



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

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TWENTY FIRST CENTURY SCIENCE

0608/05

Paper 5

May/June 2010

1 hour 30 minutes

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, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.
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.

For Examiner's Use	
1	
2	
3	
4	
Total	

This document consists of **14** printed pages and **2** blank pages.



Section A

Read this newspaper article.

Could cloning save animals from extinction?

The bucardo is an extinct species of mountain goat. A species is extinct when all the individuals of that species have died. Extinctions can occur due to environmental change or the activity of humans.

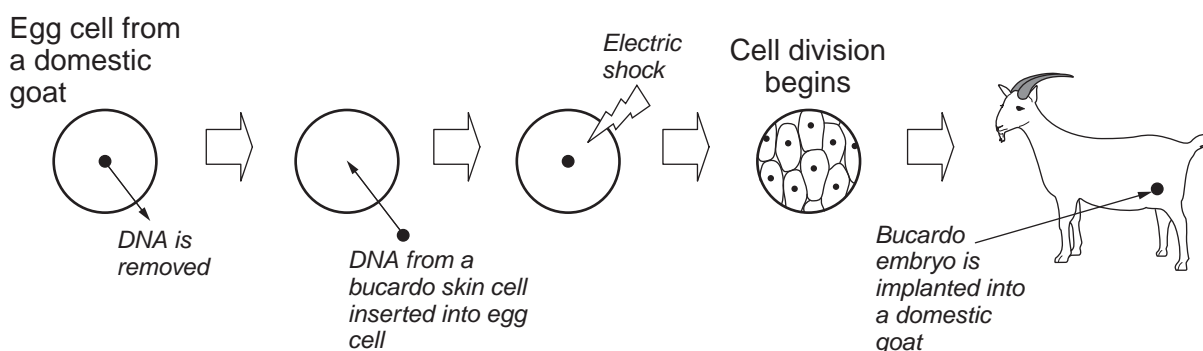
Scientists have created a clone of the bucardo using its closest living relative, the domestic goat.

How did the scientists clone a bucardo?

Before the last bucardo died, skin cells were removed from its ear. These cells were stored at a temperature of -198°C . Scientists transferred the DNA from these skin cells into an egg cell from a domestic goat. This egg cell had previously had its own DNA removed. They then used an electric shock to trigger cell division and a bucardo embryo began to develop. The bucardo embryo was then implanted into a domestic goat to develop into a young bucardo.



This process is summarised below.



Scientists created 439 bucardo embryos. They implanted 208 of these into domestic goats. Seven goats became pregnant. One goat gave birth to a live bucardo. Unfortunately this young bucardo only lived for a few minutes.

Cloned animals often suffer from developmental problems. These problems make it very difficult for the pregnancies to continue as normal. Even if the baby animal is born, it will often die within the first few days.

Should the cloning of endangered animals be allowed?

The bucardo was already extinct when these experiments were carried out. Some scientists believe that cloning could be used to prevent animals becoming extinct. Scientists are looking at how cloning could help to preserve endangered species such as the giant panda and the pygmy hippo.

Cloning could enable us to save the unique genetic make-up of endangered species. The cloned offspring could be used for captive breeding programmes to help the population of rare species increase. But cloning can also harm the animals involved and could be dangerous. Some scientists believe that the money spent on cloning should be used to remove the factors that are causing the extinctions.

Use information from the article 'Could cloning save animals from extinction?' to help you answer question 1.

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1 (a) What is meant by the term *extinct species*?

.....
..... [1]

(b) (i) If the population of a predator increases, it may cause a species to become extinct.

Explain how this change may cause a species to become extinct.

.....
..... [1]

(ii) Name one **other** environmental change that may cause a species to become extinct.

..... [1]

(c) Humans may contribute to extinctions both directly and indirectly.

Give one example of each:

directly:
.....

indirectly:
..... [2]

(d) Reducing the number of extinctions maintains the biodiversity on Earth. This is part of using the environment in a sustainable way.

Explain what is meant by the term *sustainable* in this context.

.....
.....
..... [2]

(e) The newspaper article describes how scientists have cloned a bucardo.

(i) What is a clone?

..... [1]

(ii) The article described a method of artificial cloning.

Identical twins are an example of natural clones.

Describe how identical twins are formed.

