Candidate surname

Other names

Pearson Edexcel
International GCSE

Centre Number

Candidate Number

Monday 14 January 2019

Afternoon (Time: 1 hour)

Paper Reference **4BI0/2B**

Biology

Unit: 4BI0
Paper: 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*.
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 60.
- 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.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over

Answer ALL questions.

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

West Nile fever spreads

Humans can contract West Nile fever if bitten by a mosquito carrying the West Nile virus. Most infected people show no symptoms of the disease, but some develop fever, headaches and nausea.

5   The higher temperatures, humidity and rainfall associated with climate change have increased the number of outbreaks of West Nile virus infections across the United States. One of the largest surveys of West Nile virus linked climate change between 2001 and 2005 to outbreaks of the disease across 17 states. In the survey, scientists matched West Nile infections to local climate data.

10   The scientists found that higher temperatures had the greatest effect on the transmission of the virus to humans. They predicted that the situation would get worse. In the United States, in 2008, there were 1300 cases showing symptoms. These 1300 cases resulted in 43 deaths.

Higher temperatures enable mosquitoes to reach biting age sooner and also increase the multiplication of the virus within the insects. Therefore, in a warmer

15   climate, not only are there more biting mosquitoes but these mosquitoes carry more copies of West Nile virus, making them more likely to infect humans.

The effects of rainfall on mosquitoes and West Nile virus are more complicated. Although their eggs need standing water to hatch, mosquito populations often recover rapidly after a drought because mosquitoes can re-colonise faster than

20   other insects. The relationship between abiotic (non-living) factors, mosquito populations and West Nile virus is complex.

A new study may help scientists make sense of some of these complex interactions. For example, the study found that a single rainstorm with at least 5 cm of rain increases infection rates while smaller rainstorms do not. Heavy

25   rainfall creates pools of water in which mosquitoes can lay their eggs. This rainfall also increases humidity, which can stimulate mosquitoes to bite.

As well as mosquitoes, certain bird species carry West Nile virus. Droughts can cause birds to migrate to towns, increasing human outbreaks of West Nile virus infection. In some towns there has also been an increase in the number of empty

30   properties with neglected swimming pools. People in these towns face a unique threat from West Nile virus infection.

(a) West Nile fever is caused by a virus.

State three ways that the structure of a virus differs from the structure of a bacterium.

(3)

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2 ....

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3 ....

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(b) Suggest one reason why the scientists predict that the situation will get worse (lines 10 to 11).

(1)

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(c) Calculate the percentage death rate of the people who contracted West Nile fever in 2008 (lines 10 to 12).

(2)

percentage = ... %

(d) Give two abiotic (non-living) factors mentioned in the passage.

(2)

1 ....

2 ....

(e) Explain why migration of birds to towns may increase human outbreaks of West Nile virus infection (lines 27 to 29).

(2)

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(f) Suggest why neglected swimming pools can lead to a unique threat from West Nile virus infection (lines 30 to 31).

(2)

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(g) A vaccine is being developed to protect people from West Nile virus.

Explain how vaccination could protect people from West Nile virus.

(3)

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(Total for Question 1 = 15 marks)

2 The diagram shows a sheep fetus inside the uterus of its mother.
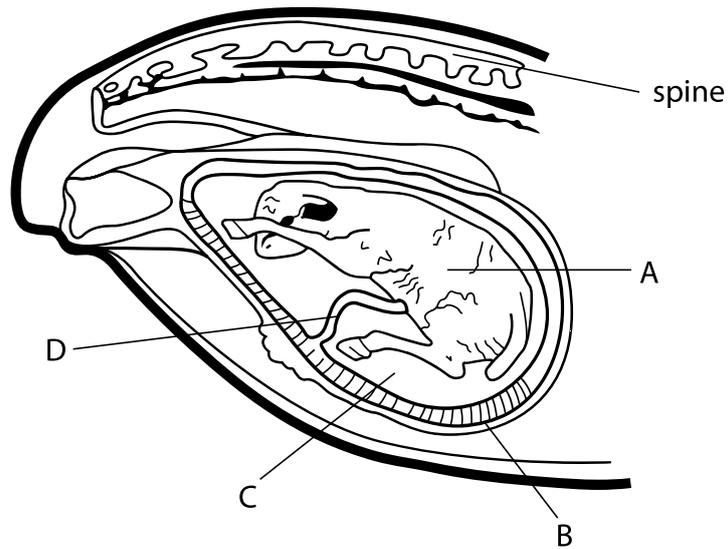
(a) (i) Name the parts labelled A, B, and C.

(3)

A ....

B ....

C ....

