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Biology
Unit B3: Using Biology

Foundation Tier

Monday 19 June 2017 – 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 ►

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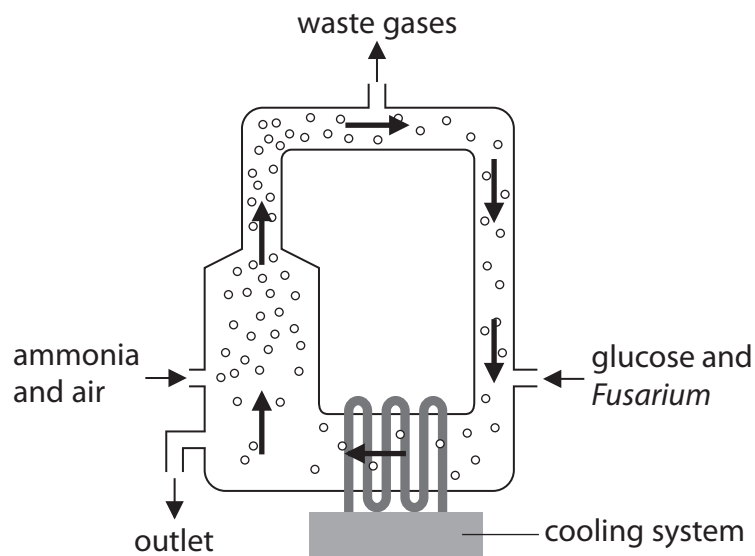
Answer ALL questions

**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 ☒.**

Fermentation

- 1** Microorganisms can be used to produce foods such as mycoprotein and yogurt.
(a) Mycoprotein is produced from the microorganism *Fusarium* which is grown in a fermenter.

The diagram shows a fermenter used to grow *Fusarium*.



- (i) Draw one line from each substance supplied to its correct use in the fermenter. (2)

Substance supplied

air ●

glucose ●

Use in fermenter

● for photosynthesis

● to denature proteins

● to supply oxygen

● to control pH

● as an energy source



(ii) Precautions are taken to ensure that the fermenter is not contaminated with other microorganisms.

State the name of these types of precautions.

(1)

(iii) Explain why the cooling system is needed.

(2)

(iv) What type of microorganism is *Fusarium*?

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

(1)

- A bacterium
- B fungus
- C parasite
- D virus

(b) Yogurt is produced from milk by microorganisms.

During the fermentation process the pH changes.

Suggest how the pH changes during yogurt production.

(2)

(Total for Question 1 = 8 marks)

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Migration

2 Every October in North America, Monarch butterflies migrate south.

This migration is affected by environmental factors and circadian rhythms.

The migration of Monarch butterflies is an example of innate behaviour.

(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer. (1)

A circadian rhythm is a

- A daily cycle
- B weekly cycle
- C monthly cycle
- D yearly cycle

(ii) Describe what is meant by innate behaviour. (1)

(b) The migration route is shown on the map.



Suggest why Monarch butterflies migrate south in October. (2)



- (c) Scientists monitored the population of Monarch butterflies at location X on the map. The number of Monarch butterflies was counted in December every four years. The table shows the size of the Monarch butterfly population from 1992 to 2012.

| year | population / million |
|------|----------------------|
| 1992 | 10 |
| 1996 | 15 |
| 2000 | 20 |
| 2004 | 10 |
| 2008 | 9 |
| 2012 | 2 |

- (i) The mean population of Monarch butterflies between 1992 and 2000 is 15 million. Calculate the mean population of Monarch butterflies between 2004 and 2012.

(2)

..... million

- (ii) State a conclusion that can be made from these two means.

(1)

(Total for Question 2 = 7 marks)



Immunisation and infection

3 Animals and plants defend themselves against infection.

(a) Malaria is an infection caused by a parasite.

In 2013, there were approximately 198 million cases of malaria worldwide resulting in an estimated 584 000 deaths.

90% of these deaths from malaria were in Africa.

(i) Calculate the number of deaths from malaria in Africa in 2013.

(2)

number of deaths =

(ii) Suggest why the number of deaths from malaria is only an estimate.

(1)

(b) Immunisation could help in the prevention of malaria.

The table shows some data from an immunisation trial.

| | children not immunised | children immunised |
|---------------------------------------|------------------------|--------------------|
| number of children in trial | 400 | 400 |
| number of children developing malaria | 64 | 32 |

(i) Describe the effectiveness of the immunisation.

(2)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer. (1)

The part of an immunisation that stimulates the production of antibodies is

- A a lymphocyte
- B an antigen
- C an injection
- D an inoculation

(c) State **two** reasons why some people might choose not to be immunised. (2)

1

2

(d) Plants are sometimes damaged as a result of infection.

