Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit B3: Using Biology

Higher Tier

Monday 15 June 2015 – Morning
Time: 1 hour

Paper Reference
5BI3H/01

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.*

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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

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

Turn over ▶

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P 4 4 6 7 7 A 0 1 1 6

PEARSON

Answer ALL questions

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 ☒.

Human evolution

1 The diagram shows four Stone Age tools discovered at different archaeological sites in Europe.

			
handaxe	arrow head	cutting stone	hammer stone

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Stone Age tool made most recently is the

(1)

☒ **A** handaxe

☒ **B** arrow head

☒ **C** cutting stone

☒ **D** hammer stone

(ii) Suggest how these tools may have helped early humans to survive.

(2)

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.....

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(b) Mitochondrial DNA can be used as evidence for human evolution.

Explain why mitochondrial DNA is used rather than nuclear DNA.

(2)

(c) Describe how fossil evidence can be used to show that humans have evolved.

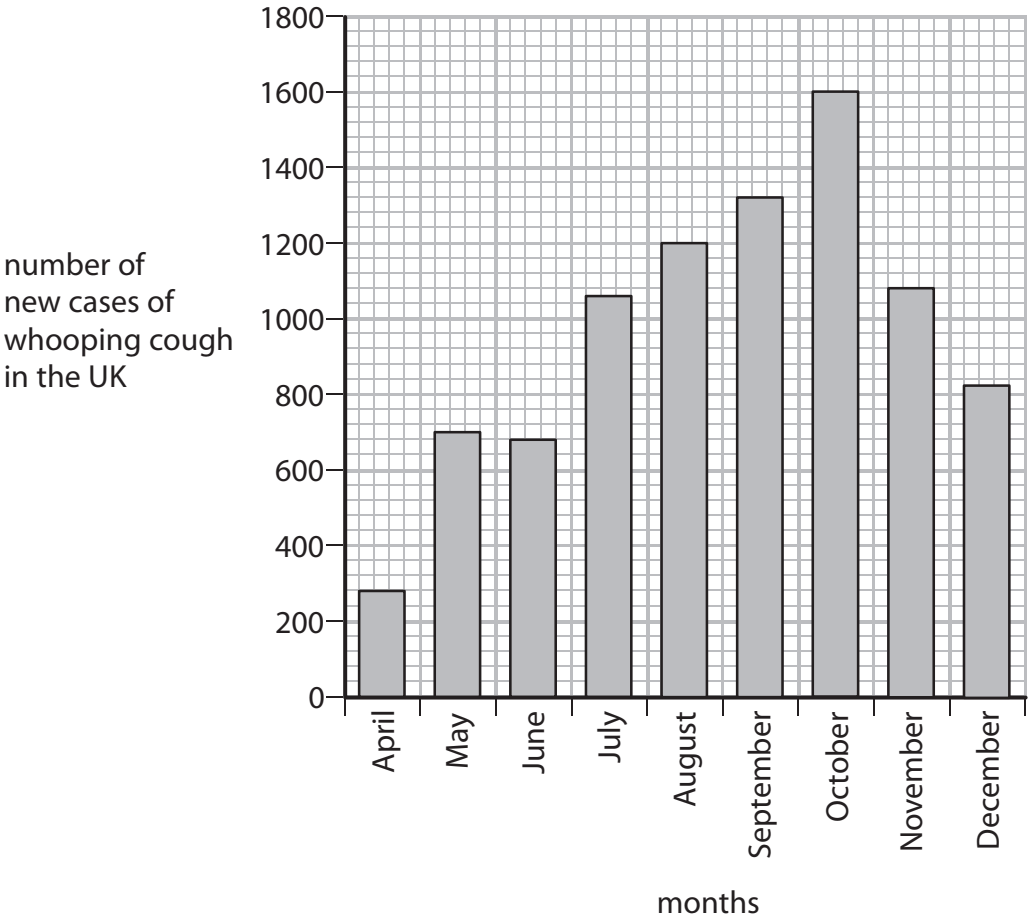
(2)

(Total for Question 1 = 7 marks)

Bacterial infection

2 In 2012 there was an outbreak of whooping cough in the UK.

The graph shows the number of new cases of whooping cough in the UK from April to December 2012.