(ii) State the role of part D.

(1)

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(b) More blood flows in the uterus of a pregnant sheep than in the uterus of a non-pregnant sheep.

The table shows blood flow per kg of uterus for a pregnant sheep and for a non-pregnant sheep.

Sheep	Blood flow per kg of uterus in cm³ per minute
pregnant	16.6
non-pregnant	2.0

Calculate the difference in volume of blood flow per kg of uterus in one day.

(2)

difference in one day = ... cm³

(c) Explain the advantages of increased blood flow in the uterus of a pregnant sheep.

(4)

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(Total for Question 2 = 10 marks)

3 The diagram shows the nitrogen cycle.

(a) The letters represent processes in the nitrogen cycle.

The table lists some of these processes.

Complete the table by giving a letter to show where each process takes place.

One has been done for you.

(5)

Process	Letter
assimilation	G
decomposition	
denitrification	
excretion	
nitrification	
nitrogen fixation	

(b) The assimilation of nitrates by plants involves active transport.

Describe the process of active transport.

(2)

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(c) Explain why a farmer may need to add fertilisers to the soil.

(5)

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(Total for Question 3 = 12 marks)

4 A student investigates how the time taken to transfer burning food affects the calculation of its energy content.

He uses this apparatus to measure the energy content of popcorn.
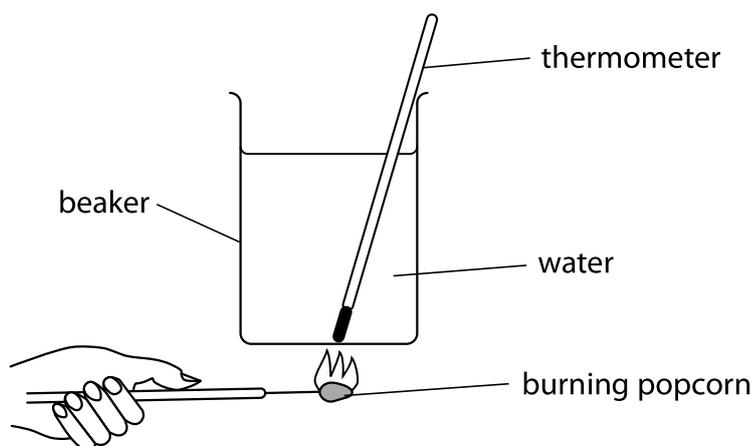
The student ignites the popcorn in a Bunsen burner flame and then transfers the burning popcorn to below the beaker of water.

For two samples, he transfers the burning popcorn quickly.

For another two samples, he transfers the burning popcorn slowly.

The table shows how the time taken to transfer the burning food affects the energy content calculated by the student.

Sample	Energy content in J per g	
	Quick transfer	Slow transfer
1	7255	4000
2	8400	5040

(a) (i) Give the dependent variable in this investigation.
(1)

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(ii) Explain how the student could improve the reliability of his results.
(2)

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(iii) Explain why the time taken to transfer the burning popcorn affects the energy content calculated by the student.

(2)

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(iv) Give two ways that the student could modify the apparatus to improve the accuracy of the energy content calculated.

(2)

1 ....

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2 ....

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(b) The student uses this formula to calculate the energy content of the food in J per g.

$$\text{energy content} = \frac{\text{mass of .... in g} \times \text{............................ rise in } °C \times 4.2}{\text{mass of .... in g}}$$

The formula is incomplete.

Complete the formula by writing a suitable word in each blank space.

(3)

(Total for Question 4 = 10 marks)

5 The photograph shows Snuppy, a cloned dog produced by scientists in South Korea.

(a) Describe the stages in the production of a cloned mammal such as Snuppy.

(4)

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(b) Pet owners can now have their dog cloned using a similar method.

However, if their pet dog has died then the skin cells used to clone the dog have to be removed soon after death.

(i) Suggest why using skin cells from a dead dog may be less successful in cloning than using skin cells from a living dog.

(1)

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(ii) Suggest why a cloned dog might not behave in the same way as the dog that it was cloned from.

(1)

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(Total for Question 5 = 6 marks)

6 Enzymes are molecules that enable chemical reactions to take place in cells.

(a) The table gives some information about different types of enzyme.

Complete the table by giving the missing information.

(4)

Type of enzyme	Example	Site of production	Optimum pH
amylase	salivary amylase		7.0
	pepsin		1.5
lipase	pancreatic lipase	pancreas	

(b) Explain why salivary amylase and pepsin have different optimum pH values.

(3)

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(Total for Question 6 = 7 marks)

TOTAL FOR PAPER = 60 MARKS

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