Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit B3: Using Biology

Foundation Tier

Monday 20 June 2016 – Morning
Time: 1 hour

Paper Reference
5BI3F/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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P46275A

1/1/1/1/1/

P 4 6 2 7 5 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 ☒.

Animal behaviour

1 Chimpanzees can use gestures to communicate with each other.

The picture shows a parent using the sole of its foot to communicate to the baby chimp, 'climb onto my back'.

(a) This gesture helps the chimpanzee to care for its young.

(i) Explain the benefit of parental care.

(2)

.....

.....

.....

.....

.....

(ii) Other than using gestures, suggest one way chimpanzees communicate.

(1)

.....

(iii) Soon after birth, baby chimps recognise and follow their mother.

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

This instinctive behaviour is an example of

(1)

☒ **A** conditioning

☒ **B** courtship

☒ **C** habituation

☒ **D** imprinting

(b) Conditioning can be used to train animals, such as police sniffer dogs.

Complete the sentence using words from the box.

(2)

harmed	operant	survival
punished	classical	rewarded

During training, animals are ..... when they produce the correct response to a specific stimulus, this is known as ..... conditioning.

(c) Explain how habituation is used to train police horses not to respond to loud noises.

(2)

.....

.....

.....

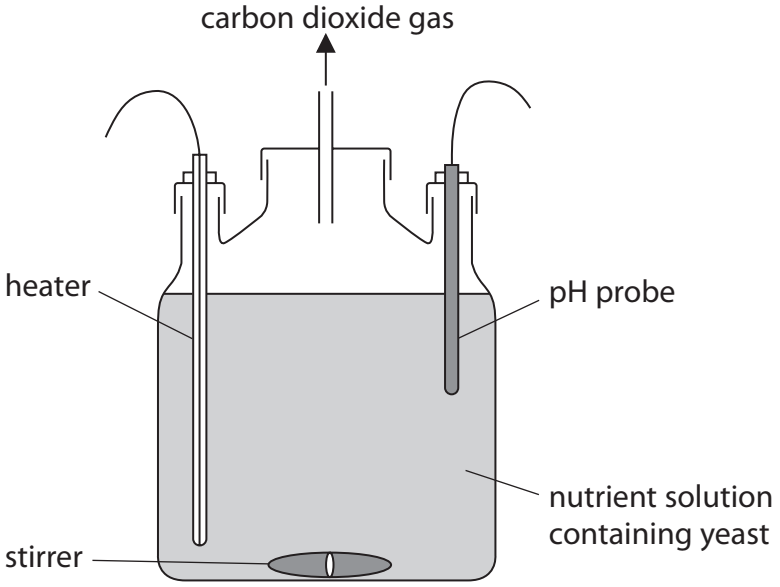
.....

.....

(Total for Question 1 = 8 marks)

Fermentation

2 The diagram shows a laboratory fermenter.



A student used the fermenter to investigate the effect of pH on the growth of yeast cells.

(a) Before being used, the empty fermenter was placed in boiling water for 5 minutes to kill unwanted microorganisms.

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

The killing of unwanted microorganisms is an

(1)

☒ **A** aerobic precaution

☒ **B** agitated precaution

☒ **C** anaerobic precaution

☒ **D** aseptic precaution

(b) (i) State two conditions that should remain constant during the investigation.

(2)

1 .....

.....

2 .....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(ii) Describe how the fermenter could be used to measure the rate of growth of yeast.

(2)

(c) The table shows the results of the investigation.

pH	rate of growth / arbitrary units
5	20
7	45
9	15

(i) Describe the effect of pH on the rate of growth of yeast.

(2)

(ii) Suggest why changing the pH affects the rate of growth of yeast.

(1)

(Total for Question 2 = 8 marks)

Products from milk

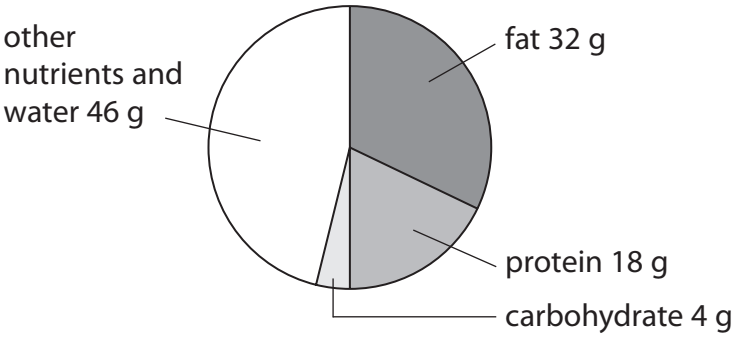
3 Cheese and yogurt are made from milk.

Both foods contain protein, fat and carbohydrate.