(a) (i) Describe the trend shown in the graph from April to December.

(1)

.....

.....

(ii) In September 2011 there were 168 cases of whooping cough in the UK.

Calculate the difference in the number of cases of whooping cough in September 2011 and September 2012.

(2)

..... cases

(b) Whooping cough is caused by the bacterium *Bordetella pertussis*, which grows rapidly in the human body.

State the term used to describe the rapid growth of a bacterial population.

(1)

(c) Children in the UK can be immunised against whooping cough.

Suggest why outbreaks of whooping cough still occur in the UK.

(2)

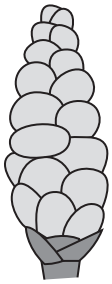
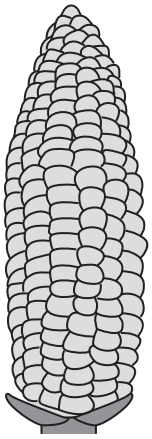
(d) Describe the response of the human body to immunisation.

(3)

(Total for Question 2 = 9 marks)

Food production

3 The diagram shows the development of maize cobs over the last 1000 years of cultivation.

maize cobs				
mean mass of cob /g	15	45	70	90
date	1000 years ago →			Present

(a) Describe how scientists can use plant breeding programmes to produce maize plants with larger cobs.

(3)

(b) There has been an increase in the use of pesticides during the last 1000 years.

Explain how the use of pesticides may benefit maize production.

(2)

(c) Maize plants can be used in the production of biofuel.

Discuss the advantages and disadvantages of the use of biofuel.

(4)

(d) Plants grown for biofuel could be genetically modified.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The microorganism used as a vector to produce transgenic plants is

(1)

☒ **A** *Agrobacterium tumefaciens*

☒ **B** *Bacillus thuringiensis*

☒ **C** *Fusarium venenatum*

☒ **D** *Saccharomyces cerevisiae*

(Total for Question 3 = 10 marks)

Medical technology

4 Infertility can be treated by increasing the chance of ovulation occurring.

Ovulation is controlled by hormones.

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The hormone that stimulates the maturation of follicles in the ovary is

(1)

☒ **A** FSH

☒ **B** LH

☒ **C** oestrogen

☒ **D** progesterone

(ii) Infertility treatments, including the use of hormones, can stimulate ovulation.

Explain **one** disadvantage of treating infertility by using hormones to stimulate ovulation.

(2)

.....

.....

.....

.....

.....

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Ovulation during pregnancy is prevented by high levels of

(1)

☒ **A** FSH

☒ **B** LH

☒ **C** insulin

☒ **D** progesterone

(b) Monoclonal antibody technology is used in pregnancy tests and in the treatment of cancer.

(i) Explain how monoclonal antibodies are used to test for pregnancy.

(3)

(ii) The use of monoclonal antibodies to treat cancer has advantages over the use of traditional chemotherapy and radiotherapy.

Explain the benefits of using monoclonal antibodies to treat cancer.

(2)

(iii) Name the type of cell that produces the monoclonal antibodies used to treat cancer.

(1)

(Total for Question 4 = 10 marks)

5 People with diabetes insipidus are unable to produce enough of the hormone ADH.

In a medical study, the ADH levels in the blood of eight people were measured.

Four of the people, A, B, C and D, do not have diabetes insipidus.

The other four people, E, F, G and H, have diabetes insipidus.

The results are shown in the tables.

people without diabetes insipidus	ADH level in blood / µg per dm^3
A	5.2
B	2.8
C	4.9
D	3.5
Mean ADH level:	

people with diabetes insipidus	ADH level in blood / µg per dm^3
E	0.1
F	0.2
G	0.1
H	0.0
Mean ADH level:	0.1

(a) (i) Calculate the mean ADH level in the people without diabetes insipidus.

(2)

..... µg per dm^3

(ii) Suggest why there is a wide range of ADH levels in the people without diabetes insipidus.

(2)

.....

.....

.....

.....

.....

.....