.....
.....
..... [2]

(iii) Artificial cloning of endangered animals has ethical questions. People disagree about what should be done and what should not be done.

Use information from the article to help complete the table.

	Why people might agree with artificial cloning of endangered animals	Why people might disagree with artificial cloning of endangered animals
Reason 1
Reason 2

[4]

(f) Using the data in the article, calculate the percentage of the total created bucardo embryos that were successfully born.

Show your working.

Percentage = % [2]

(g) Many species have become extinct.

The Dodo was a flightless bird that became extinct in the 17th Century. It became extinct after Dutch sailors arrived on the island of Mauritius where the dodos lived.

(i) There is a correlation between the number of sailors arriving in Mauritius and the population of dodos.

Describe this correlation.

.....
..... [1]

(ii) The correlation does not actually show that the sailors caused the extinction.

What further information is needed to show that the sailors did cause this extinction?

.....
.....
.....
..... [2]

(iii) Give another example of a correlation that you know about.

.....
..... [1]

(h) Scientists have recently discovered the remains of a Dodo in a cave in Mauritius.

The closest living relative to the Dodo is a pigeon.

(i) Describe how scientists could try to clone a Dodo. Use the article to help you.

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..... [4]

(ii) Suggest a reason why scientists would find it difficult to clone a Dodo.

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..... [1]

(iii) The scientists who clone the Dodo are likely to send the results of their experiment to scientific journals for publication.

Before publication, the article is sent to other scientists.

What is the name given to this process?

..... [1]

(iv) Suggest why this process is important.

.....
.....
..... [2]

(v) After publication, other scientists will want to check the results.

How and why would they do this?

.....
.....
..... [2]

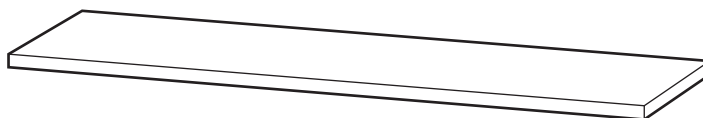
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Section B

2 A scientist compares the stiffness of two different polymers, **A** and **B**.

He uses a sample of each polymer measuring $200 \times 30 \times 2$ mm.



He also uses the following apparatus.

- stand
- clamp
- mass holder
- 10g, 50g, 100g and 1000g masses (two of each)
- 50cm ruler

The table shows how much each polymer sample bends when loaded with different masses.

	bend of polymer sample (in mm)				
mass (in g)	50	100	150	200	250
polymer A	32	65	96	127	161
polymer B	2	4	6	30	50

(a) Describe how the scientist used the apparatus to obtain these measurements.

.....

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..... [4]

(b) What conclusions about the stiffness of polymers **A** and **B** can be made from the results?

.....

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..... [2]

(c) Another scientist suggests two improvements to the design of this investigation.

Suggestion 1 Repeat the experiments using several different samples of each polymer.

Suggestion 2 Use polymer samples measuring 300 × 30 × 2 mm length.

Explain how each suggestion would improve the investigation.

(i) Suggestion 1

.....
.....
..... [2]

(ii) Suggestion 2

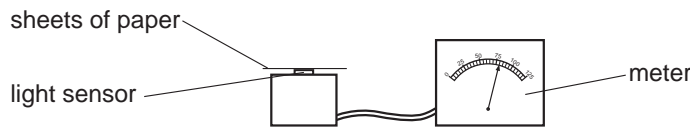
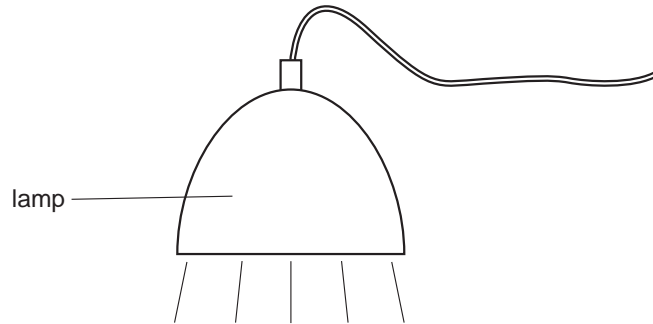
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[Total: 10]

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3 Rhys investigates how much light passes through different thicknesses of paper.

