Write your name here

Surname	Other names

Pearson Edexcel International GCSE (9-1)

Centre Number | Candidate Number

Biology

Paper 2

Sample Assessment Materials for first teaching September 2017

Time: 1 hour 15 minutes

Paper Reference **4BI1/2B**

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Calculators may be used.
- Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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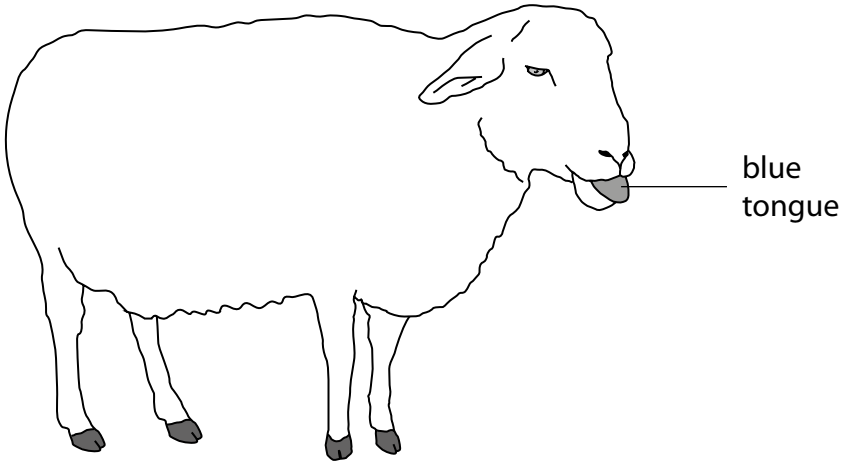
S 5 2 9 1 4 A 0 1 2 0

PEARSON

Answer ALL questions. Write your answers in the spaces provided.

1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Bluetongue disease in sheep



Global warming can lead to biological consequences. Some insects are vectors for disease. These insects can move to habitats that were previously too cold for their survival. These insects spread diseases, such as malaria, when they feed on the blood of animals that they bite. Warmer air temperatures increase the rate at which insects reproduce, as well as increasing the number of times that the insects bite animals to feed on their blood.

Bluetongue is a disease that affects sheep. It is common in countries in southern Europe, but was not found in the UK until 2007. The disease has been found in sheep further north in the UK since 2007. Bluetongue is caused by a virus that is spread by a small insect, called a midge. Although there are about 995 species of midge, only 20 species are vectors for the bluetongue virus.

One symptom of bluetongue is fever. When a sheep has a fever, its body temperature rises. If the sheep's temperature becomes very high, it can affect enzymes in sheep cells, which can lead to the death of the sheep. Sheep do not sweat, but can lower their body temperature by panting. Panting involves blowing air out of the lungs over the tongue. Another symptom is swelling of the lips and the tongue, which change colour from pink to blue. The blue colour is caused by reduced blood circulation, and it gives the disease its name.

Bluetongue is difficult to treat. It is possible to prevent the disease by vaccination or by controlling the midge vector. The disease can also be controlled by quarantining infected sheep. This involves keeping the infected sheep indoors, away from other sheep.

The cabins of aircraft arriving from other countries are often sprayed with insecticide to kill any insects that may have been present.

(a) The spread of bluetongue may be one consequence of global warming (line 1).

Explain one other biological consequence of global warming.

(2)

(b) Suggest how the midge acts as a vector (line 1).

(1)

(c) Explain why sheep with bluetongue need to pant (line 14).

(2)

(d) Give **one** reason why bluetongue was not found in the UK before 2007 (line 7).

(1)

(e) Calculate the percentage of midge species that are vectors of the bluetongue virus (line 10).

(2)

percentage = ... %

(f) Explain why the lips of sheep with bluetongue turn blue (line 16).

(2)

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(g) Explain how vaccination could protect a sheep from bluetongue (line 19).

(3)

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(h) Explain how quarantine could protect sheep from bluetongue (line 20).

