Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **October/November 2015**

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 During respiration, a chemical is produced that causes the indicator methylene blue to change from blue to colourless.

Some students investigated the effect of temperature on the rate of respiration in yeast, using yeast and methylene blue.

- A ruler was used to measure 2 cm from the top of **three** test-tubes and a line was drawn on each test-tube.
- Yeast suspension with glucose was poured into each test-tube until it reached the line drawn on the test-tube.
- Three beakers were labelled: **cold**, **warm** and **hot**.
- One test-tube was placed in each container.
- A mixture of ice and water was placed into the beaker labelled **cold**, tap water at room temperature into the beaker labelled **warm** and hot water from a tap into the beaker labelled **hot**.
- A thermometer was used to measure the temperature in each beaker.
- The test-tubes were left for five minutes and then 1 cm^3 of methylene blue was added to each test-tube.
- A glass rod was used to stir the mixture so the methylene blue spread evenly.
- A stopper (bung) was placed in each test-tube and a timer started.
- The time for the methylene blue to become colourless was recorded. This was trial 1.
- The same procedure for trial 1 was repeated twice to give results for trial 2 and trial 3.

Fig. 1.1 shows the temperatures of the water in each beaker and the times, in minutes and seconds, for each test-tube to become colourless.

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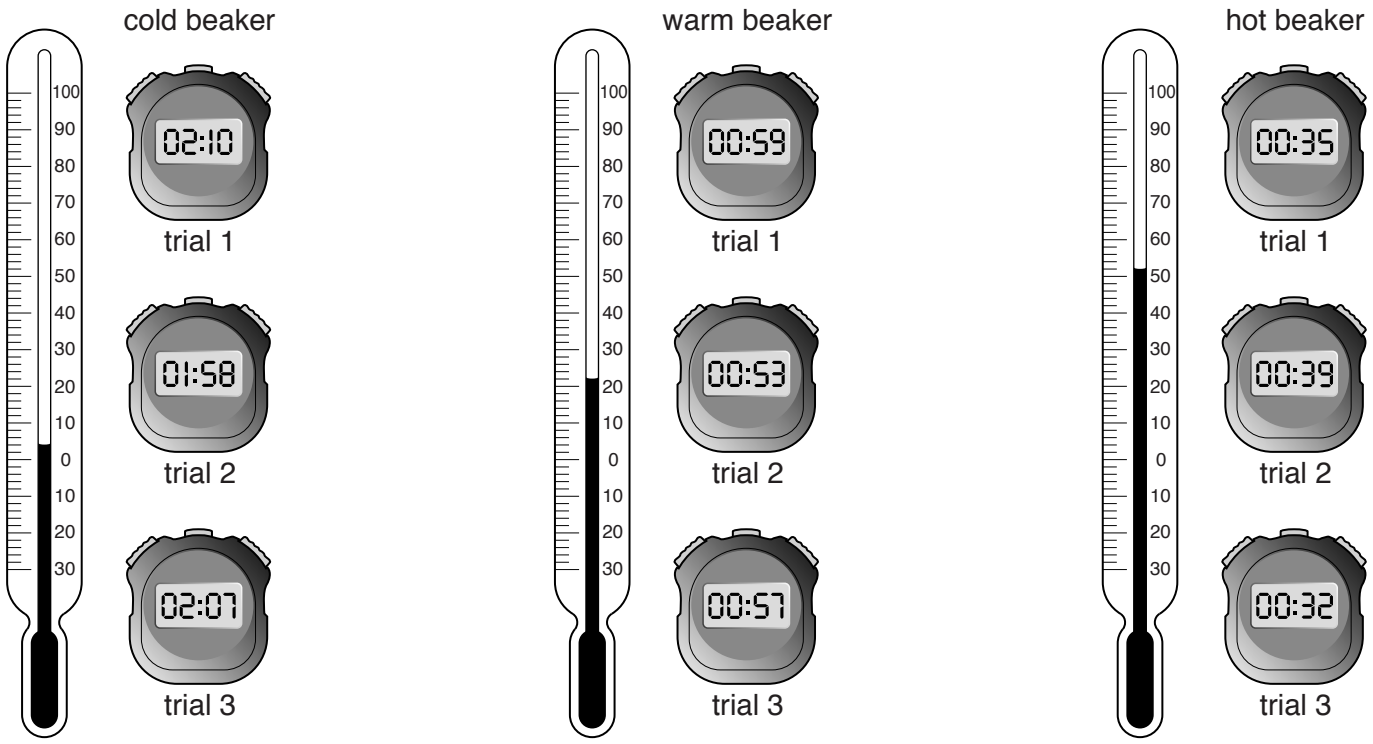

