Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

8584089390

BIOLOGY **5090/62**

Paper 6 Alternative to Practical **October/November 2018**

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 an HB 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.
Write your answers in the spaces provided on the Question Paper.

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.

This document consists of **9** printed pages and **3** blank pages.

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Answer **all** questions in the spaces provided.

1 Certain bacteria are important in the production of yoghurt. Live yoghurt contains these living bacteria. A small volume of live yoghurt can be added to milk and, given suitable conditions, the bacteria will change the milk into yoghurt.

(a) A yoghurt-milk mixture was produced by adding 5 cm^3 of live yoghurt to 100 cm^3 of milk. The mixture was stirred well. Given suitable conditions this mixture would then form yoghurt.

The consistency of the yoghurt-milk mixture was compared to the consistency of the milk and the yoghurt. The pH of each was measured.

The observations are recorded in the table.

sample	consistency	pH
milk	watery	7
yoghurt-milk mixture	watery	7
yoghurt	thick and creamy	5

(i) If you were making the yoghurt-milk mixture in your laboratory, state which pieces of equipment you could use for obtaining the most accurate measurement of:

100 cm^3 of milk,

.....

5 cm^3 of yoghurt.

.....

[2]

(ii) Describe, in detail, how you would use pH indicator paper to measure the pH of the samples in the table.

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.....[3]

(iii) Referring to the pH of the samples in the table, describe any change in pH that occurs as the yoghurt-milk mixture forms yoghurt.

.....[1]

(b) When making yoghurt, the milk is first heated to 85 °C and then allowed to cool to 45 °C.

(i) Suggest why the milk is heated to 85 °C.

.....

.....[1]

(ii) State how you could determine when the milk reached a temperature of 85 °C.

.....

.....[1]

After the milk has been cooled to a temperature of 45 °C, a small volume of live yoghurt is added to it. This mixture is stirred and left at 45 °C for 8 hours. After this time, the milk has turned to yoghurt which can be cooled and eaten.

(iii) Using information in the table on page 2, suggest **two** ways you could check that the milk has been turned into yoghurt.

1 .....

.....

2 .....

.....
[2]

(iv) You are given milk and natural live yoghurt. Describe an experiment you could carry out to show that the bacteria in the natural yoghurt must be alive for milk to be turned into more yoghurt.

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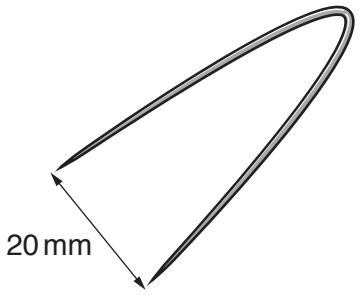
.....[5]

[Total: 15]

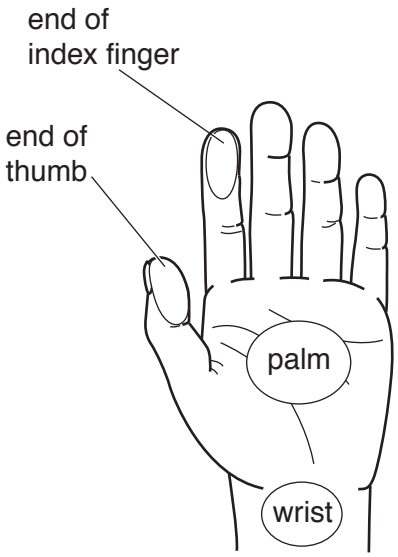
2 Human skin is a sense organ containing sensory receptors that can detect touch.

(a) A student carried out an experiment to investigate the sensitivity of the skin of the hand of another student, whose eyes were covered with a strip of thick cloth called a blindfold.

A piece of wire was bent into the shape shown in the diagram and adjusted so that the two sharp ends were 20 mm apart.



The areas of the hand that were tested are shown in the diagram below.



The blindfolded student's index finger was gently touched with the points of the wire. Sometimes only one point was used and sometimes both, at random. The blindfolded student indicated whether he could feel only one point or two separate points.

The wire was then adjusted so that the points were 15 mm apart. One or two points were again gently touched on the end of the blindfolded student's index finger. The student indicated whether he could feel only one point or two separate points.

The test was repeated with the points of the wire 10 mm, 5 mm and 2 mm apart.

The tests were then repeated on the blindfolded student's wrist.

(i) Suggest why the student being tested was blindfolded.

.....

.....[1]

The results for the index finger and the wrist are shown in the table. When two separate points were used and correctly sensed by the student, a tick was inserted in the table. A cross indicates that the two points were not sensed separately but as one only.

	area tested			
distance between the two points/mm	**end of index finger**	**end of thumb**	**palm**	**wrist**
20	✓			✓
15	✓			✓
10	✓			✗
5	✓			✗
2	✓			✗

The wire was then used to find the minimum distance that could be detected as two points by the skin on the end of the thumb and in the centre of the palm.

For the end of the thumb this distance was 3 mm. For the centre of the palm it was 16 mm.

(ii) Use this information to complete the table using ticks and crosses. [2]

(iii) State which part of the student's hand is most sensitive.

.....[1]

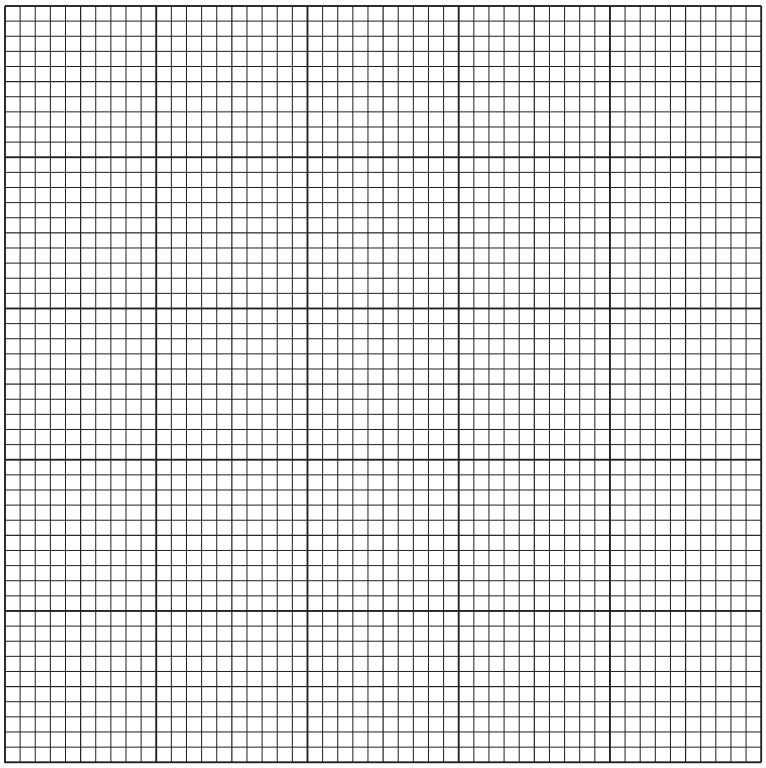
[Turn over

(b) The student extended this investigation to include other parts of the body. He recorded the minimum distance between the two points that could be sensed on the forearm, upper arm and shoulder.

The blindfolded student then removed his blindfold and gave it to the other student who used it to cover his eyes. All the previous tests were then carried out on this second student. The mean results for the two students are shown in the table.

area of skin	mean minimum distance detected as two points/mm
index finger	2
palm	14
forearm (between wrist and elbow)	32
upper arm (between elbow and shoulder)	38
shoulder	42

(i) Construct a bar chart to display these results on the grid below.



[4]

(ii) Explain why the students tested each other and calculated a mean result.

.....

.....[1]

(iii) Suggest **one** other variable that the students should control to ensure that their results are valid.

.....

.....[1]

(iv) Suggest reasons for the different sensitivity of these areas of the skin.

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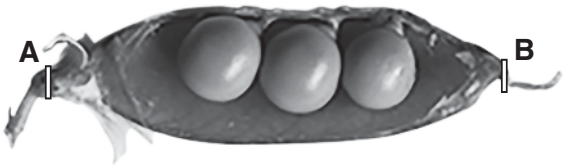
.....[2]

[Total: 12]

3 The photograph shows a developing fruit of a pea flower with half of the wall cut away.



×1.2

(a) (i) Make a large drawing of this developing fruit in the space below and label a seed and the pericarp (fruit wall).

[5]

(ii) Measure the distance between the lines labelled **A** and **B** on the photograph and record it.

..... mm

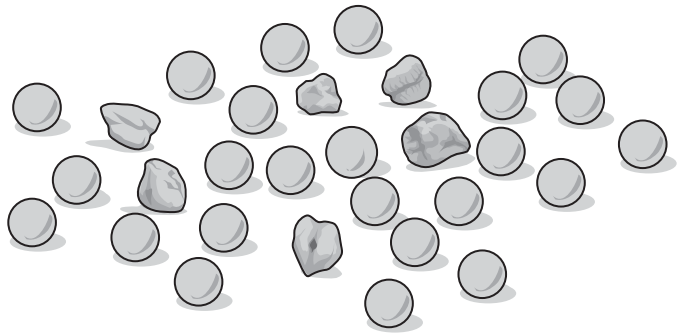
Calculate the length of the **actual** fruit in the photograph. Show your working.

.....[3]

(b) When pea seeds are fully formed they can be either round or wrinkled (with a rough surface).

In a genetics experiment, two pea plants grown from round seeds were cross-pollinated. The seeds from these plants were collected.

A random sample of these seeds is shown in the diagram.



(i) Count and record the number of round and wrinkled seeds.

round seeds .....

wrinkled seeds .....

[1]

(ii) Calculate the number of wrinkled seeds as a percentage of the total number of seeds shown. Show your working.

.....% [2]

(iii) A student states that this experiment should produce a ratio of 3 round seeds : 1 wrinkled seed. Comment on why the ratio obtained in the experiment differs from that predicted by the student.

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.....[2]

[Total: 13]

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