OCR
Oxford Cambridge and RSA

# Wednesday 6 January 2016 – Morning

## LEVEL 1 CAMBRIDGE NATIONAL IN SCIENCE

**R072/01** How scientific ideas have developed

Candidates answer on the Question Paper.
A calculator may be used for this paper.

**OCR supplied materials:**
- Insert (R072/01/I – inserted)

**Other materials required:**
- Pencil
- Ruler (cm/mm)

**Duration:** 1 hour

*R072/01*

| Candidate forename | | Candidate surname | |
|---|---|---|---|

| Centre number | | | | | | Candidate number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

**INSTRUCTIONS TO CANDIDATES**

- The Insert will be found inside this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- Your quality of written communication is assessed in questions marked with a pencil (✎).
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

**1** This question refers to the case study **The Organisation Man** in the insert.

**(a) (i)** Look at **Fig. 1** and **Fig. 2** in the case study.

Which part of the modern classification system was **not** used by Linnaeus?
Put a (ring) around the correct answer.

**Class** **Phylum** **Genus** **Species** **[1]**

**(ii)** Which **two** parts of the classification system did Linnaeus use to name organisms?

.....

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

**(b)** Linnaeus classified the world into three kingdoms.

To which kingdom do each of the following species belong?
Put one tick (✓) in the correct column for each.

| **Species** | **Kingdom** | | |
|---|---|---|---|
| | Animal | Plant | Mineral |
| *Homo sapiens* | | | |
| *Lycopersicon esculentum* | | | |

**[2]**

**(c)** After Linnaeus, 'no one person could ever hope to create such a complete record'.

**(i)** Why was this?

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

**(ii)** How can lots of modern scientists create such a record?

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

**(d) (i)** Which **two** characteristics did Linnaeus use to classify plants?

Class: .....

Order: ..... **[2]**

**(ii)** Why did Linnaeus **not** use DNA in his classification system?

.....

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

**(e)** Look at the information about classifying animals and **Fig. 3**.

**(i)** Which **two** features did Linnaeus use to classify birds?

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

**(ii)** Why would Linnaeus put a duck in the same group as a pelican, and how would they be distinguished?

.....

.....

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

**(f)** Linnaeus lived long before Darwin and Lamarck.

In what ways were Linnaeus' ideas related to the work of Darwin and Lamarck?

.....

.....

.....

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

**2** Mendel did some plant breeding experiments using pea plants.
Some of the pea plants were tall (about 200 cm) and others were short (about 30 cm).

**(a)** In some experiments, he used pure breeding tall plants.

What does the term **pure breeding** mean?

.....

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

**(b)** Mendel repeated his experiments several times.

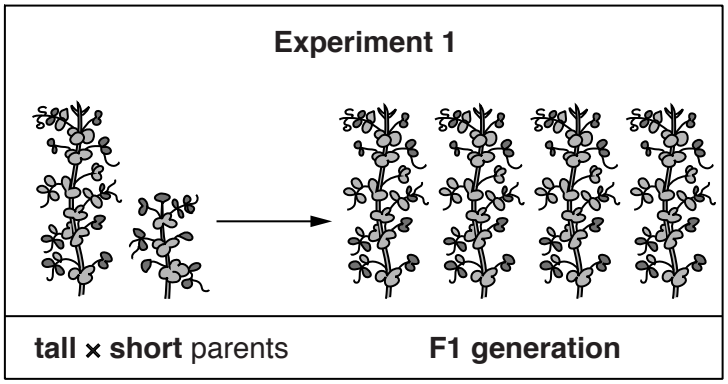
Explain why he did this.

.....