Fig. 1.1

(a) Prepare a table to record the results of the investigation shown in Fig. 1.1.

View solution

Read the temperature for each beaker and the times taken for the methylene blue to become colourless at each temperature.

In your table:

- record the temperatures in degrees Celsius
- record the times in **seconds**.

[6]

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(b) (i) State a reason why the students took three readings for each temperature.

.....

.....[1]

(ii) Calculate the average time for the methylene blue to become colourless at each temperature.
Show your working and record your results in Table 1.1.

Give your answer to the nearest whole number.

Table 1.1

temperature /°C	working	average

[2]

(iii) State **one** conclusion about the effect of temperature on the rate of respiration in yeast.

.....

.....[1]

(c) (i) The method of timing how long it takes for the methylene blue in the three test-tubes to become colourless is a source of error. Suggest why.

.....

.....[1]

(ii) Describe how you could improve the method to reduce this source of error.

.....

.....

.....[1]

(d) Some students investigated the effect of pH on the rate of respiration by measuring the volume of carbon dioxide produced by yeast in 30 minutes.

View solution

Their results are shown in Table 1.2.

Table 1.2

pH	average volume of carbon dioxide produced in 30 minutes / cm^3	rate of carbon dioxide production / cm^3 per minute
4	6	0.2
5	12	0.4
6	36	1.2
7	54	.....
8	63	2.1

(i) Complete Table 1.2 by calculating the rate of carbon dioxide production at pH 7.

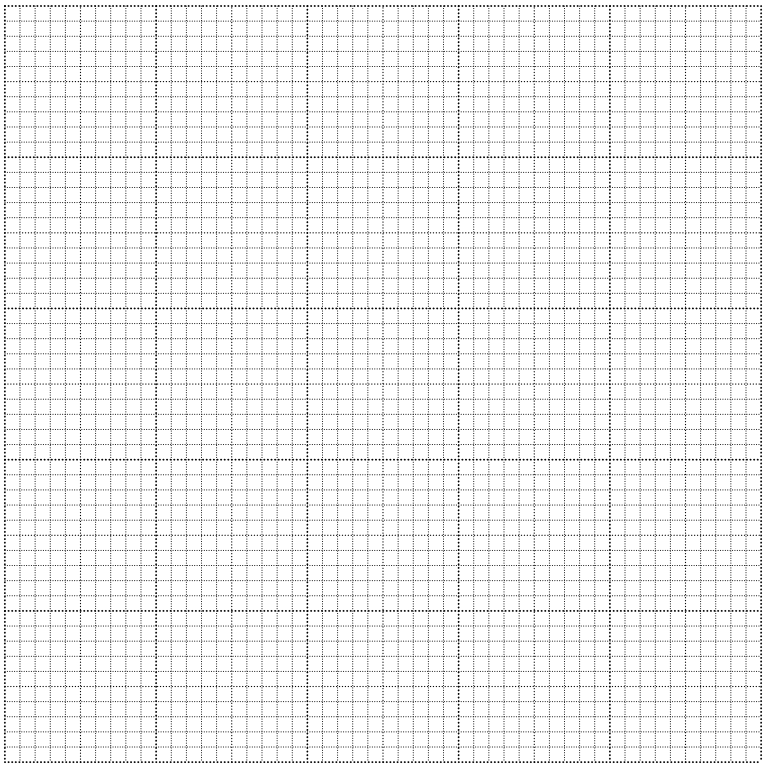
Write your answer in the space in Table 1.2.