(2)

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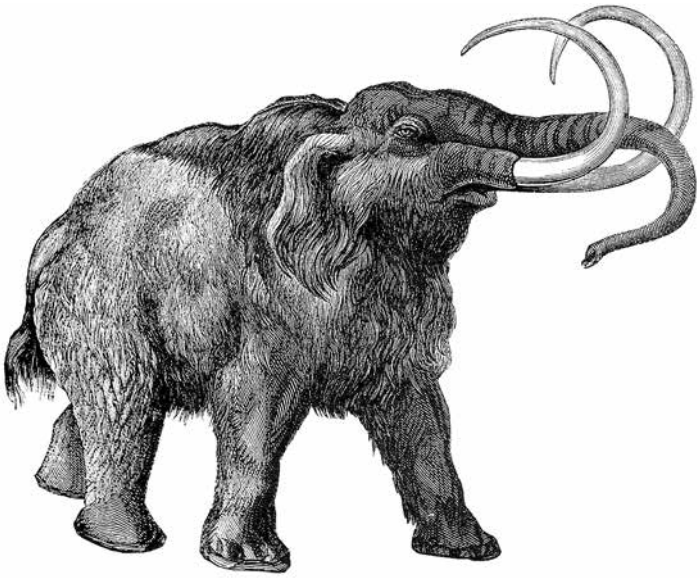
(Total for Question 1 = 15 marks)

2 Mammoths were large animals that existed from 5 million to 4500 years ago, but are now extinct. They shared a common ancestor with modern-day elephants.

The drawing shows a mammoth.



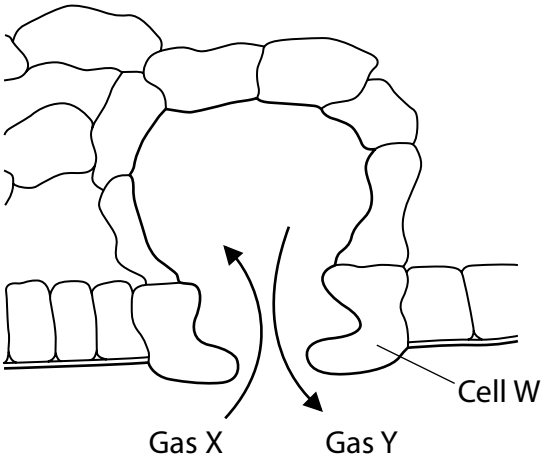
Scientists recently found a thigh bone of a frozen mammoth in Russia.

The bone had been frozen for 40 000 years. The scientists intend to use the bone cells to clone a mammoth.

Describe the method that could be used to clone a mammoth.

(Total for Question 2 = 4 marks)

3 The leaf contains pores called stomata.
The diagram shows a section of a leaf showing a stoma.



(a) The arrows show the diffusion of two different gases on a sunny day.

(i) Which row of the table correctly names gas X and gas Y?

(1)

	Gas in (X)	Gas out (Y)
☒ **A**	oxygen	carbon dioxide
☒ **B**	carbon dioxide	oxygen
☒ **C**	water vapour	carbon dioxide
☒ **D**	oxygen	water vapour

(ii) Which of the following is correct on a sunny day?

(1)

☒ **A** The volume of cell W increases and the stoma opens.

☒ **B** The volume of cell W decreases and the stoma closes.

☒ **C** The volume of cell W increases and the stoma closes.

☒ **D** The volume of cell W decreases and the stoma opens.

(b) Farmers spray chemicals called herbicides on their fields to kill unwanted plants called weeds.

An investigation was carried out into the effects of herbicides on weeds. Weeds were grown in two fields. One field of weeds was sprayed with herbicide and the other with a control solution.

Both sets of weeds were left for one week and the following factors were measured:

- the rate of carbon dioxide absorption by the weeds
- the rate of water loss from the stomata of the weeds
- the dry mass of the weeds.

The table shows the results.

Treatment	Dry mass of weeds / g	CO_2 absorption / µmol per cm^2 per minute	Rate of water loss / mol per m^2 per minute
control solution	33.3	0.97	55.8
herbicide solution	19.5	0.85	15.7

(i) Explain the effect of this herbicide on the growth of the weeds.
Use information from the table to support your answer.

(6)

(ii) Calculate the difference in carbon dioxide absorption between the control and herbicide treatments in one week. Show your working.