He sets up his apparatus like this:



(a) The light sensor gives a reading on the meter even when the lamp is switched off. This is due to light coming in through the window.

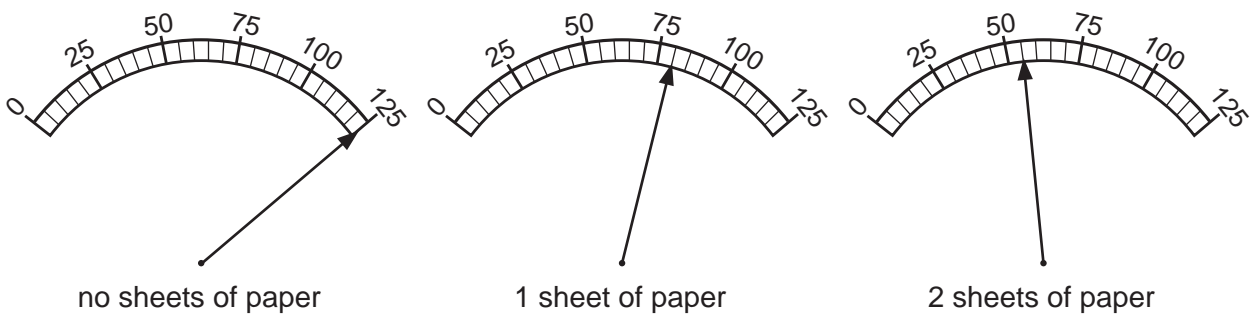
Describe **two** ways of stopping the light coming through the windows.

.....

.....

..... [2]

(b) Rhys takes these readings from the meter.



Write these meter readings in the spaces in the table.

number of sheets of paper	0	1	2	3	4	5
meter reading				40	25	20

[3]

(c) In another experiment, Rhys decides to find how much light is absorbed by different depths of a coloured solution.

(i) List the apparatus he would need as well as the lamp, light sensor and meter.

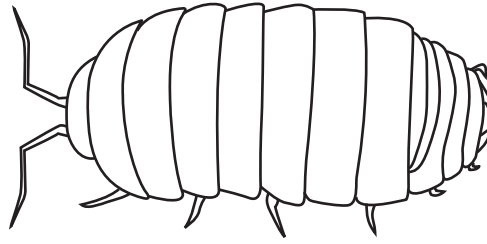
.....
.....
..... [2]

(ii) Describe how Rhys could carry out this experiment to obtain a reliable set of results.

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..... [3]

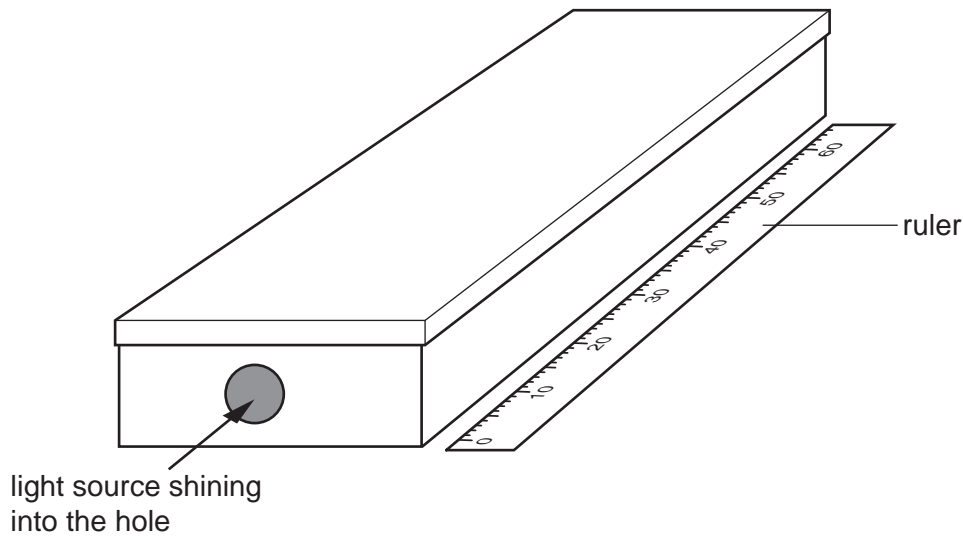
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- 4 Amy wants to find out if woodlice are affected by light. Woodlice are small invertebrates that live under logs and stones.