Show your working in the space below.

[1]

(ii) Plot the data from Table 1.2 to show the effect of pH on the rate of carbon dioxide production by yeast.

View solution



[4]

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(iii) Describe **and** explain the trend shown by the results in Table 1.2 and the graph you have drawn.

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.....

.....

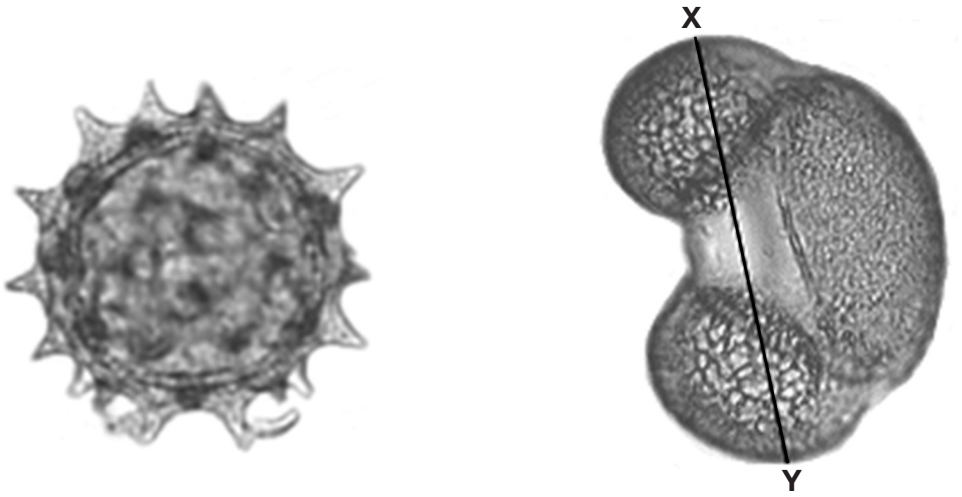
.....

.....[3]

[Total: 20]

View solution

2 Fig. 2.1 shows photomicrographs of two types of pollen grain, **R** and **S**.



R **S** **not to scale**

Fig. 2.1

(a) **(i)** Make a large drawing of pollen grain **S**.

View solution

[3]

(ii) Measure the length of the line **XY** on Fig. 2.1. Include the unit.

length of **XY** .....

Draw the line **XY** on your drawing, in the same position as on Fig. 2.1.

View solution

Measure the length of **XY** on your drawing. Include the unit.

length of **XY** on your drawing .....

Calculate the magnification of your drawing.
Show your working.

magnification x .....
[5]

(b) (i) State **two** ways, visible in Fig. 2.1, in which pollen grain **R** is different from pollen grain **S**.

Write your answers in Table 2.1.

View solution

Table 2.1

feature	pollen grain **R**	pollen grain **S**
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

[2]

(ii) Describe **one** feature, visible in Fig. 2.1, of pollen grain **R** that helps it to be dispersed.

.....

.....[1]

View solution

(c) Some students placed samples of each type of pollen grain on a microscope slide and added a drop of dilute sugar solution. Pollen tubes started to grow.

To find out which of the pollen tubes grew faster, students measured the length of the pollen tubes every 2 minutes for 20 minutes.

View solution

(i) Suggest how the pollen tubes could be measured using a microscope.

.....[1]

Their results are recorded in Table 2.2.

Table 2.2

time/min	length of pollen tubes/μm	
	pollen grain **R**	pollen grain **S**
2	0.5	0.4
4	1.8	1.5
6	4.2	3.9
8	12.6	13.4
10	18.8	21.1
12	24.9	29.6
14	30.2	36.8
16	36.6	44.2
18	41.9	52.8
20	48.5	59.8

(ii) Compare the growth of pollen grain **S** with pollen grain **R**, using the data from Table 2.2.

