

Wednesday 7 January 2015 – 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



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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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. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- 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 **16** pages. Any blank pages are indicated.

Answer **all** the questions.

This question is based on the case study ‘Continental Drift’.

1 (a) Look at **Table 1**.

Use the data in **Table 1** to identify which continents may have been directly linked.

Which pairs of continents may have been linked?

Put ticks (✓) in the boxes next to the **two** correct answers.

- Africa and India
- Antarctica and South America
- India and South America
- South America and Africa
- South America and Australasia

[2]

(b) How did the scientists before Wegener believe mountains were formed?

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

(c) The theory of land bridges was developed by a number of scientists. However, Wegener developed his theory by himself.

Scientists support each other when working as a team.

What are the advantages to scientists of working in a team?

Put ticks (✓) in the boxes next to the **two** correct answers.

- They check each other’s data.
- The team shares ideas.
- They share credit for each other’s work.
- The team needs less resources.

[2]

(d) Wegener used evidence from fossils to support his theory that the different continents had once been joined. Give **two other** pieces of evidence that Wegener used to support his theory.

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

(e) Wegener believed that Pangaea existed 300 million years ago.

How many years after this did Pangaea begin to break up?

Show your working.

..... million years [2]

(f) (i) Some scientists thought Wegener was **not** qualified to put forward a theory about changes to the Earth's surface?

Why did they think this?

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

(ii) Look at the responses to Wegener's theory on page 4 of the case study.

Which **two** people are using evidence to argue against Wegener's theory?

Put a **ring** around the **two** correct answers.

A B C D E

[2]

(g) Holmes' theory helps to explain sea floor spreading.

What other changes to the Earth does Holmes' theory explain?

Put ticks (✓) in the boxes next to the **two** correct answers.

Climate change

Earthquakes

Formation of fossils

Formation of mountains

Rising sea levels

[2]

(h) Some scientists think that the sea floor gets 5 cm wider each year.

Which of the following expressions can be used to calculate how many years it will take for the sea floor to get 1 km wider?

Put a (ring) around the correct answer.

$$\frac{1}{5}$$

$$\frac{1000}{5}$$

$$\frac{1000}{0.05}$$

$$\frac{100000}{0.05}$$

[1]

[Total: 15]

5
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Question 2 begins on page 6
PLEASE DO NOT WRITE ON THIS PAGE

- 2 Kevin investigates how different types of breakfast affect his blood glucose levels.

One morning he eats a high protein breakfast and another morning he has a high carbohydrate breakfast. Both types of breakfasts provide the same amount of energy overall.

He knows that the body makes glucose from carbohydrates in his food.

Kevin measures his blood glucose level before his breakfast and every 30 minutes afterwards.

These are Kevin's results.

Blood glucose level in mmol/L at these times					
Type of breakfast	Before breakfast	07:30	08:00	08:30	09:00
High protein	4.6	5.4	5.2	5.1	5.2
High carbohydrate	4.5	9.1	7.4	7.2	5.4

- (a) Explain why it is important to ensure that both types of breakfasts provide the same amount of energy overall.

.....
 [1]

- (b) (i) Look at the data in the table for the **high carbohydrate** breakfast.

Calculate the change in Kevin's blood glucose level from before breakfast to 07:30.

Show your working.

..... [2]

- (ii) Use your answer to part (i) to show that this change in Kevin's blood glucose level is more than 100%.

Show your working.

..... % [2]

(c) (i) Kevin's blood glucose levels were different after eating each type of breakfast.

Describe how his blood glucose levels are different at 07:30 and explain why.

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

(ii) Give **one** similarity and **one** difference shown by the pattern in the data for each type of breakfast.

Similarity

.....

Difference

..... [2]

(iii) Suggest **two** ways in which Kevin could collect more evidence for his investigation.

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

(iv) Kevin published his results on his internet blog.
A friend posted a comment on his blog about the results.

Explain why this is **not** the same as the process of peer review for a scientific journal.

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

BLANK PAGE

Question 3 begins on page 10

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3 A mobile phone uses electromagnetic waves to exchange data with a phone network.