(2)

difference in one week = ... μmol per cm^2

(iii) Calculate the percentage decrease in the dry mass of weeds when the herbicide is used.

(2)

percentage decrease = ... %

(c) A student wants to compare the transpiration rate of two weed species.

Describe how the student could measure the rate of water loss in order to make a valid comparison.

(5)

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(Total for Question 3 = 17 marks)

4 (a) The kidney carries out two functions in the human body.

State these functions.

(2)

1 .....

2 .....

(b) The data shows the concentration of substances in different liquids from different locations in the kidney.

Substance	Concentration of each substance / g per 100 cm^3		
	plasma	glomerular filtrate	urine
protein	8.0	0	0
glucose	0.10	0.90	0
urea	0.030	0.030	0.200

(i) Calculate the range of urea concentrations across the three different locations in the kidney.

(1)

range = ...

(ii) Explain the differences in the concentration of protein and glucose. Use information from the table to support your answer.

(4)

(iii) Describe an experiment you could carry out to compare the glucose concentration of samples of plasma and glomerular filtrate.

(4)

(c) The composition of urine changes depending on the conditions within the body.

Explain how the composition of urine changes if a person is in a very warm environment.

(3)

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(Total for Question 4 = 14 marks)

5 The DNA molecule codes for the production of proteins in cells.

(a) Describe the structure of a DNA molecule.

(3)

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(b) (i) DNA is used as a template for protein synthesis.

Which of the following is the correct sequence for this synthesis?

(1)

☒ **A** DNA → transcription → mRNA → translation → amino acid chain

☒ **B** amino acid chain → mRNA → transcription→ DNA → translation

☒ **C** DNA → translation → mRNA → transcription → amino acid chain

☒ **D** mRNA → translation → transcription → amino acid chain → DNA

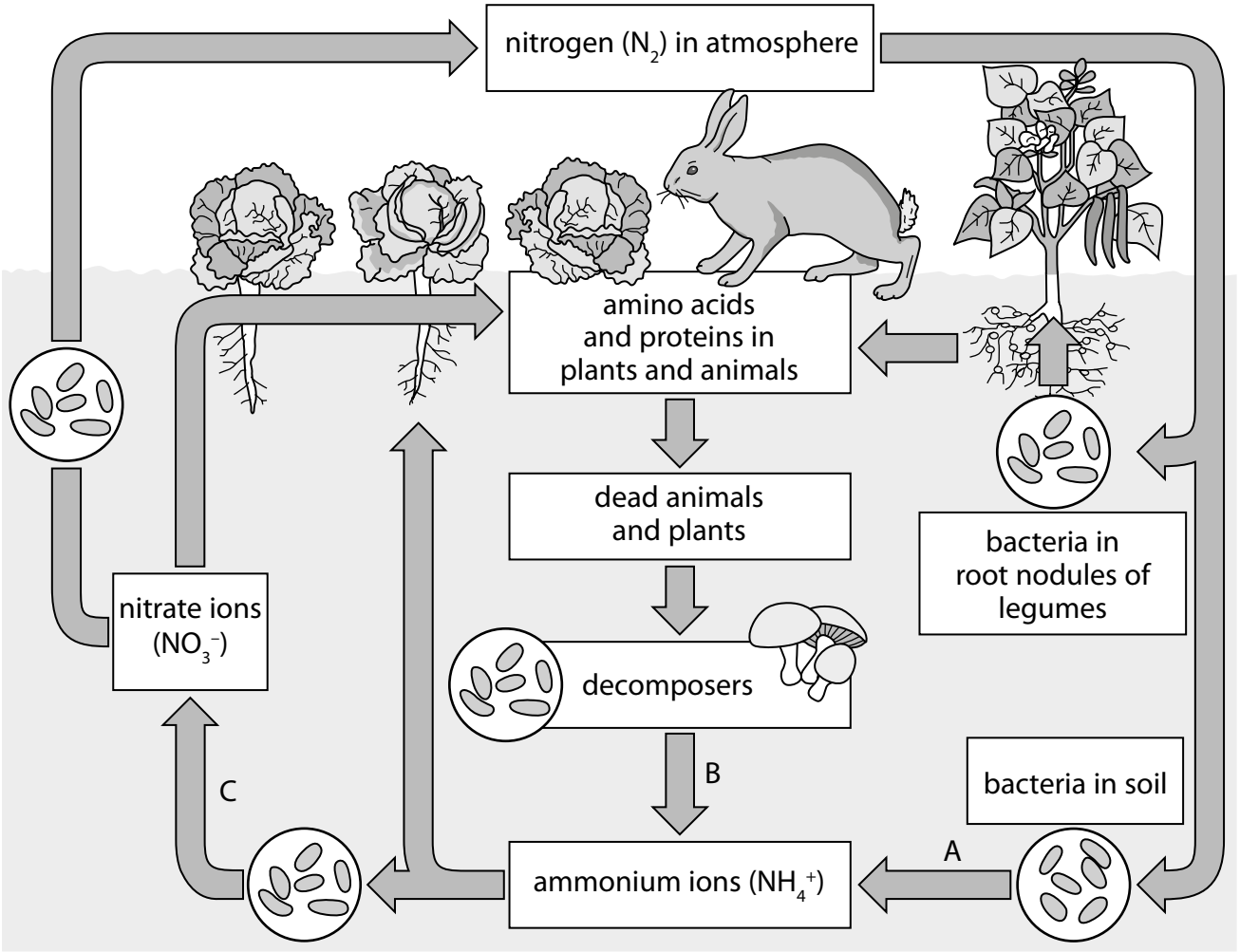
(ii) A codon is made of three bases. There are four different bases.