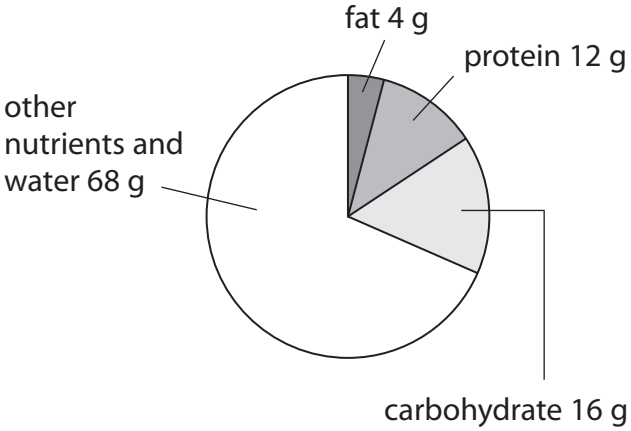
The remaining mass is made up of other nutrients and water.

The pie chart shows the nutritional content of 100 g of cheese and 100 g of yogurt.

Cheese



Yogurt



(a) (i) Compare the nutritional content of cheese with that of yogurt.

(2)

.....

.....

.....

.....

(ii) Calculate the mass of protein in 25 g of cheese.

(2)

..... g

(b) Describe how enzymes are used to produce vegetarian cheese.

(2)

.....

.....

.....

.....

(c) (i) The pH of yogurt changes when bacteria break down lactose.

Name the chemical produced that changes the pH of the yogurt.

(1)

.....

(ii) Which statement describes the changes that occur during the production of yogurt?

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

(1)

☒ **A** The number of bacteria increases and the pH decreases

☒ **B** The number of bacteria increases and the pH increases

☒ **C** The number of bacteria decreases and the pH decreases

☒ **D** The number of bacteria decreases and the pH increases

(d) Proteins are broken down into amino acids.

Describe how excess amino acids are broken down in the body.

(2)

.....

.....

.....

.....

(Total for Question 3 = 10 marks)

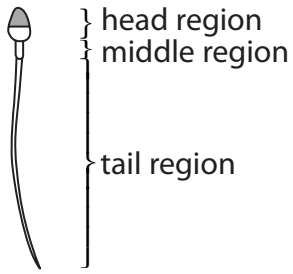
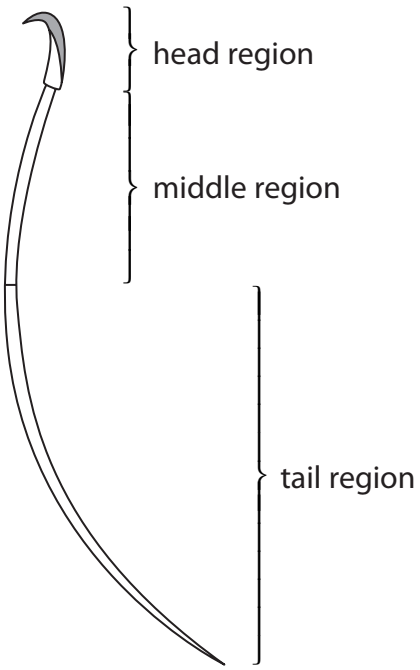
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Sperm cells

4 The diagram shows a sperm cell from a human and a sperm cell from a mouse.

human	mouse
	
Overall length 40 μm	Overall length 100 μm

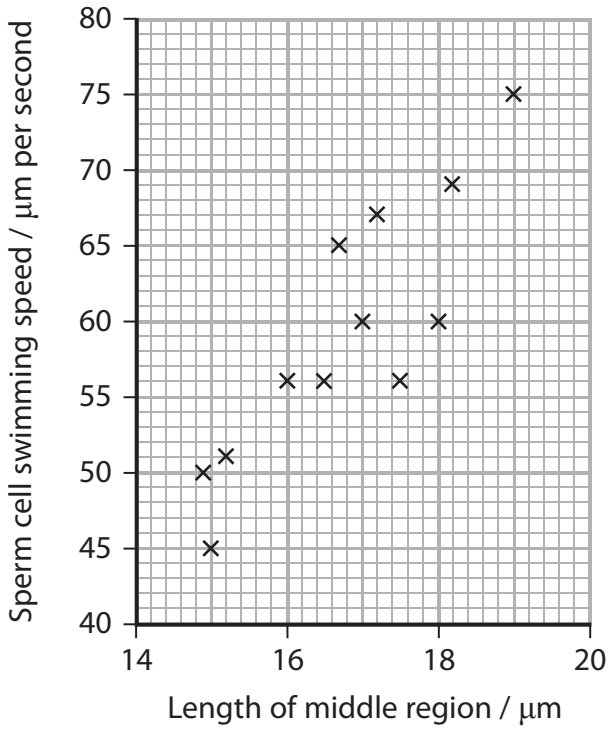
(a) Calculate how many times longer the mouse sperm cell is compared with the human sperm cell.

(2)

.....

(b) In an investigation, the swimming speeds of mouse sperm cells, with middle regions of different lengths, were measured.

The results are shown in the graph.