Explain how plants defend themselves against infection. (2)

(Total for Question 3 = 10 marks)

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Genetic modification

4 The organism *Agrobacterium tumefaciens* can be used to genetically modify tomato plants.

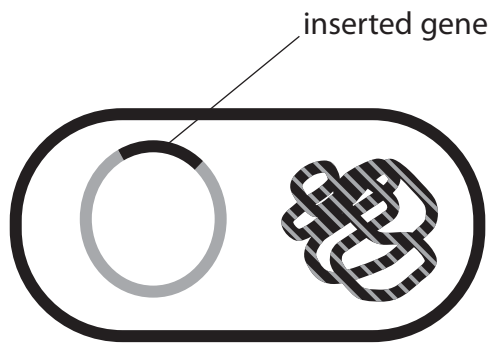
(a) Complete the sentence by putting a cross (☒) in the box next to your answer. (1)

Agrobacterium tumefaciens is a

- A bacterium
- B fungus
- C plant
- D virus

(b) 'Purple tomato' plants contain high levels of flavonoids, usually found in blackberries.

The diagram shows an *Agrobacterium tumefaciens* with the gene to produce flavonoids inserted into a plasmid.



(i) Describe how this *Agrobacterium tumefaciens* could be used to produce a 'purple tomato' plant. (3)

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(ii) Explain **one** advantage of the genetic modification of the 'purple tomato' plant.

(2)

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(c) Corn is a food source.

Corn can be genetically modified to be resistant to herbicides.

Explain how growing herbicide-resistant corn can increase the food supply.

(2)

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(d) The European corn borer is an insect pest that feeds on corn.

The ladybird is a predator of the European corn borer.

Describe how the ladybird could be used to increase crop yield.

(3)

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(Total for Question 4 = 11 marks)

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Behaviour in animals

- 5 The picture shows two goslings and a mother goose shortly after the goslings have hatched.



© Shutterstock

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

(1)

The behaviour shown by the goslings is

- A conditioning
- B habituation
- C imprinting
- D training

- (b) Explain the benefits of the behaviour shown by the goslings.

(3)

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- (c) Explain how parental care may involve risks to the parent.

(2)

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*(d) Conditioning can be used to train dogs to perform specific tasks.

Some dogs naturally chase sheep.

Explain how the **two** types of conditioning can be used to train dogs to control sheep. (6)

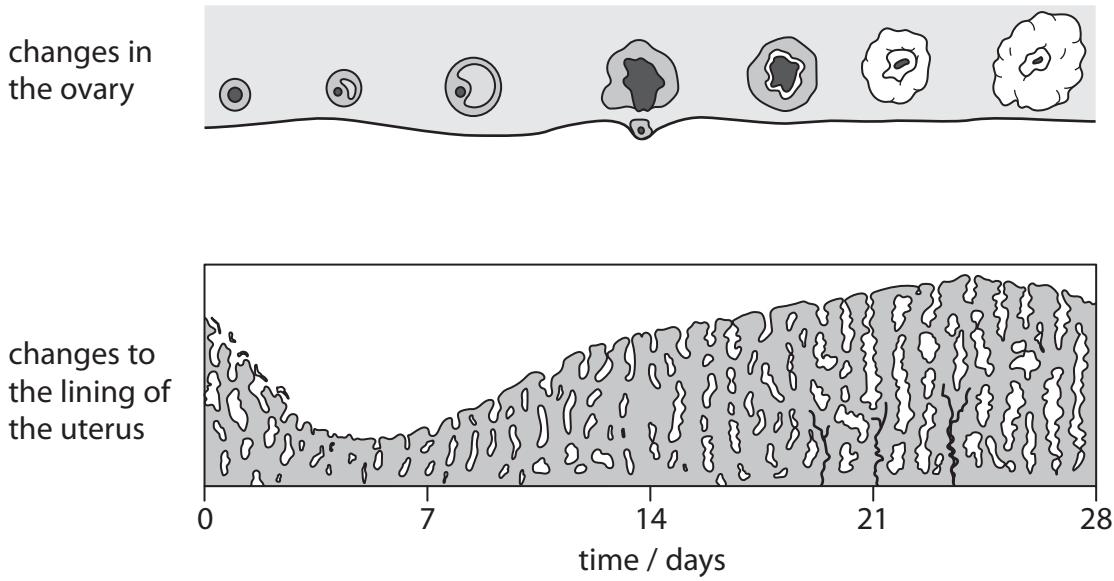
Area with horizontal dotted lines for writing.

(Total for Question 5 = 12 marks)



Human reproduction

6 The diagram shows the changes in the ovary and to the lining of the uterus during 28 days.



(a) Name the event that takes place

(i) between days 0 – 5

(1)

(ii) at day 14

(1)

(iii) Name the **two** hormones responsible for the changes to the lining of the uterus.

(2)

1

2

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

(1)

The uterus lining is maintained after

- A fertilisation
- B germination
- C immunisation
- D sterilisation

(v) State why the uterus lining is maintained.

(1)

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* (b) Explain how the structures of a human egg cell and a sperm cell are adapted to their function.

(6)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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