How many different codons can be produced?

(1)

number of different codons = ...

6 The diagram shows the nitrogen cycle.



(a) Name the processes labelled A, B and C.

(3)

A .....

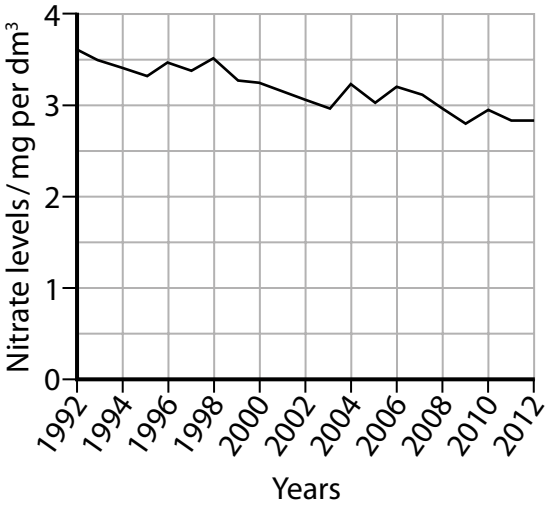
B .....

C .....

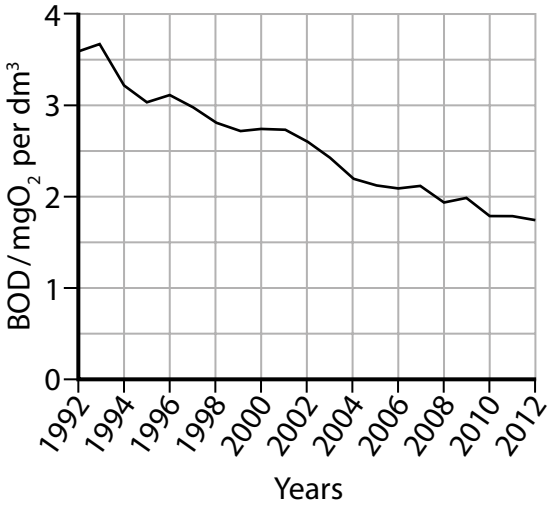
(b) Nitrates are one cause of pollution in rivers.

The graphs show the changes in nitrate levels and the biological oxygen demand (BOD) of the same rivers over a number of years. A high BOD means that there is a large population of microorganisms in a water sample.

Nitrate — River water quality



BOD — River water quality



(i) Describe how the nitrate levels and BOD change over the time period shown.

(2)

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(ii) Explain the relationship between nitrate levels and BOD in these rivers.

(4)

(Total for Question 6 = 9 marks)

TOTAL FOR PAPER = 70 MARKS

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