

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**(d)** The students prepared another three slides using solutions **A**, **B** and **C** and left them for 60 minutes. They measured the length of the pollen tubes in 20 germinated pollen grains.

View solution

The results are shown in Table 2.3.

**Table 2.3**

| solution | average length of pollen tube / μm |
|---|---|
| **A** | 190 |
| **B** | 220 |
| **C** | 265 |

Fig. 2.5 shows the grid that the students used to plot a graph of their results.

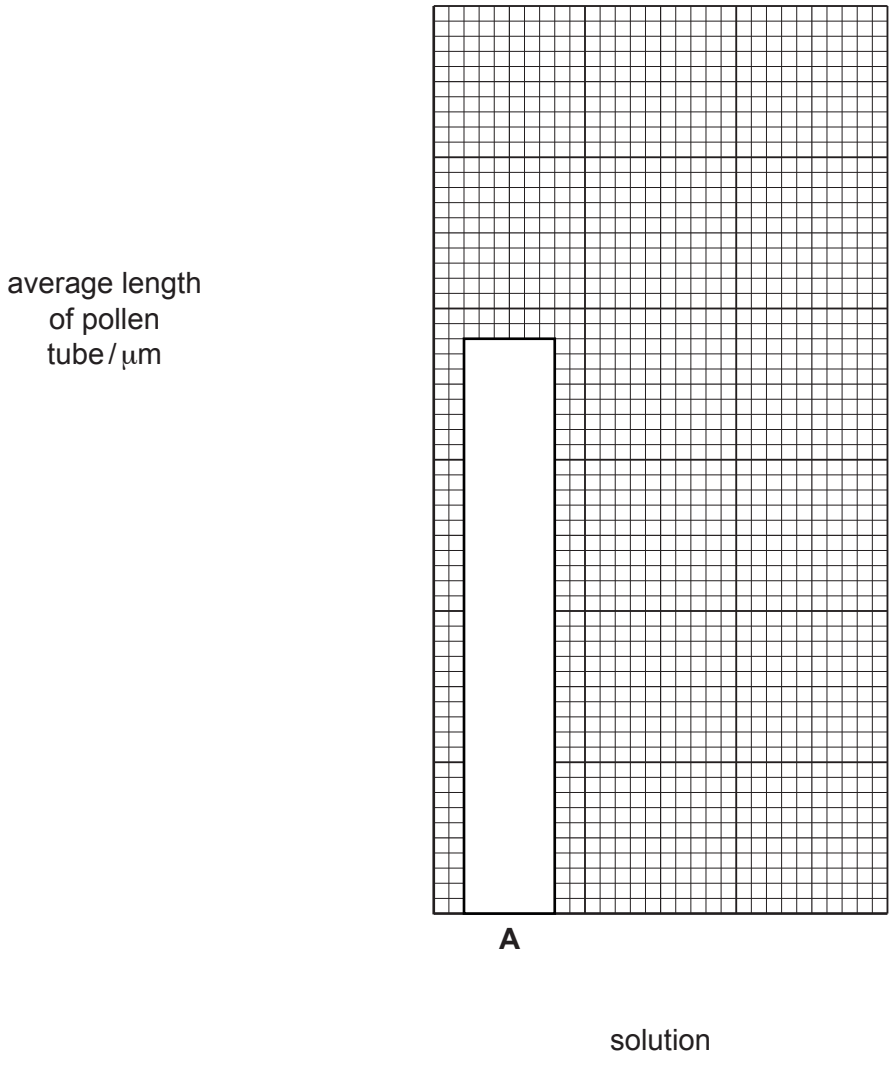


**Fig. 2.5**

Use the information in Table 2.3 to complete the graph **in Fig. 2.5** by:

- adding the scale for the *y-axis*
- plotting the bars for solutions **B** and **C**.

[2]

[Total: 18]

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