She uses a cardboard box with a lid. One end of the box has a small hole in it.

Amy places a light source next to this hole and a ruler alongside the box.



Amy places 25 woodlice in the box and puts the lid on.

After 5 minutes, Amy removes the lid and counts the number of woodlice at each distance from the light source. She records her results in the table.

Amy carries out the experiment three times.

distance from light source (cm)	number of woodlice			
	experiment 1	experiment 2	experiment 3	mean (average)
0–10	0	0	0	0
11–20	0	1	0	0.3
21–30	1	2	1	1.3
31–40	3	5	3	3.7
41–50	9	11	10	10
51–60	12	6	11	

(a) Amy decides to ignore the result at 51–60 cm for Experiment 2.

(i) Suggest a reason why she does this.

..... [1]

(ii) Calculate the mean (average) number of woodlice at 51–60 cm from the light source. Show your working.

mean (average) value = [1]

(b) What is the range for the number of woodlice observed at 31–40 cm from the light source?

range = to [1]

(c) Explain why Amy carries out her experiment three times.

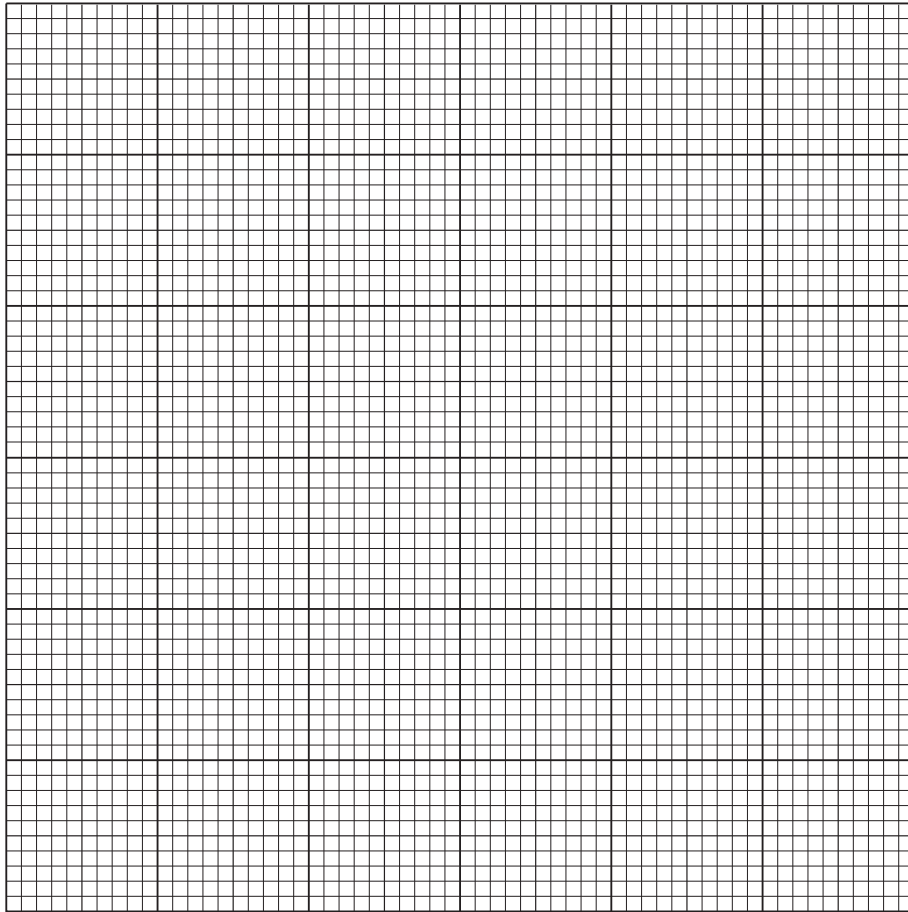
.....
..... [1]

(d) Suggest one variable that must be kept the same in all three experiments.

.....
..... [1]

(e) Draw a bar chart on the grid to plot the mean (average) number of woodlice against distance from the light source. [3]

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(f) (i) What conclusion can Amy draw from her experiment?

.....
.....
..... [1]

(ii) Suggest how this behaviour helps woodlice to survive.

.....
.....
..... [1]

[Total: 10]

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