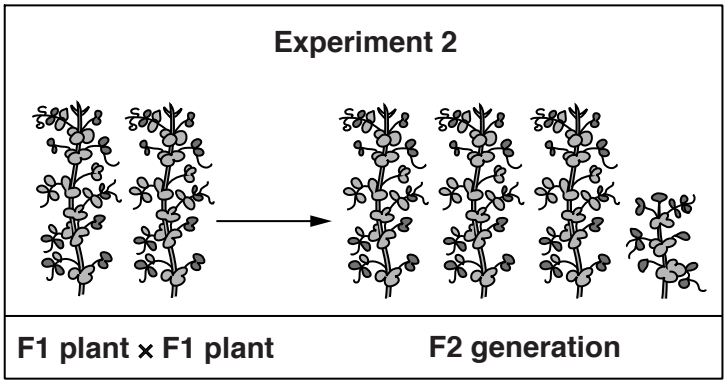
..... **[1]**

**(c)** A student called Eve repeated some of Mendel's experiments.
She used pure breeding tall plants.

In **Experiment 1**, Eve crossed a pure breeding **tall** plant with a pure breeding **short** plant.
All the offspring (the F1 generation) were the same as each other.




In another experiment, **Experiment 2**, Eve crossed plants from the F1 generation together.
The offspring (F2 generation) were not the same.



Describe the results of Eve's two experiments and explain why the F1 and F2 generations are different.

*The quality of written communication will be assessed in your answer.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

**3** Our understanding of the Universe has changed over time. The Ancient Greek view of the Universe was challenged by Copernicus in 1514.

For each of the ideas below, put ticks (✓) to show whether it was believed by the **Ancient Greeks**, by **Copernicus** or **Neither**.

Each row should have one or more ticks.

| | **Ancient Greeks** | **Copernicus** | **Neither** |
|---|---|---|---|
| The Earth orbits the Sun. | | | |
| The Sun orbits the Earth. | | | |
| The Moon orbits the Earth. | | | |
| The planets orbit the Earth. | | | |

**[4]**

**4** Kyle has heard that people who play computer games develop shorter reaction times.
He takes a simple test of reaction times and gets the following results.

| **Test** | **A** | **B** | **C** | **D** |
|---|---|---|---|---|
| **Reaction time (ms)** | 310 | 320 | 280 | 290 |

**(a) (i)** In which test (**A**, **B**, **C** or **D**) did he react most quickly?

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

**(ii)** Calculate his mean reaction time.

Show your working.

mean reaction time = ..... ms **[2]**

**(b)** Kyle plays a computer game for four hours and then repeats his experiment.

| **Test** | **E** | **F** | **G** | **H** |
|---|---|---|---|---|
| **Reaction time (ms)** | 350 | 290 | 280 | 280 |

He believes that his reaction times have improved, but his sister says that the results for **E**, **F**, **G** and **H** do not show this.

**(i)** Suggest why Kyle believes that his reaction times have improved.

.....

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

**(ii)** Why do Kyle's results **not** show that his reaction times have improved?

.....

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

**(iii)** Give **two** ways in which Kyle could get more evidence to confirm that people playing computer games develop shorter reaction times.

.....

.....

.....

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

**5** Colin looks up at the sky at different times of the day and night.

**(a)** He can see the following things:

| | |
|---|---|
| A | Clouds |
| B | Sun |
| C | Stars |
| D | Moon |

Put them in order of increasing distance from the surface of the Earth. The first has been done for you:

closest | A | | | | furthest away

**[2]**

**(b)** In 1687, a famous scientist suggested objects experience a force of attraction between each other.

**(i)** Give the name of the scientist who suggested this idea.

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

**(ii)** What name is given to this force of attraction?

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

**(c)** Colin's teacher told him that Earth is in a galaxy called The Milky Way and there are many more galaxies in the Universe.

Suggest **two** reasons why Colin cannot see other galaxies.

.....

.....

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

**(d)** In 1929, Edwin Hubble worked out that the Universe was expanding very rapidly.
He calculated a constant which showed how fast it was expanding.

**(i)** Suggest why it was important that Hubble published his work.

.....

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

**(ii)** Hubble's calculations suggested that the Universe was about 2 billion years old. Measurements of the radioactivity in rocks on Earth suggested that the Earth was much older than that.

Which of these statements explain how this is possible?
Put ticks (✓) in the boxes next to the **two** best answers.