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

ADH is a hormone released into the blood by the

(1)

- ☒ **A** corpus luteum
- ☒ **B** collecting duct
- ☒ **C** pituitary gland
- ☒ **D** glomerulus

(iv) Suggest a symptom of diabetes insipidus.

(1)

*(b) Explain the role of ADH in regulating the water content of the blood.

(6)

(Total for Question 5 = 12 marks)

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Biotechnology

6 A diet that is high in fat can lead to an increase in the total cholesterol levels in the blood.

The table shows the total cholesterol levels in the blood of a man, over a 10-year period.

time	total cholesterol level in blood / mmol per dm^3
10 years ago	4.8
5 years ago	5.1
present day	6.0

(a) (i) Calculate the percentage increase in total cholesterol level in the blood over this 10-year period.

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** 2.0%
- ☒ **B** 2.5%
- ☒ **C** 20.0%
- ☒ **D** 25.0%

(ii) The government recommends that the total cholesterol level in the blood for adults should be 5 mmol per dm^3.

Explain why this man has been advised to eat mycoprotein rather than meat.

(2)

(b) Describe how mycoprotein is produced.

(3)

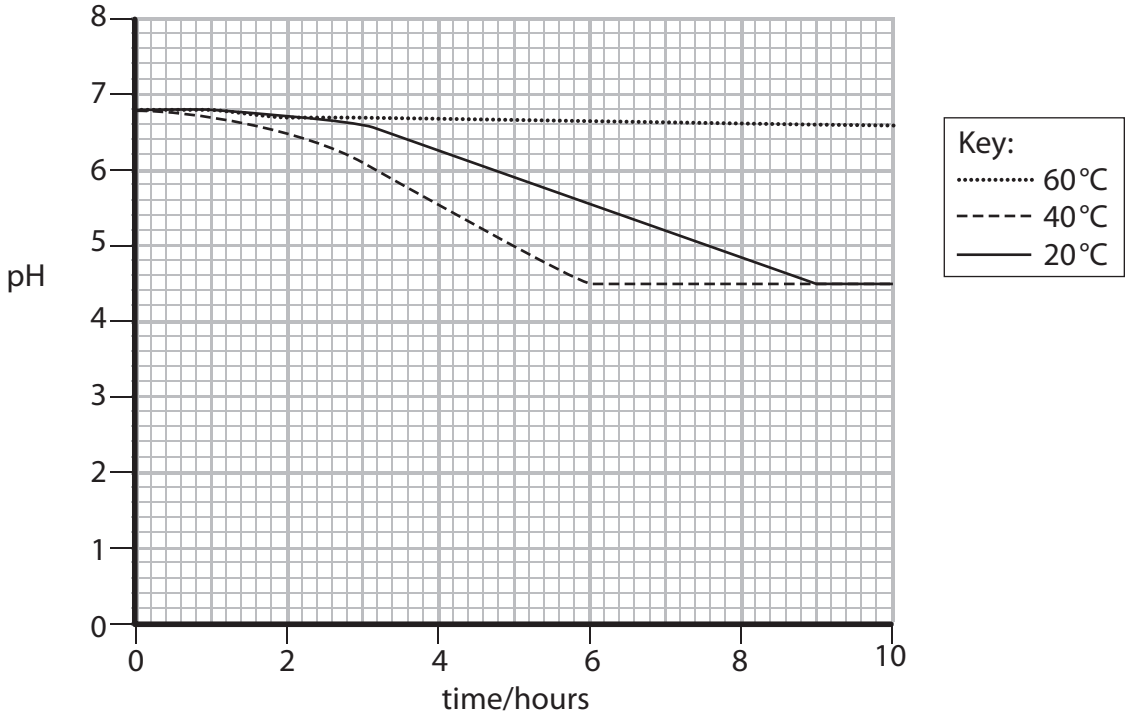
*(c) Yogurt can be produced by adding a starter culture of microorganisms to milk.

The starter culture was added to milk kept at 20 °C.

The pH was recorded over 10 hours.

This was repeated with milk kept at 40 °C and 60 °C.

The graph shows the results.



Using the information in the graph, explain how temperature affects the fermentation process during yogurt production.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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