(a) At what speed do electromagnetic waves travel in a vacuum?

Draw **one line** to join the correct speed with its unit.

speed	unit
3000	kilometres
30 000	kilometres per second
300 000	bits
3 000 000	bits per second

[2]

(b) Which type of electromagnetic wave is used when a mobile phone exchanges data with a phone network?

Put a **ring** around the correct answer.

red light microwaves infra-red radiation blue light

[1]

(c) Nicola makes a long call on her mobile phone. At the end of it, her ear feels warm. Her father says that waves from the phone have heated up her ear.

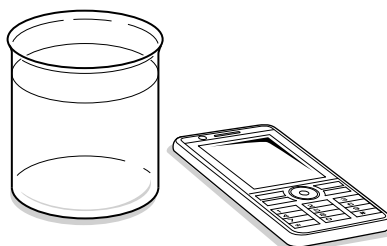
What type of statement did Nicola's father make?

Put a tick (✓) next to the best description of this statement.

- data
- evidence
- hypothesis
- observation

[1]

- (d) Nicola's father puts her phone next to a beaker of cold water in a warm room and measures the temperature while the phone is being used.



Here are his results.

Experiment 1

Time in minutes from start of call	0	1	2	3	4	5
Temperature of water in °C	16	17	17	18	18	19

He says that the results of the experiment prove that the waves from the phone have heated up the water.

Nicola was surprised by these results and so does the experiment again.

Here are her results.

Experiment 2

Time in minutes from start of call	0	1	2	3	4	5
Temperature of water in °C	22	22	22	22	22	22

- (i) Put one tick (✓) in the best column to describe what happens to the water in each experiment.

	gets warmer	gets colder	stays the same
Experiment 1			
Experiment 2			

[1]

- (ii) Suggest what Nicola could do to produce more evidence that the waves from the phone do not affect the water.

.....

.....

..... [2]

[Total: 7]

(b) (i) The ancient Greeks based their ideas on what they could see.

Thousands of years later Galileo collected data about small moons around the planet Jupiter.

Explain why Galileo could collect this data but the ancient Greeks could not.

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

(ii) Newton developed theories to support Copernicus.

What theories did Newton develop?

Put ticks (✓) in the boxes next to the **two** correct answers.

- gravity
- homeostasis
- classification systems
- names of planets
- laws of motion

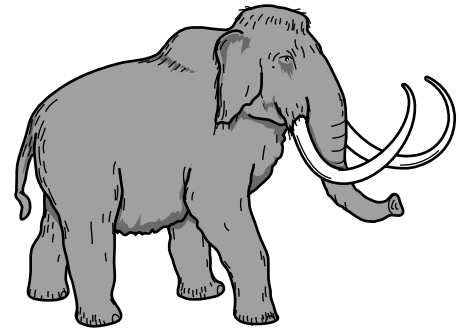
[2]

[Total: 10]

5 Mammoths were large animals which are now extinct.

Mammoths lived in cold climates.

They looked like elephants but had much more hair on their bodies.



(a) Lamarck had a theory that explained why mammoths had long hair.

Lamarck's theory:

- They all grew long hair during their lifetime to keep them warm.
- Mammoths who had grown long hair passed this characteristic on to their offspring.
- Over many generations all mammoths had offspring with long hair.

Modern scientists rejected Lamarck's explanation.

Explain which parts of **Lamarck's theory** were not correct.

.....

.....

..... [2]

(b) Charles Darwin suggested an alternative theory called **natural selection**.

How could Charles Darwin's theory of **natural selection** explain how mammoths evolved to have long hair?

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

.....

.....

.....

.....

.....

..... [4]

(c) Suggest why mammoths are extinct but elephants are not.

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

(d) Fitzroy was Darwin’s friend. He objected to Darwin’s theory of natural selection.

Fitzroy said: “I believe God created all the animals.”

Why is it difficult to collect evidence to investigate Fitzroy’s belief?

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

[Total: 9]

END OF QUESTION PAPER

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