.....

.....

.....

.....

.....[3]

View solution

(d) The plant that produces pollen grain **R** produces fruits that contain seeds. These fruits disperse the seeds by splitting along the edges, throwing out the seeds.

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The students counted the number of seeds in a random sample of 100 fruits.

Fig. 2.2 is a frequency histogram of their results.

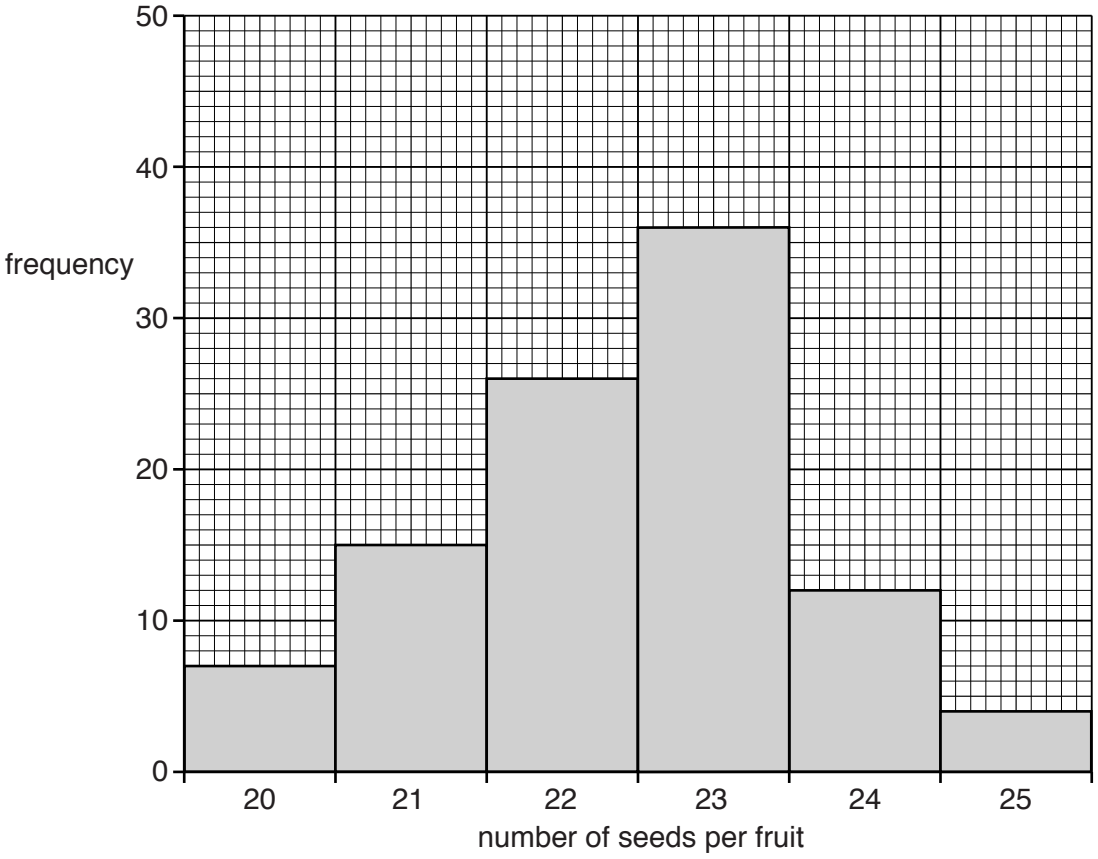

Fig. 2.2

(i) Suggest how the students could collect a random sample and count the seeds accurately.

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.....

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.....

.....

.....[3]

(ii) Identify the most frequent number of seeds in a fruit.

.....[1]

(iii) Suggest **one** reason why some fruits have a lower number of seeds than others.

.....

.....[1]

[Total: 20]

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