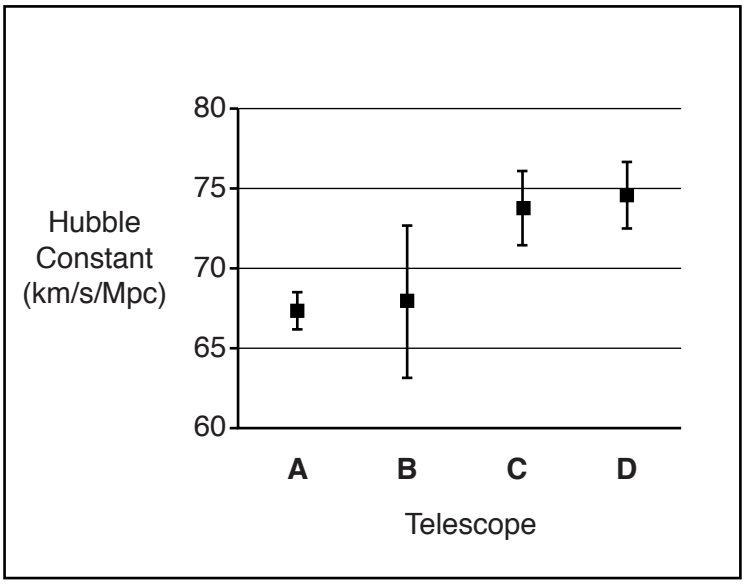
| | |
|---|---|
| The Earth is older than the Universe. | ☐ |
| Hubble was wrong when he worked out his value. | ☐ |
| Measurements of the reactivity in rocks give much better data than Hubble's telescope. | ☐ |
| Individual scientists can never get the right answer. | ☐ |
| The Universe is getting smaller. | ☐ |
| The Earth is the centre of the Universe. | ☐ |

**[2]**

**(e)** Hubble decided that his observations showed that the Universe was expanding.
He showed this by calculating the **Hubble Constant**. He thought this had a value of about 500 km/s/Mpc.

The Hubble Constant has been worked out again by many other scientists using modern telescopes. These are very different from the value that Hubble worked out.

The graph shows the values using data from four modern powerful telescopes, **A**, **B**, **C** and **D**.



**(i)** Which of these four telescopes (**A**, **B**, **C** or **D**) has given a mean value which is closest to Hubble's value of 500 km/s/Mpc?

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

**(ii)** Why would a scientist prefer to use the data from telescope **A** rather than the data from telescope **B**?
Put a tick (✓) next to the best answer.

| | |
|---|---|
| Telescope **A** gives the lowest mean value. | ☐ |
| Telescope **A** gives the smallest range. | ☐ |
| Telescope **B** gives the largest range. | ☐ |
| Telescope **A** and **B** both give similar mean values. | ☐ |

**[1]**

**(f)** Colin states that you can study the stars using other parts of the electromagnetic spectrum other than visible light.

Give the name of **three** other parts of the electromagnetic spectrum and put them in the correct order of increasing wavelength.

Smallest wavelength ..... ..... ..... largest wavelength
**[2]**

**6** Martyn takes part in a cycle race.
His core body temperature changes during the race, as shown by the table below.

| **Distance travelled (km)** | 0 | 1 | 2 | 3 | 4 | 5 | 10 |
|---|---|---|---|---|---|---|---|
| **Core temperature (°C)** | 37.5 | 38.0 | 38.5 | 39.0 | 39.5 | 39.5 | 39.5 |

**(a)** Describe how Martyn's core body temperature changes during the race.

.....

.....

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

**(b)** Explain **why** Martyn's temperature changes during the race and **how** the body reacts to this change.

*The quality of written communication will be assessed in your answer.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[6]**

**(c)** At the end of the race, a special blanket is wrapped around Martyn to stop him getting cold.

**(i)** Explain why he would get cold without the blanket.

.....

.....

.....

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

**(ii)** Martyn is advised to eat some sweets after the race.

Explain why this is a good idea.

.....

.....

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

**END OF QUESTION PAPER**

## ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.