(i) Using data from the graph, describe the relationship between the sperm cell swimming speed and length of the middle region.

(2)

(ii) Suggest an explanation for the results shown in the graph.

(3)

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

The nucleus in the sperm cell is

(1)

☒ **A** diploid

☒ **B** haploid

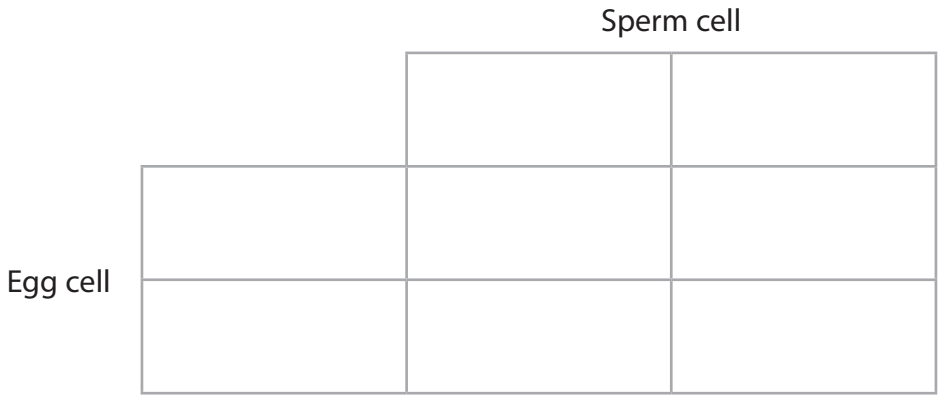
☒ **C** heterozygous

☒ **D** homozygous

(d) Sex determination of mice is the same as humans.

Complete the diagram to show how the sex of a mouse is determined.

(2)



(Total for Question 4 = 10 marks)

Historical scientists

5 Robert Koch (1843–1910) discovered that bacteria cause some diseases.

As part of his work, he isolated bacteria from patients and grew the bacteria in the laboratory.

(a) (i) A nutrient broth contained 200 bacteria.

These bacteria double in number every 20 minutes.

Calculate the number of bacteria in this broth after 1 hour.

(2)

..... bacteria

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

The term that describes the rapid growth of these bacteria is

(1)

☒ **A** antigenic

☒ **B** exponential

☒ **C** immune

☒ **D** circadian

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) Resazurin dye can be used to measure the growth of bacteria.

It changes colour when bacteria grow and oxygen concentration decreases.

Oxygen concentration: High ⟶ Low

Dye colour: Blue ⟶ Pink ⟶ Colourless

Samples of bacteria were added to milk and incubated at different temperatures for 3 hours.

Resazurin dye was then added and the colour of the dye was recorded.

The results are shown in the table.

sample	temperature / °C	colour of resazurin dye
A	5	blue
B	20	pink
C	40	colourless
D	80	

(i) State the colour of the resazurin dye for sample D.

(1)

.....

(ii) Explain why the dye in sample C is colourless.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

*(c) Robert Koch knew about the work of Edward Jenner (1745–1823) and Louis Pasteur (1822–1895).

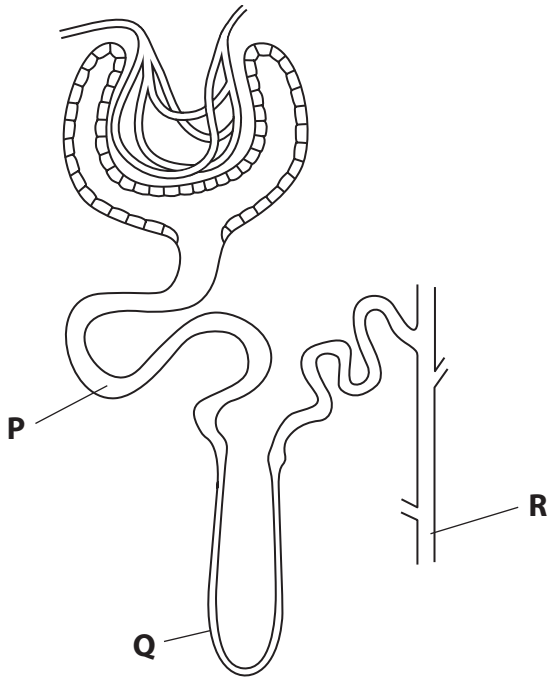
Describe the work of Edward Jenner and Louis Pasteur.

(6)

(Total for Question 5 = 12 marks)

The kidney

6 The diagram shows a nephron from a human kidney.



(a) (i) Name the parts labelled **P**, **Q** and **R**.

(3)

P .....

Q .....

R .....

*(ii) Explain how the structures that make up the nephron are related to its function.

(6)

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

The tube leading from a kidney to the bladder is the

(1)

☒ **A** renal artery

☒ **B** renal vein

☒ **C** ureter

☒ **D** urethra

(c) Describe the possible treatments for kidney failure.

(2)

.....

.....

.....

.....

.....

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA