EDEXCEL GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT B3 FOUNDATION TIER 5BI3F PAPERS

STEMUP

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Centre Number | | | | | |

Candidate Number | | | | |

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

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- Check your answers if you have time at the end.

Turn over ▶

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Answer ALL questions

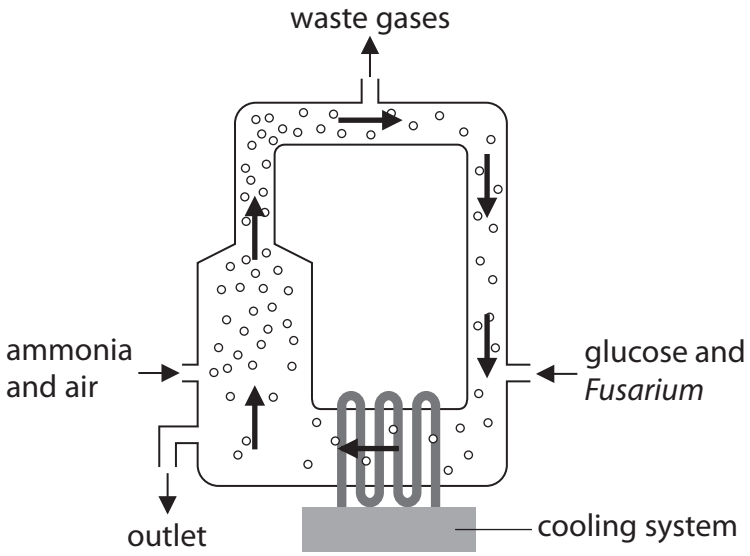
Some questions must be answered with a cross in a box ☒.
If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

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	Use in fermenter
	for photosynthesis
air	to denature proteins
	to supply oxygen
glucose	to control pH
	as an energy source

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(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)

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(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)

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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)

.....

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.....

(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

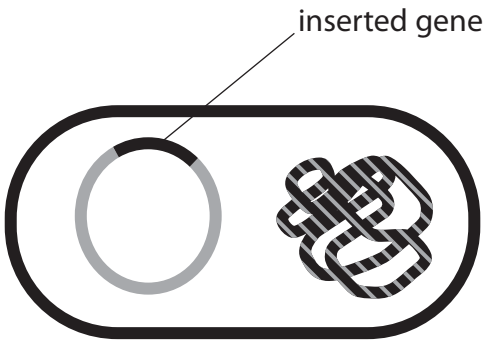
☒ **B** fungus

☒ **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)

(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)

(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)

(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)

(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.

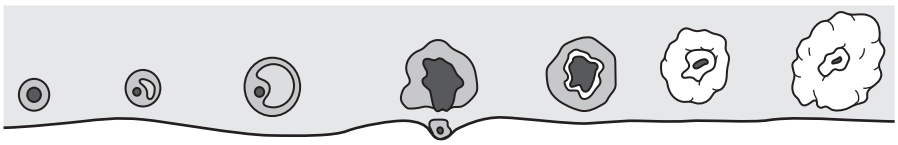
(6)

(Total for Question 5 = 12 marks)

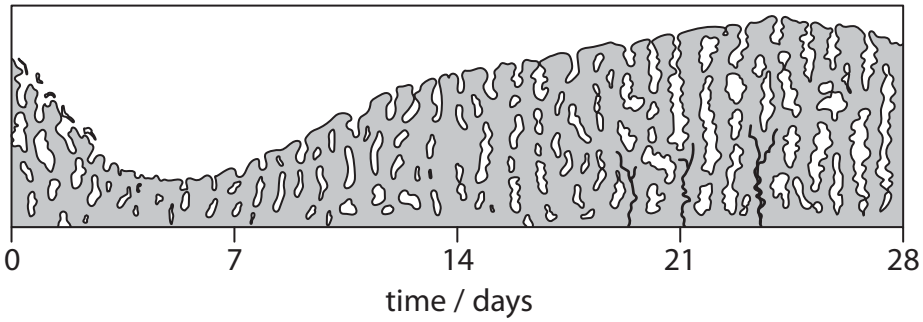
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6 The diagram shows the changes in the ovary and to the lining of the uterus during 28 days.

changes in the ovary



changes to the lining of the uterus



(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)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Biology (5BI3F) Paper 01

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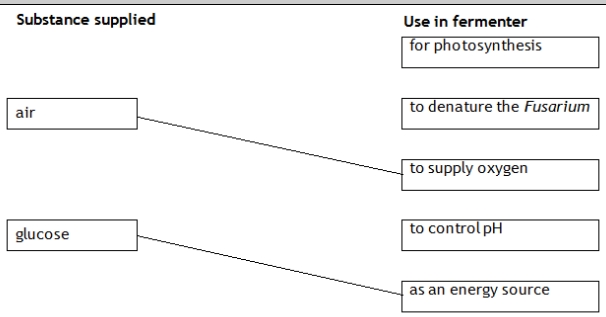
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Summer 2017
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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Acceptable answers	Marks
1 (a) (i)		Reject if two lines from same box	(2)

Question number	Answer	Marks
1 (a) (ii)	Aseptic (techniques)	(1)

Question number	Answer	Acceptable answers	Marks
1 (a) (iii)	An explanation linking to control the temperature/provide optimum conditions (1) for maximum growth of *Fusarium* / to prevent microorganisms being killed/prevent enzymes denaturing (1)	Keep constant, not too hot, doesn't overheat	(2)

Question number	Answer	Marks
1 (a) (iv)	**B** Fungus **The only correct answer is B** ***A** is not correct because Fusarium is a eukaryote and not prokaryotic* ***C** is not correct because Fusarium is saprophytic* ***D** is not correct because Fusarium is a eukaryote and not a virus*	(1)

Question number	Answer	Marks
1 (b)	A suggestion including the following: • pH decreases / becomes more acidic (1) • lactic acid (is produced) (1)	(2)

Total for question 1 = 8 marks

Question number	Answer	Marks
2 (a) (i)	**A** daily cycle **The only correct answer is A** ***B*** *is not correct because a week is 7 days* ***C*** *is not correct because a month is longer than a day* ***D*** *is not correct because a year is not 24 hours long*	(1)

Question number	Answer	Acceptable answers	Marks
2 (a) (ii)	instinctive(1)	inherited, does not need to be learned	(1)

Question number	Answer	Acceptable answers	Marks
2 (b)	A suggestion to include the following: warmer in south (1) killed by cold (1)	 colder in north to breed/feed	(2)

Question number	Answer	Acceptable answers	Marks
2 (c) (i)	(10+9+2) ÷ 3 7	 two marks for correct answer	(2)

Question number	Answer	Acceptable answers	Marks
2 (c) (ii)	population is decreasing (1)	Ignore restating the data do not accept fluctuation of data / calculation of data without clarification	(1)

Total for question 2 = 7 marks

Question number	Answer	Acceptable answers	Marks
3 (a) (i)	584 000 * 0.9 (1) 525 600	Two marks for correct answer Accept other valid methods	(2)

Question number	Answer	Marks
3 (a) (ii)	cases not reported/causes of death unknown / named example	(1)

Question number	Answer	Acceptable answers	Marks
3 (b) (i)	A description including the following less children who are given immunisation get malaria (1) use of manipulated data (1)	 half as many develop malaria / 16% vs 8%	(2)

Question number	Answer	Marks
3 (b) (ii)	**B** antigen **The only correct answer is B** ***A** is not correct because a lymphocytes do not form part of the immunisation* ***C** is not correct because the injection is an action and cannot stimulate antibody production* ***D** is not correct because inoculation is the act of immunizing and does not in itself lead to antibody production*	(1)

Question number	Answer	Acceptable answers	Marks
3 (c)	Any two from Concerns over side effects / allergic reactions (1) Afraid of needles (1) Against religious beliefs (1) Unable to afford it (1)	 Concerns it causes illness ethics	(2)

Question number	Answer	Acceptable answers	Marks
3 (d)	An explanation including the following; produce chemicals (1) to kill/deter pathogen (1)	 named chemical resist pathogen accept named pathogen / predator/ herbivore	(2)

Total for question 3 = 10 marks

Question number	Answer	Marks
4 (a)	**A** bacterium **The only correct answer is A** ***B*** *is not correct because Agrobacterium tumefaciens is a prokaryote* ***C*** *is not correct because Agrobacterium tumefaciens does not show any of the characteristics of a plant* ***D*** *is not correct because Agrobacterium tumefaciens is a prokaryote and is not a virus*	(1)

Question number	Answer	Acceptable answers	Marks
4 (b) (i)	A description to include three of following; bacteria multiply (1) used to infect the (tomato) plant / as a vector (1) transfer the gene to the tomato plant DNA (1) produces a callus /tumour (1) culturing of transgenic/purple tomato plantlets (1)	Accept crown gall	(3)

Question number	Answer	Acceptable answers	Marks
4 (b) (ii)	An explanation to include two of the following; EITHER flavonoids are antioxidants /good for health (1) example of health benefit (reduce cancer risk)(1) OR improve appearance (1) (so) more people buy them/ more profit	 Accept 'look different/unusual' Accept 'so children will eat them'	(2)

Question number	Answer	Marks
4 (c)	Explanation linking: (herbicides) do not affect/kill corn (1) kills weeds (1) less competition for space / mineral ions / light /water (1)	(2)

Question number	Answer	Marks
4 (d)	A description to include; biological controls (1) release (large numbers of) ladybirds into crop (1) ladybirds eat corn borers so (1) less corn eaten less damage to crop (by corn borer) (1)	(3)

Total for question 4 = 11 marks

Question number	Answer	Marks
5 (a)	**C** imprinting **The only correct answer is C** ***A** is not correct because conditioning responses are learnt over time* ***B** is not correct because habituation results in suppression of an action* ***D** is not correct because training involves repeated stimuli*	(1)

Question number	Answer	Marks
5 (b)	An explanation linking: goslings follow their mother (1) with two of the following: don't get lost (1) goslings learn skills needed to survive (1) (mother provides) protection (1) (mother takes them) to food (1)	(3)

Question number	Answer	Marks
5 (c)	An explanation linking: preventing predators attacking offspring (1) put their own life at risk (1)	(2)

Question Number		Indicative Content	Mark
QWC	***5d**	A explanation to include some of the following points classical conditioning • linking a neutral stimulus (e.g. whistling) with innate behaviour (e.g. chasing sheep) • repetition • conditioned reflex • results in learning e.g. dogs herding sheep in response to whistle operant conditioning • accidental event e.g. dog scares the sheep to move • positive reinforcement as reward • negative reinforcement as punishment • repetition • results in learning e.g. dogs herding sheep	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited explanation of either classical conditioning or operant conditioning • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple explanation of both classical conditioning and operant conditioning or a detailed description of one • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed explanation of both classical conditioning and operant conditioning • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for question 5 = 12 marks

Question number	Answer	Acceptable answers	Marks
6 (a) (i) (ii)	menstruation (1) ovulation (1)	period egg release	(2)

Question number	Answer	Acceptable answers	Marks
6 (a) (iii)	oestrogen (1) progesterone (1)	accept answers in any order FSH / follicle stimulating hormone (1) LH / luteinising hormone (1)	(2)

Question number	Answer	Marks
6 (a) (iv)	**A** fertilization **The only correct answer is A** ***B*** *is not correct because germination occurs in plants* ***C*** *is not correct because immunization involves a response of the immune system* ***D*** *is not correct because sterilization is part of aseptic technique in the removal of microorganisms*	(1)

Question number	Answer	Acceptable answers	Marks
6 (a) (v)	allow implantation (of embryo)	maintains pregnancy	(1)

<table>
<tr><th colspan="2">Question Number</th><th>Indicative Content</th><th>Mark</th></tr>
<tr><td>QWC</td><td>*6b</td><td>A explanation to include some of the following points

Sperm:<table><tr><th>structure</th><th>function</th></tr><tr><td>tail</td><td>mobility</td></tr><tr><td>acrosome</td><td>enzymes/entry to egg</td></tr><tr><td>mitochondria</td><td>Energy (to move)</td></tr><tr><td>haploid nucleus</td><td>For fertilisation/ to produce diploid zygote</td></tr></table>
Egg<table><tr><th>structure</th><th>function</th></tr><tr><td>Cell membrane</td><td>Changes after entry of sperm</td></tr><tr><td>Round shape</td><td>Allows easy movement</td></tr><tr><td>Haploid nucleus</td><td>For fertilisation/ to produce diploid zygote</td></tr><tr><td>cytoplasm</td><td>Store of nutrients</td></tr><tr><td>Zone/wall around egg</td><td>Protection of egg</td></tr></table></td><td>(6)</td></tr>
<tr><td>Level</td><td>0</td><td colspan="2">No rewardable content</td></tr>
<tr><td>1</td><td>1 - 2</td><td colspan="2">• A simple explanation of a structure and a function of either egg or sperm
• the answer communicates ideas using simple language and uses limited scientific terminology
• spelling, punctuation and grammar are used with limited accuracy</td></tr>
<tr><td>2</td><td>3 - 4</td><td colspan="2">• A limited explanation of a structure and a function of egg or sperm AND a limited explanation of a structure or function of the other
• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately
• spelling, punctuation and grammar are used with some accuracy</td></tr>
<tr><td>3</td><td>5 - 6</td><td colspan="2">• A detailed explanation of the structures and function of egg and sperm
• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately
• spelling, punctuation and grammar are used with few errors</td></tr>
</table>

Total for question 6 = 12 marks

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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.
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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 ☒.

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)

.....

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(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)

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(Total for Question 1 = 8 marks)

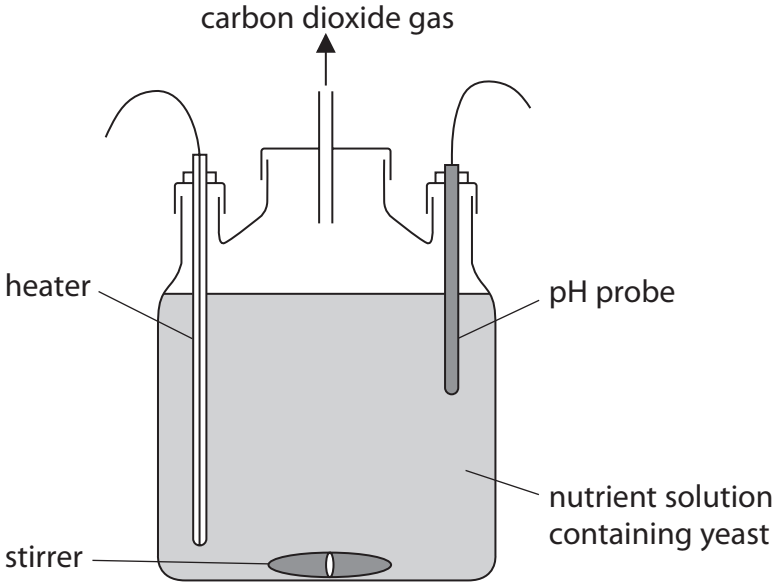
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Fermentation

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 .....

.....

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(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)

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Products from milk

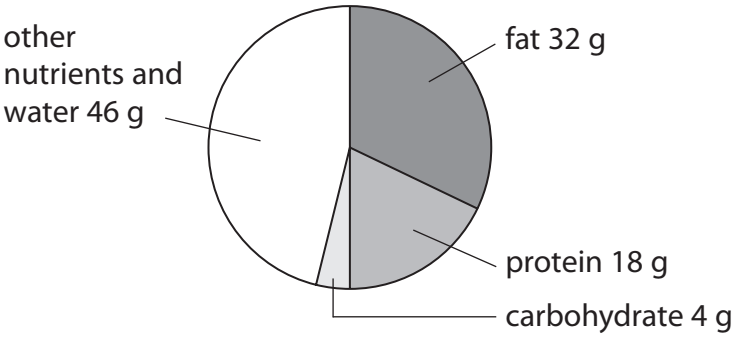
3 Cheese and yogurt are made from milk.

Both foods contain protein, fat and carbohydrate.

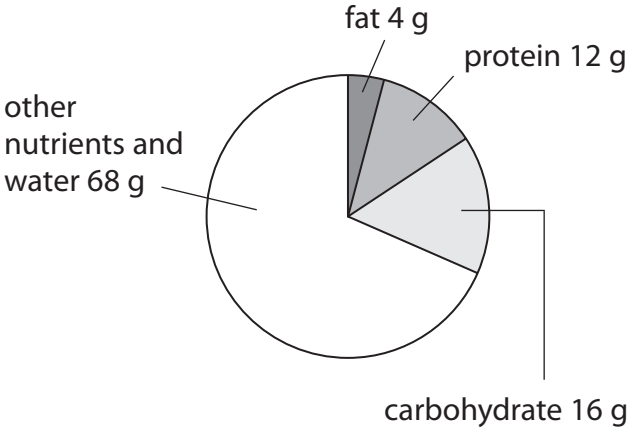
The remaining mass is made up of other nutrients and water.

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)

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.....

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

(2)

..... g

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(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.

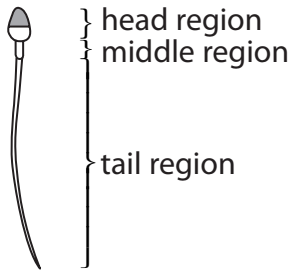
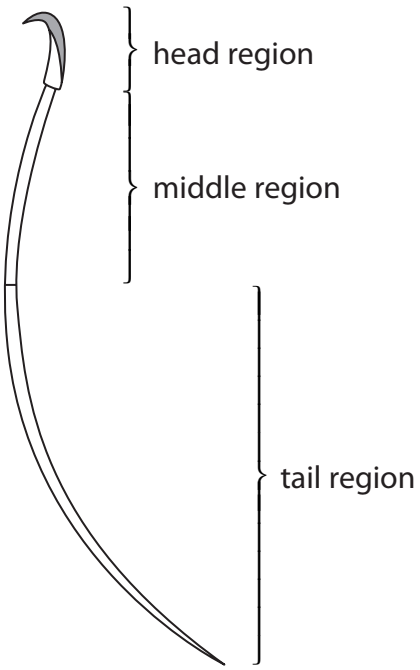
(2)

(Total for Question 3 = 10 marks)

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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.

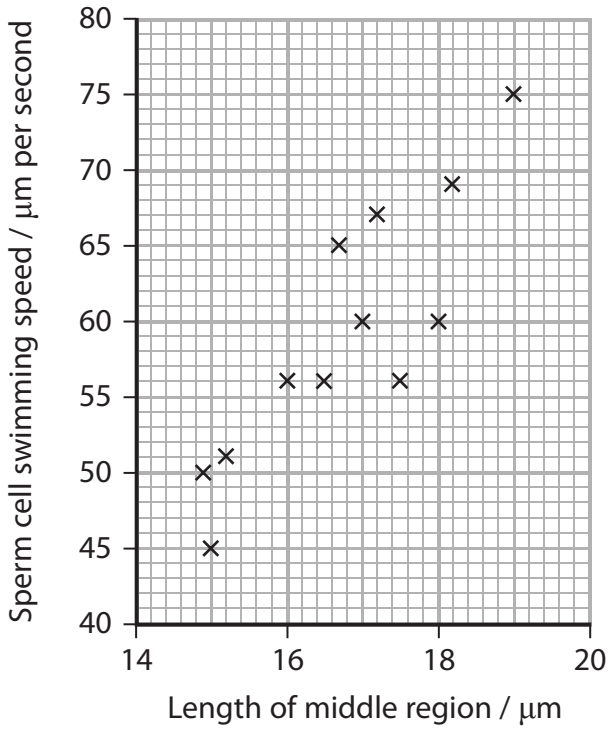
(2)

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(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)

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(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

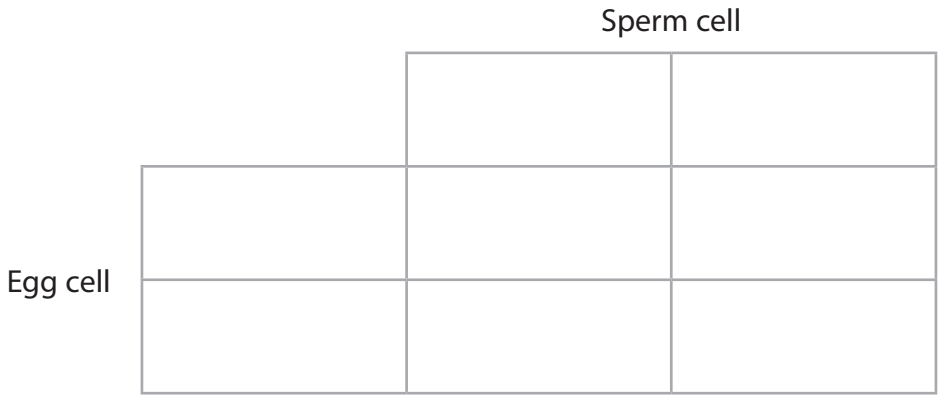
☒ **C** heterozygous

☒ **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)

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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

(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)

.....

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*(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.

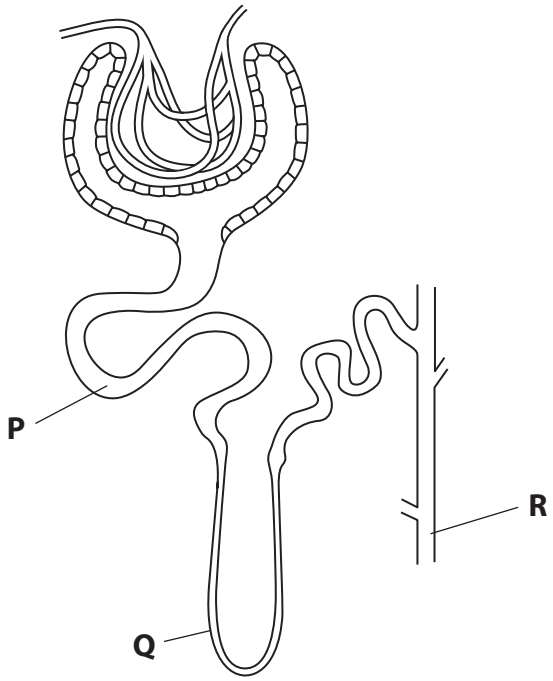
(6)

(Total for Question 5 = 12 marks)

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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 .....

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

(6)

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(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)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Biology (5BI3F) Paper 01 Unit 3: Using Biology

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question number	Answer	Notes	Marks
1 (a) (i)	An explanation linking two of the following: increased chance of young surviving (1) passing on parental genes (1) example of parental care (1)	Accept: protection (from predators) / leaning life skills / parent feeds the young.	(2)

Question number	Answer	Notes	Marks
1 (a) (ii)	sound/facial expression /pheromone/chemical signal (1)		(1)

Question number	Answer	Notes	Marks
1 (a) (iii)	**D** imprinting (1)		(1)

Question number	Answer	Notes	Marks
1 (b)	rewarded (1) operant (1)		(2)

Question number	Answer	Notes	Marks
1 (c)	An explanation linking two of the following: exposed to loud noises (1) repeated exposure (1) ignores harmless stimulus (1)		(2)

Total for question 1 = 8 marks

Question number	Answer	Notes	Marks
2 (a)	**D** aseptic precaution (1)		(1)

Question number	Answer	Notes	Marks
2 (b) (i)	temperature (1) (rate of) stirring (1)	**Accept** mixing Accept pressure (1) nutrient concentration (1) yeast concentration (1) oxygen (1) volume of solution (1)	(2)

Question number	Answer	Notes	Marks
2 (b) (ii)	**A description including two of the following:** (collection of) carbon dioxide gas (1) (over a) unit of time (1) repeat (1)	Accept other method of measuring growth	(2)

Question number	Answer	Notes	Marks
2 (c) (i)	A description including the following rate of growth is highest/optimum at pH7 (1) correct manipulation of data (1)	**ORA**	(2)

Question number	Answer	Notes	Marks
2 (c) (ii)	(pH) affects enzymes (1)	Accept kills yeast	(1)

Total for question 2 = 8 marks

Question number	Answer	Notes	Marks
3 (a) (i)	Any two from the following: cheese has more fat (1) cheese has more protein (1) cheese has less carbohydrate (1) cheese has less other nutrients and water (1)	ORA for yogurt	(2)

Question number	Answer	Notes	Marks
3 (a) (ii)	(100/25) ÷4 (1) 4.5 (g)	two marks for correct answer	(2)

Question number	Answer	Notes	Marks
3 (b)	A description including two of the following chymosin (1) coagulates milk protein/clots milk/forms curds (1) compressed to form cheese (1)		(2)

Question number	Answer	Notes	Marks
3 (c) (i)	lactic acid (1)	Accept lactate	(1)

Question number	Answer	Notes	Marks
3 (c) (ii)	**A** The number of bacteria increases and the pH decreases (1)		(1)

Question number	Answer	Notes	Marks
3 (d)	A description including the following urea (1) formed in the liver (1)		(2)

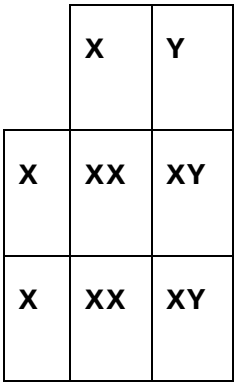
Total for question 3 = 10 marks

Question number	Answer	Notes	Marks
4 (a)	100 ÷ 40 (1) 2.5 (times)	**Two marks for correct answer**	(2)

Question number	Answer	Notes	Marks
4 (b) (i)	A description including the following as length increases the swimming speed increases (1) reference to correct readings from the graph (1)	ORA	(2)

Question number	Answer	Notes	Marks
4 (b) (ii)	**An explanation linking three of the following:** longer middle region (1) more mitochondria (1) more (aerobic) respiration (1) more energy (released/available) (1)		(3)

Question number	Answer	Notes	Marks
4 (c)	**B** haploid (1)		(1)

Question number	Answer	Notes	Marks
4 (d)	correct parents gametes (1) correct offspring genotypes shown (1) 		(2)

Total for question 4 = 10 marks

Question number	Answer	Notes	Marks
5 (a) (i)	200 x 2 x 2 x 2 / (20 min) x3 (= 1 hour) (1) = 1600	2 marks for correct answer	(2)

Question number	Answer	Notes	Marks
5 (a) (ii)	**B** exponential (1)		(1)

Question number	Answer	Notes	Marks
5 (b) (i)	blue		(1)

Question number	Answer	Notes	Marks
5 (b) (ii)	An explanation linking two of the following: more bacteria/faster growing bacteria (1) more respiration (1) low oxygen levels in the milk (1)		(2)

Question Number		Indicative Content	Mark
QWC	***5c**	A description to include some of the following points Edward Jenner • developed vaccinations • noticed milkmaids did not develop smallpox • inoculated small boy with cowpox • tried to infect the boy with smallpox • the boy was immune to smallpox • led to the eradication of smallpox Louis Pasteur • germ theory • developed pasteurisation • credited with development of aseptic techniques • pasteurisation extends the shelf life of food products • milk heated to 72˚C for 15 seconds • kills bacteria • found that micro-organisms caused food and drinks to spoil • also worked on development of immunisations to other diseases • reference to Pasteur's work on rabies	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description linking at least one scientist with their major development • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description linking both scientists with their major development OR a detailed description of the development of one scientist • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of the major developments of both scientists • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for question 5 = 12 marks

Question number	Answer	Notes	Marks
6 (a) (i)	P (proximal/first) convoluted tubule Q loop of Henle R collecting duct		(3)

Question Number		Indicative Content	Mark
QWC	***6a(ii)**	Explanation to include some of the following points Glomerulus/Bowman's capsule • filtration • due to pressure changes • eg glucose / urea Convoluted tubules • re-absorption of glucose/amino acids • selective Loop of Henle • re-absorption of water • osmosis / osmoregulation Collecting duct • re-absorption of water • urine formation	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• A limited explanation which includes at least one named structure OR one function • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• A simple explanation of at least two functions OR a detailed explanation of one structure with its function • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed explanation of two structures with their functions • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question number	Answer	Notes	Marks
6 (b)	**C** ureter (1)		(1)

Question number	Answer	Notes	Marks
6 (c)	A description including the following organ donation (to replace diseased kidney) (1) dialysis (1)		(2)

Total for question 6 = 12 marks

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Surname	Other names

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Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit B3: Using Biology

Foundation Tier

Monday 15 June 2015 – 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.
- 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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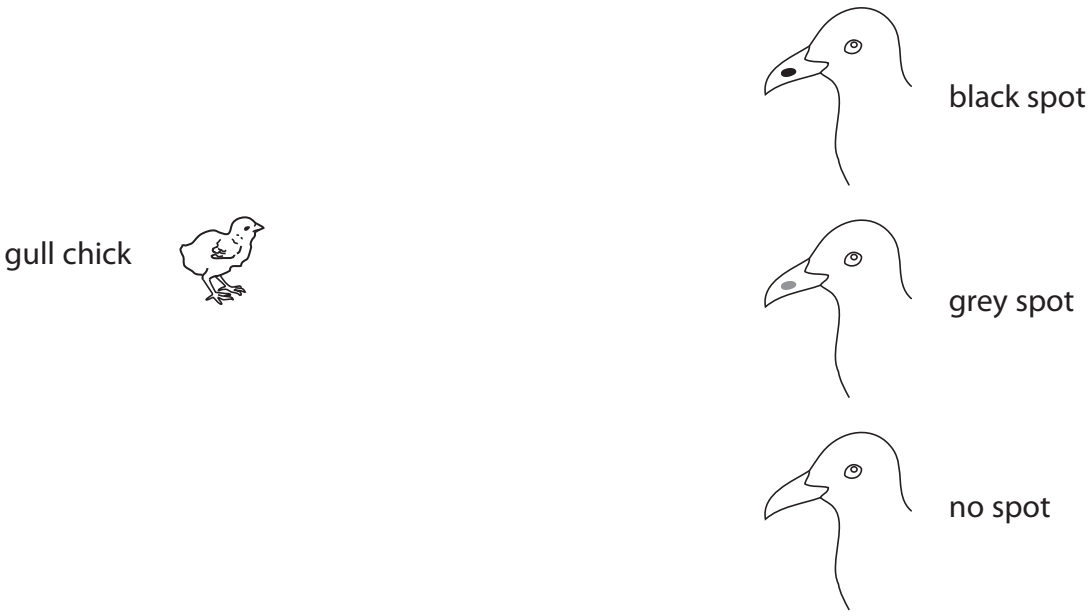
Answer ALL questions

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 A scientist investigated the behaviour of a newly-hatched gull chick.

She painted a coloured spot on the beaks of plastic adult gulls, as shown in the diagram.



She observed how many times the chick pecked at the spot on each beak.

The results were recorded in a tally chart.

	number of pecks	
spot colour	**tally**	**total**
black	𝍸 𝍸 ||||	14
grey	𝍸 ||	
no spot	|||	3

(a) (i) State the number of pecks at the grey spot.

(1)

..... pecks

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(ii) Describe the effect of spot colour on the behaviour of the gull chick.

(2)

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

The type of behaviour shown by the gull chick is

(1)

- ☒ **A** conditioning
- ☒ **B** courtship
- ☒ **C** innate
- ☒ **D** imprinting

(iv) Live adult gulls have a red spot on their beaks.

The investigation was repeated but an additional plastic gull was included. This gull had a red spot painted on its beak.

Suggest how this might affect the results of the investigation.

(1)

(b) In some seaside towns adult gulls are becoming a problem because they steal food from people on the beach.

Suggest why adult gulls are showing this behaviour.

(2)

(Total for Question 1 = 7 marks)

Microorganisms and food

2 The photograph shows a potato with powdery scab disease.

This disease causes damage to the potato skin.



In an investigation, equal numbers of two varieties of potato were planted in a field.

The potato plants were harvested and checked for the disease.

The results are shown in the table.

potato variety	number of potatoes harvested	number of potatoes affected by powdery scab disease	percentage affected by powdery scab disease (%)
Charlotte	200	2	1
Pentland Javelin	350	140	

(a) (i) Calculate the percentage of Pentland Javelin potatoes affected by powdery scab disease.

(2)

..... %

(ii) Using the information in the table, suggest a reason why a farmer would grow Charlotte potatoes.

(1)

.....

.....

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(iii) Using the information in the table, suggest a reason why a farmer would grow Pentland Javelin potatoes.

(1)

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

Microorganisms that cause diseases such as powdery scab are known as

(1)

☒ **A** antibodies

☒ **B** antigens

☒ **C** lymphocytes

☒ **D** pathogens

(c) Suggest **one** reason for the difference in the number of potatoes affected by powdery scab disease.

(1)

(d) Powdery scab disease is caused by a fungus.

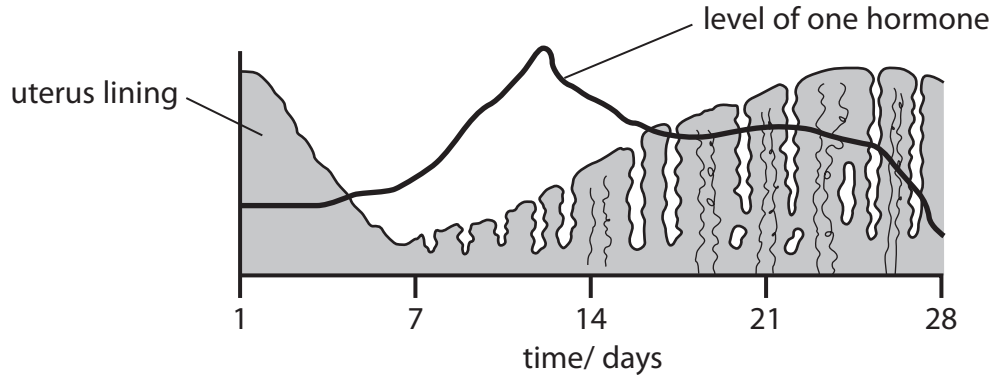
The fungus *Fusarium* is used to produce mycoprotein.

Explain **one** advantage of using mycoprotein as a food source.

(2)

(Total for Question 2 = 8 marks)

3 (a) The diagram shows changes in the thickness of the uterus lining during one menstrual cycle and the level of one hormone involved.



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

This hormone causes the uterus lining to thicken.

This hormone is

(1)

☒ **A** chymosin

☒ **B** oestrogen

☒ **C** progesterone

☒ **D** sucrase

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

In this menstrual cycle ovulation is most likely to occur on

(1)

☒ **A** day 1

☒ **B** day 7

☒ **C** day 14

☒ **D** day 21

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(b) During ovulation an egg is released.

Explain the changes to an egg immediately after a sperm enters it.

(2)

(c) A sperm has a tail for motility.

Explain **one** other feature of a sperm cell.

(2)

(d) The kidneys and bladder are part of the human urinary system.

(i) Kidneys remove waste products, including urea, from the body.

Use words from the box to complete the sentences.

(3)

collecting duct	fats	sugars	glomerulus
liver	amino acids	urethra	

Urea is produced in the ..... .

Urea is produced when excess ..... are broken down.

Urea travels to the kidney and is filtered from the blood in the ..... .

(ii) Glucose is filtered from the blood but is not normally present in urine.

Explain what happens in the nephron to make sure that glucose is not present in urine.

(2)

.....

.....

.....

.....

.....

(Total for Question 3 = 11 marks)

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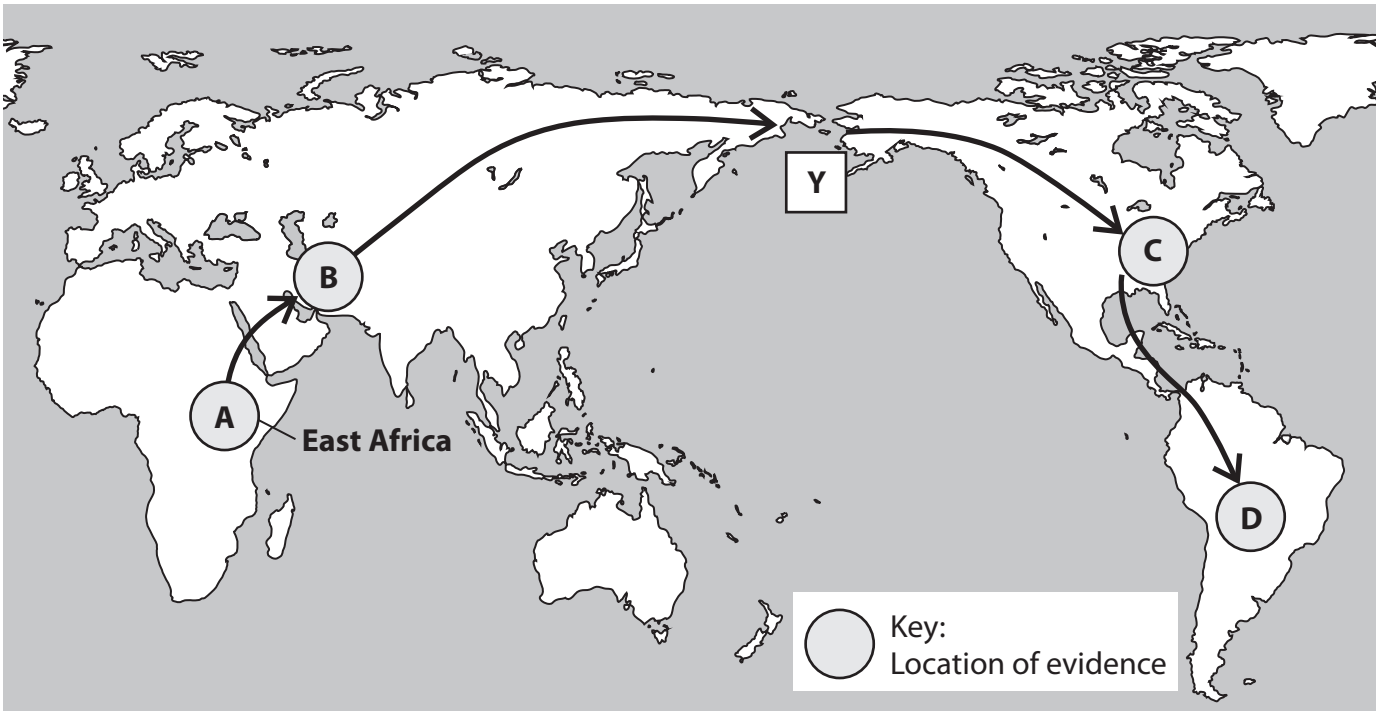
Question 4 is on the next page.

Human evolution

4 Human ancestors are thought to have originated in East Africa.

The 'Out of Africa' theory suggests that human migration followed the route shown on the map.

Evidence for this theory has been found along the route.



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The evidence from the four locations is shown in the table.

evidence		approximate age/ years
arrow head		15 000
flake tool		20 000
jaw bone		50 000
hand axe		190 000

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

The hand axe, shown in the table, is most likely to have been found at location

(1)

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(b) Describe how the ages of the stone tools could be estimated.

(2)

.....

.....

.....

.....

(c) Use words from the box to complete the sentences.

(2)

Ardi	billion	Leakey
million	Lucy	thousand

Some of the earliest human-like remains are estimated to be about

4.4 ..... years old. These fossils were named ..... .

(d) Suggest how climate change may have helped early humans cross the Bering Sea at point **Y** on the map.

(3)

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(e) Early humans developed methods of communication.

State **two** ways in which early humans communicated.

(2)

.....

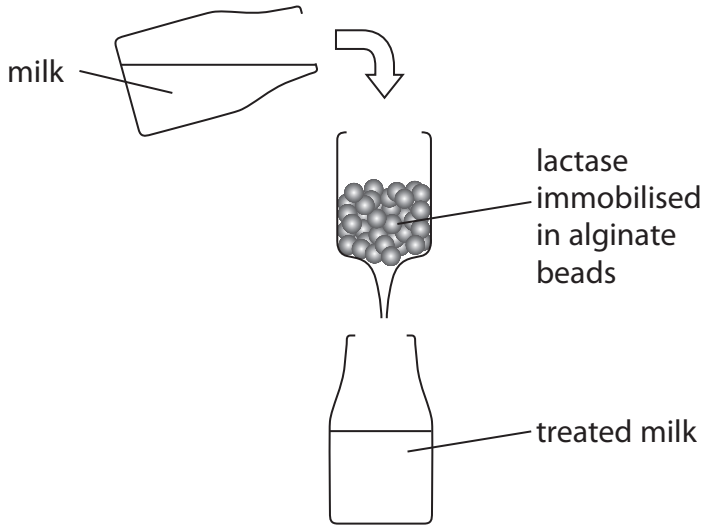
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(Total for Question 4 = 10 marks)

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Food production

5 The diagram shows how milk can be treated using the enzyme lactase.



(a) (i) Explain why milk is treated with lactase.

(2)

(ii) The lactase enzyme stays in the alginate beads.

Suggest why this is an advantage.

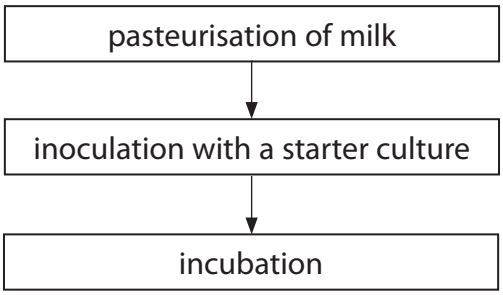
(2)

(b) Invertase is another enzyme used in food production.

Describe the use of invertase in the production of sweets.

(2)

*(c) The diagram shows some of the stages in the production of yogurt.



Describe these stages in the production of yogurt.

In your answer include references to microorganisms.

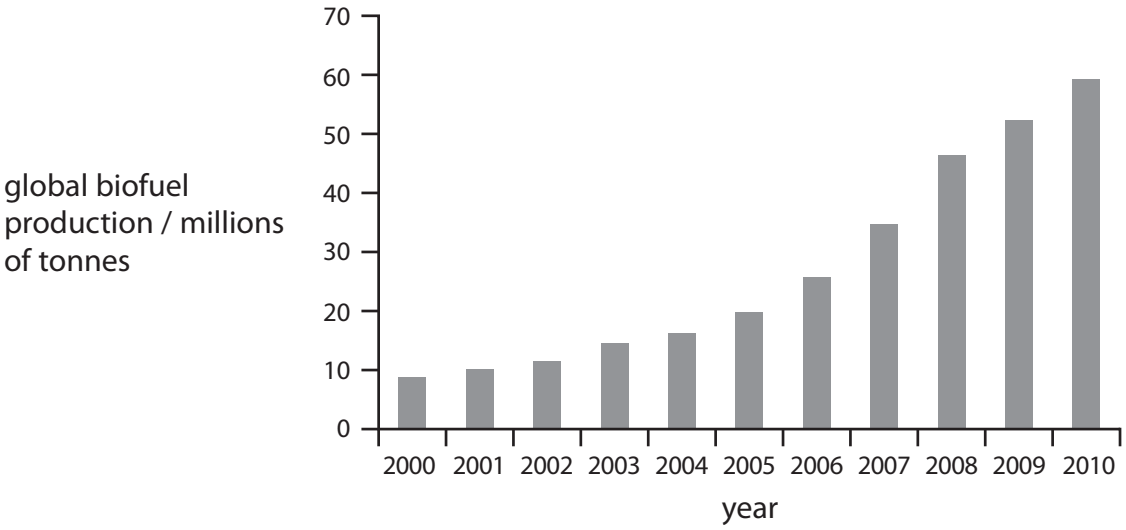
(6)

(Total for Question 5 = 12 marks)

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Global population

6 The graph shows the global production of biofuel from 2000 to 2010.



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

An example of a biofuel is

(1)

- ☒ **A** ethanol
- ☒ **B** flavonoid
- ☒ **C** resazurin
- ☒ **D** urea

(ii) Describe **two** advantages of using biofuel instead of fossil fuels.

(2)

(b) Explain how an increasing human population has led to problems in food supply in some areas of the world.

(3)

*(c) Explain how the development of new plant varieties, the genetic modification of plants and the successful management of pests can be used to increase food production.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Biology (5BI3F/01) Unit 3: Using Biology

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
-

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	7 (pecks)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	**A description including two of the following:** (spot) colour affects number of pecks (1) indication of preference for a specific colour (1) use of figures from table (1)	 darker the spot, more pecks black has the most pecks grey has second highest number of pecks no spot has the least pecks grey has less than black / more than no spot black (14) has twice as many pecks as grey (7)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	**C** ☒ innate		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iv)	(red spot gull) would receive the most pecks / other colours will receive fewer pecks		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	**A suggestion linking two of the following** a need for food (1) food availability (1) habituation/learned behaviour (1)	 to feed young/ hungry lots of food around/on beach/easy to get they are not afraid of humans	**(2)**

Total for Question 1 = 7 marks

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	140 (÷) 350 (1) 40 (%)	 two marks for correct answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	higher resistance to disease / fewer potatoes with the disease		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(iii)	more potatoes harvested / larger yield		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	**D** ☒ pathogens		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	(some potatoes/varieties) are resistant to /produce chemicals against pathogens	Reject immune Ignore larger crop so more affected Ignore environmental factors	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	An explanation linking the following produced in a fermenter (1) rapid growth / independent of environment (1) OR type of food eg low in fat / low in cholesterol / high in protein / high in fibre (1) health benefits eg reduced risk of heart disease / suitable for vegetarians / eq (1)	Ignore easy/cheap to produce	**(2)**

Total for Question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	**B** ☒ oestrogen		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	**C** ☒ day 14		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	**An explanation including the following** the cell membrane changes (1) blocking entry of more sperm (1)	 Accept hardens/thickens	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	**An explanation linking the following** acrosome (1) contains enzymes (1) **OR** nucleus (1) haploid /containing one set of genetic information (1) **OR** mitochondria (1) respiration/to release energy (for swimming) (1)	 half the genetic information allow 23	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(i)	liver amino acids glomerulus	Must be in the correct order	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(d)(ii)	**An explanation linking two of the following** (selectively) re-absorbed (1) (back) into blood (1) in the convoluted tubule (1)		**(2)**

Total for Question 3 = 11 marks

Question Number	Answer	Acceptable answers	Mark
4(a)	**A** ☒		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	**A description including two of the following** determine level in / age of strata (1) using dates of associated artefacts/fossils/buildings (1) carbon dating of organic artefacts (1) reference to design/manufacture (1)	 compare with similar tools of known dates axe handles, bindings, cloth	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	million Ardi	**Must be in the correct order**	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	**A suggestion linking the following** temperature dropped/ice age (1) sea froze (1) OR lower sea level (1) no gap (1) OR narrower gap (1) migrate/travel/walk across (1)	 Ignore continental drift	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(e)	**any two from** sound (1) chemical signals (1) visual signals (1)	 examples of sound examples of chemical signals examples of visual signals	**(2)**

Total for Question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	**An explanation including the following** breaks down the lactose / produces lactose free milk (1) suitable for people with a lactose intolerance (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	**A suggestion linking the following** allows the enzyme to be reused (1) stops the enzymes contaminating the milk / reduces need to purify the product (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)	**A description including two of the following:** breaks down sucrose (1) into fructose / glucose (1) more liquid consistency /soft centred sweets (1)		**(2)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	**A description to include some of the following points** pasteurisation • heat the milk • to 72°C / high temperature • to remove unwanted micro organisms inoculation • add bacteria • *Lactobacillus*/ named bacteria • start fermentation process incubation • incubate at suitable temperature • bacteria multiply • bacteria convert lactose • into lactic acid • reduces the pH • thickens milk	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of one stage involved in the production of yogurt. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description of at least two stages OR a detailed description of incubation. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description that includes all three stages involved in the production of yogurt. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	**A** ☒ ethanol		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	renewable (1) carbon neutral (1)	sustainable carbon dioxide used up in growth / description	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)	**An explanation linking three of the following** greater demand for food (1) not enough food produced (1) alternative use of (farm)land (1) social reasons / wars / poverty (1)	 biofuel production/housing	**(3)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	**An explanation to include some of the following points** new plant varieties: • selection of best varieties/species • selective breeding • cloning • example (pest resistance/environmental tolerance) genetic modification: • addition of genes • to improve characteristics • by *Agrobacterium tumefaciens*/vector • example (flavonoids/bio-fortification/pest resistance) pest control: • use of pesticides • biological control • reference to reduction in loss (due to pest)	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of one method of increasing food production. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation of two methods OR a detailed explanation of one method of increasing food production. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation of at least two methods OR an explanation with points from all three methods of increasing food production. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 6 = 12 marks

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Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Unit B3: Using Biology

Foundation Tier

Monday 16 June 2014 – 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.
- 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 3 4 1 6 A 0 1 2 4

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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 ☒.

Animal behaviour

1 The photograph shows a robin.

Robins are songbirds.

Robins usually attract one mate for a breeding season.



(a) (i) In spring, male robins sing loudly to attract a female.

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

This type of behaviour is

(1)

- ☒ **A** courtship
- ☒ **B** habituation
- ☒ **C** imprinting
- ☒ **D** conditioning

(ii) Suggest a different way a robin can communicate.

(1)

.....

.....

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(b) The survival rate for the offspring of many animals is very low.

A robin produced 12 offspring but only 5 survived their first year.

(i) Calculate the percentage survival rate for the offspring of this robin.

(2)

..... %

(ii) Suggest how robins care for their offspring.

(2)

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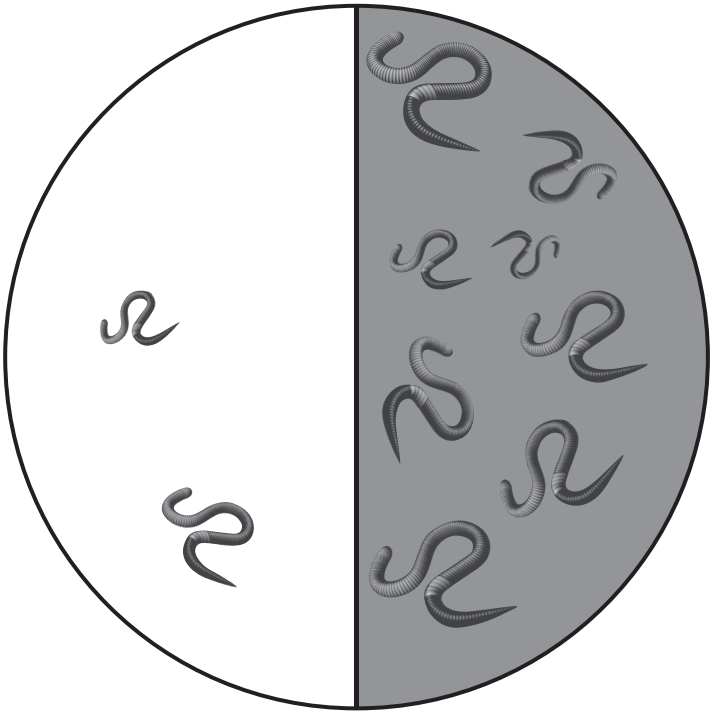
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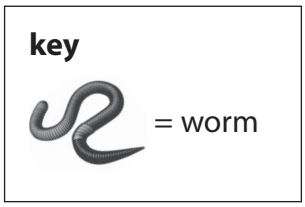
(c) Robins eat worms.

10 worms were placed in the centre of a choice chamber.

Half the chamber was in the light and half the chamber was in the dark.

The diagram shows the position of the worms after one hour.





Explain how this behaviour helps the worms to survive.

(2)

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(Total for Question 1 = 8 marks)

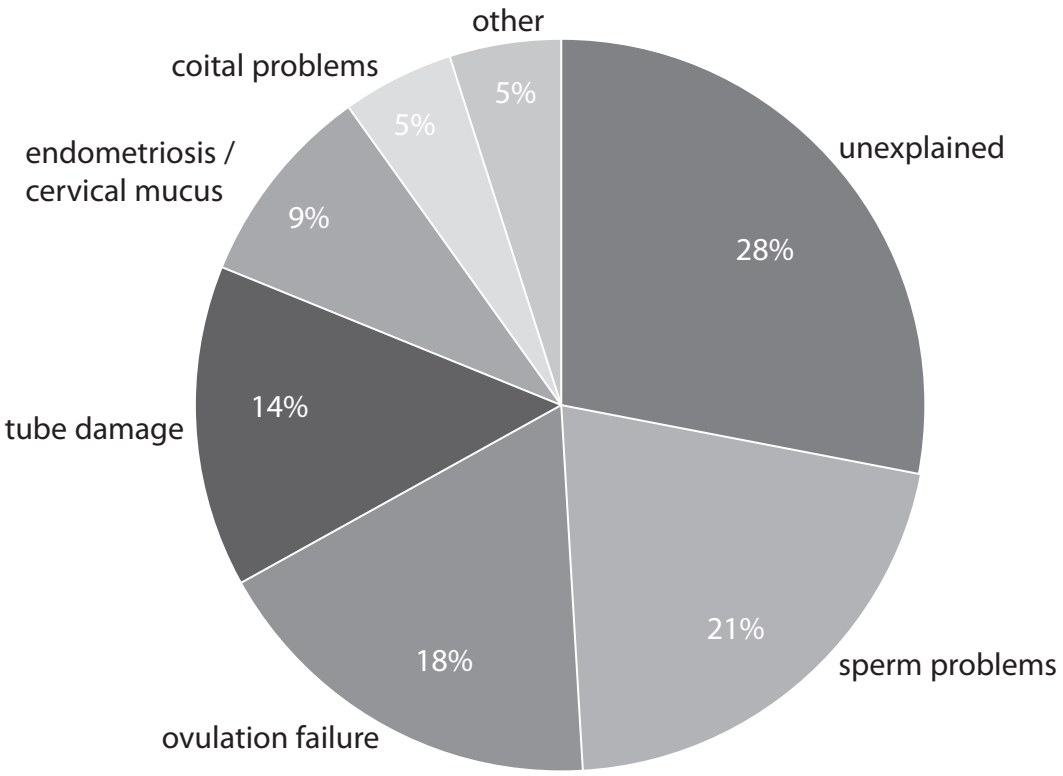
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Question 2 is on the next page

Infertility

2 (a) The pie chart shows the common causes of infertility for the human population of the United Kingdom.



What is the main explained cause of infertility?

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

(1)

- ☒ **A** coital problems
- ☒ **B** ovulation failure
- ☒ **C** sperm problems
- ☒ **D** tube damage

(b) State **two** treatments for infertility.

(2)

1 .....

.....

2 .....

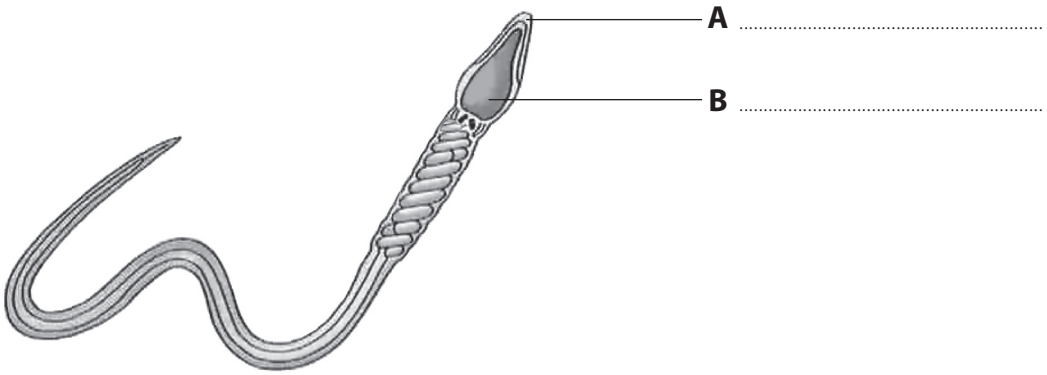
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(c) Sometimes parts of the sperm do not function correctly.

(i) Name the parts labelled **A** and **B**.

(2)



(ii) Explain why mitochondria are important for the correct functioning of the sperm.

(3)

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(Total for Question 2 = 8 marks)

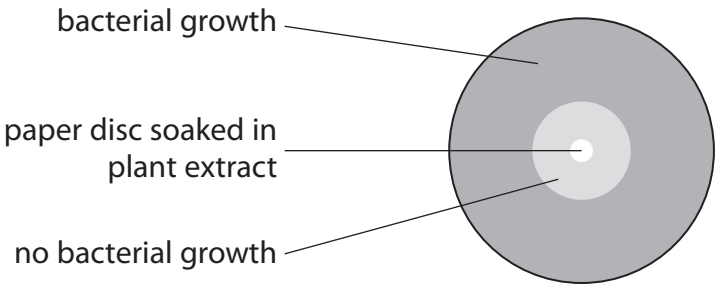
Natural antiseptics

3 Some plant extracts contain natural antiseptics.

A scientist spread bacteria on an agar plate.

She then soaked a paper disc in a plant extract and placed the disc on the agar plate.

The diagram shows how the agar plate looked after 24 hours.



(a) Suggest why there is no bacterial growth around the paper disc.

(1)

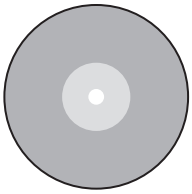
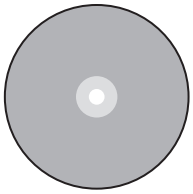
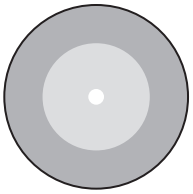
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(b) The scientist then tested three more plant extracts **A**, **B** and **C**.

The table shows the results for the three different plant extracts.

plant extract	**A**	**B**	**C**
agar plate after 24 hours			
radius of circle with no bacterial growth / mm	25	15	50
total area with no bacterial growth / mm^2	1963	707	

The area of a circle can be calculated using the following formula

Area of a circle = πr^2

The value for π is 3.14

r = radius

(i) Calculate the area with no bacterial growth for plant extract **C**.

(2)

..... mm^2

(ii) Compare the antiseptic properties of plant extracts **A**, **B** and **C**.

(2)

.....

.....

.....

.....

(c) Suggest why plants may produce natural antiseptics.

(2)

(d) Photoperiodicity is important in plants.

(i) State the stimulus that results in photoperiodicity in plants.

(1)

(ii) Explain why photoperiodicity is important in plants.

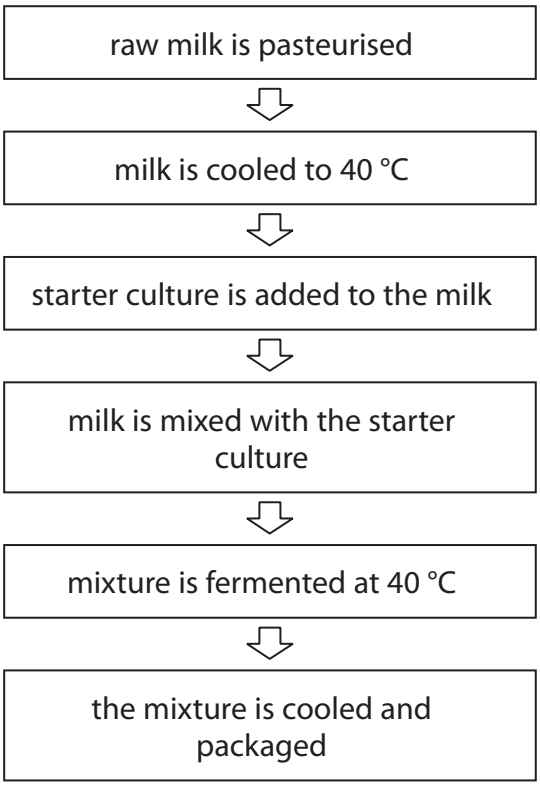
(2)

(Total for Question 3 = 10 marks)

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Enzyme technology

4 The diagram shows one method of yogurt production.



(a) (i) Explain why the milk is kept at a temperature of 40 °C during fermentation.

(2)

(ii) Use words from the box to complete the following sentences about yogurt production.

(2)

lactose	boil	glucose
thicken	sucrose	liquify

The starter culture contains *Lactobacillus* bacteria which convert the

..... into lactic acid.

The lactic acid causes the milk to ..... and

produce yogurt.

(iii) Explain why the milk is pasteurised before the production of yogurt.

(2)

.....

.....

.....

.....

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

The scientist whose research contributed to the process of pasteurisation is

(1)

☒ **A** Diane Fossey

☒ **B** Edward Jenner

☒ **C** Jane Goodall

☒ **D** Louis Pasteur

(b) *Saccharomyces cerevisiae* is a microorganism used in the manufacture of sweets.

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

Saccharomyces cerevisiae is used in the manufacture of sweets because it produces the enzyme

(1)

- ☒ **A** chymosin
- ☒ **B** invertase
- ☒ **C** mycoprotein
- ☒ **D** protease

(c) Enzymes can also be used in washing powders.

Explain why enzymes are used in washing powders.

(3)

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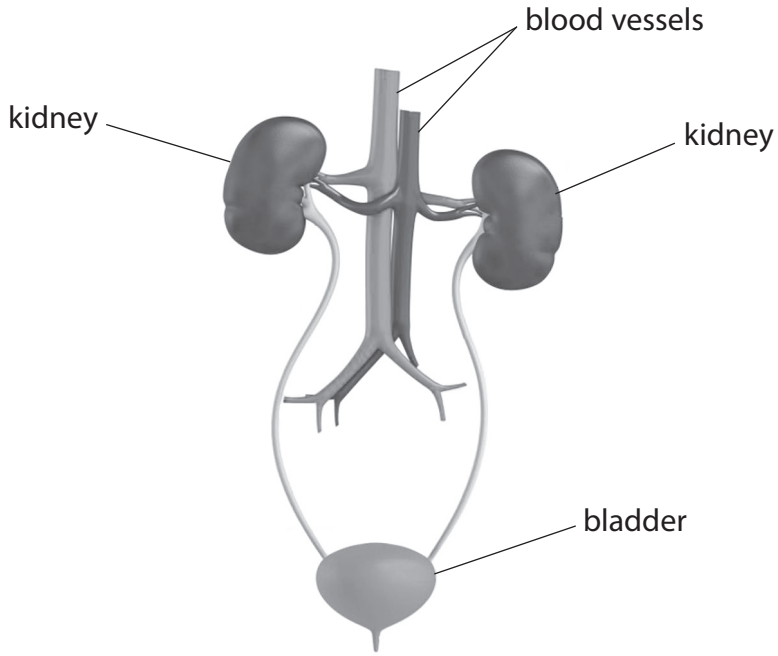
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(Total for Question 4 = 11 marks)

Kidneys and disease

5 Kidney disease can be treated by kidney dialysis or kidney donation.

The diagram shows the human urinary system.



(a) Draw **one** straight line from each part of the urinary system to its function.

(2)

part of urinary system	function
renal artery	transports urine to the bladder
	transports blood into the kidneys
ureter	transports urine from the bladder
	transports blood away from the kidneys

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(b) Kidney dialysis removes harmful chemicals from a patient's blood.

Urea is one chemical that is removed from a patient's blood.

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

Urea is produced in the

(1)

- ☒ **A** bladder
- ☒ **B** gall bladder
- ☒ **C** liver
- ☒ **D** pancreas

(c) In one year a total of 3600 kidney donations took place.

A third of kidney donations are from donors who are still living.

(i) Calculate the number of kidneys donated by donors who are still living.

(2)

.....

(ii) Suggest why kidney donations from people who are still living are more common than other organ donations.

(1)

.....

.....

*(d) Haemophilia is a sex-linked genetic disorder of the blood.

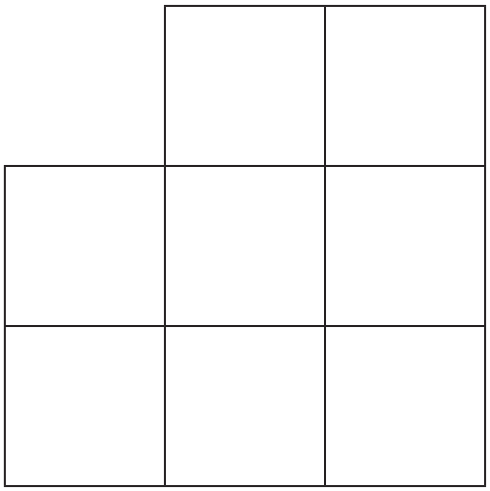
The allele for haemophilia is recessive and is located on the **X** chromosome.

A female heterozygous for haemophilia and an unaffected male have children.

Use a genetic diagram to help explain what the genotypes and phenotypes of their children could be.

Use the letter **h** for the haemophilia allele.

(6)



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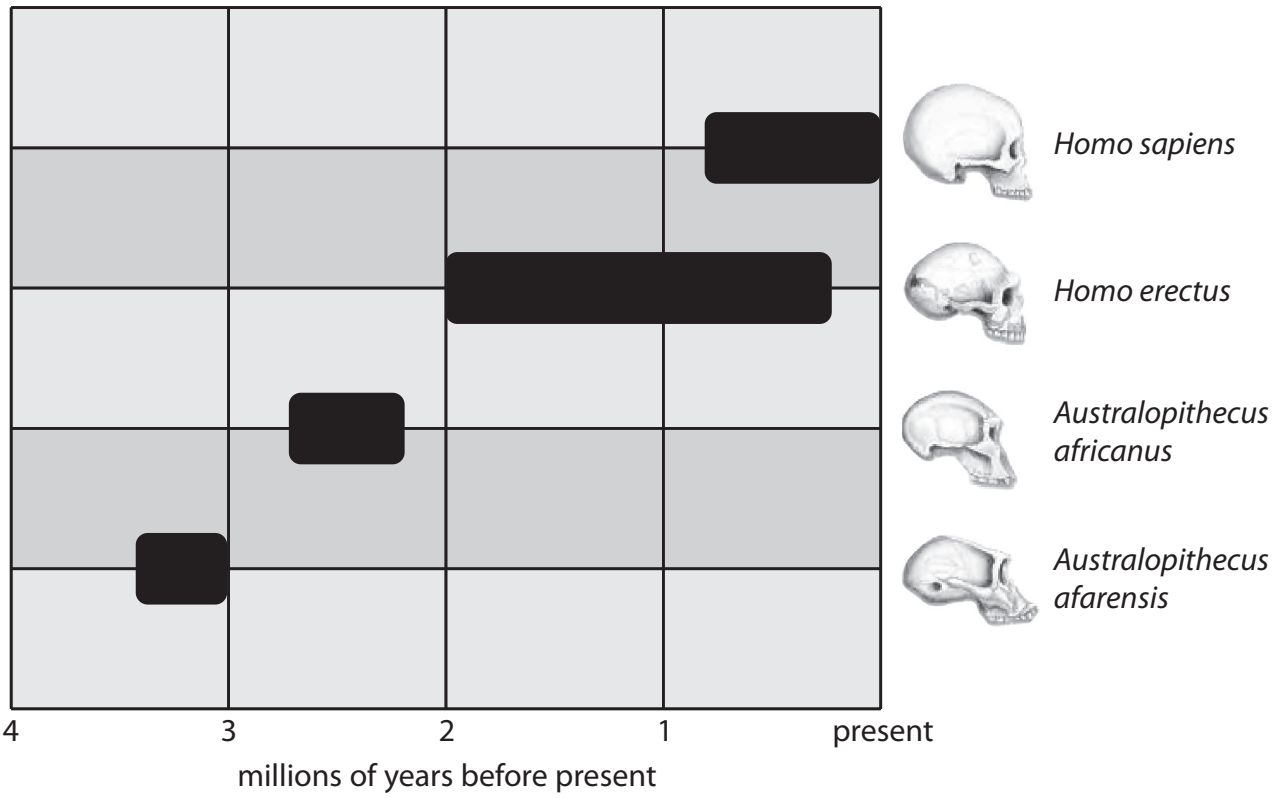
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(Total for Question 5 = 12 marks)

Human evolution

6 (a) The diagram shows the estimated time when early humans and their ancestors existed.



(i) In which time period did *Australopithecus afarensis* exist?

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

(1)

☒ **A** present day to 1 million years before present

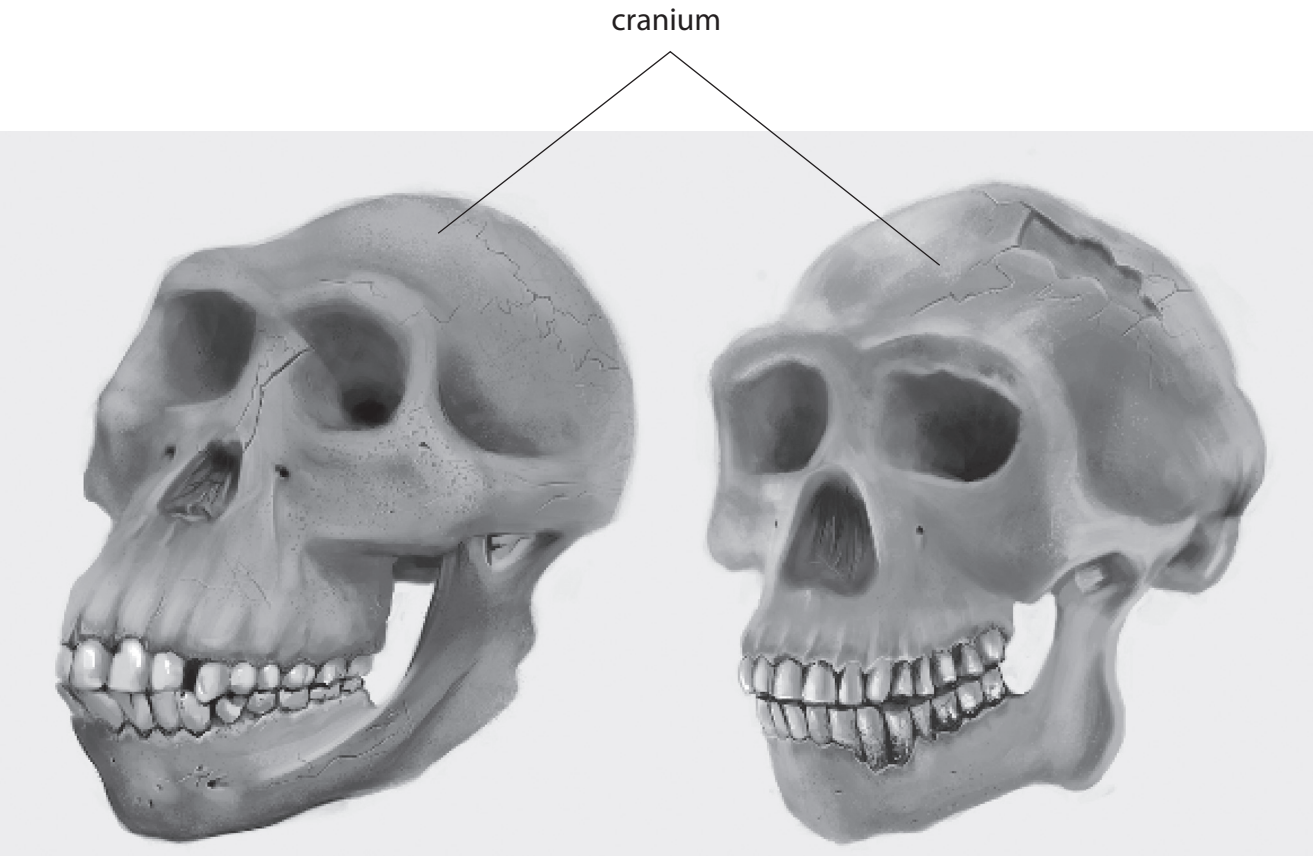
☒ **B** 1 to 2 million years before present

☒ **C** 2 to 3 million years before present

☒ **D** 3 to 4 million years before present

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The photograph shows the skulls of two different early humans.



Australopithecus afarensis *Homo erectus*

(ii) Suggest why the cranium of *Australopithecus afarensis* is smaller than the cranium of *Homo erectus.*

(1)

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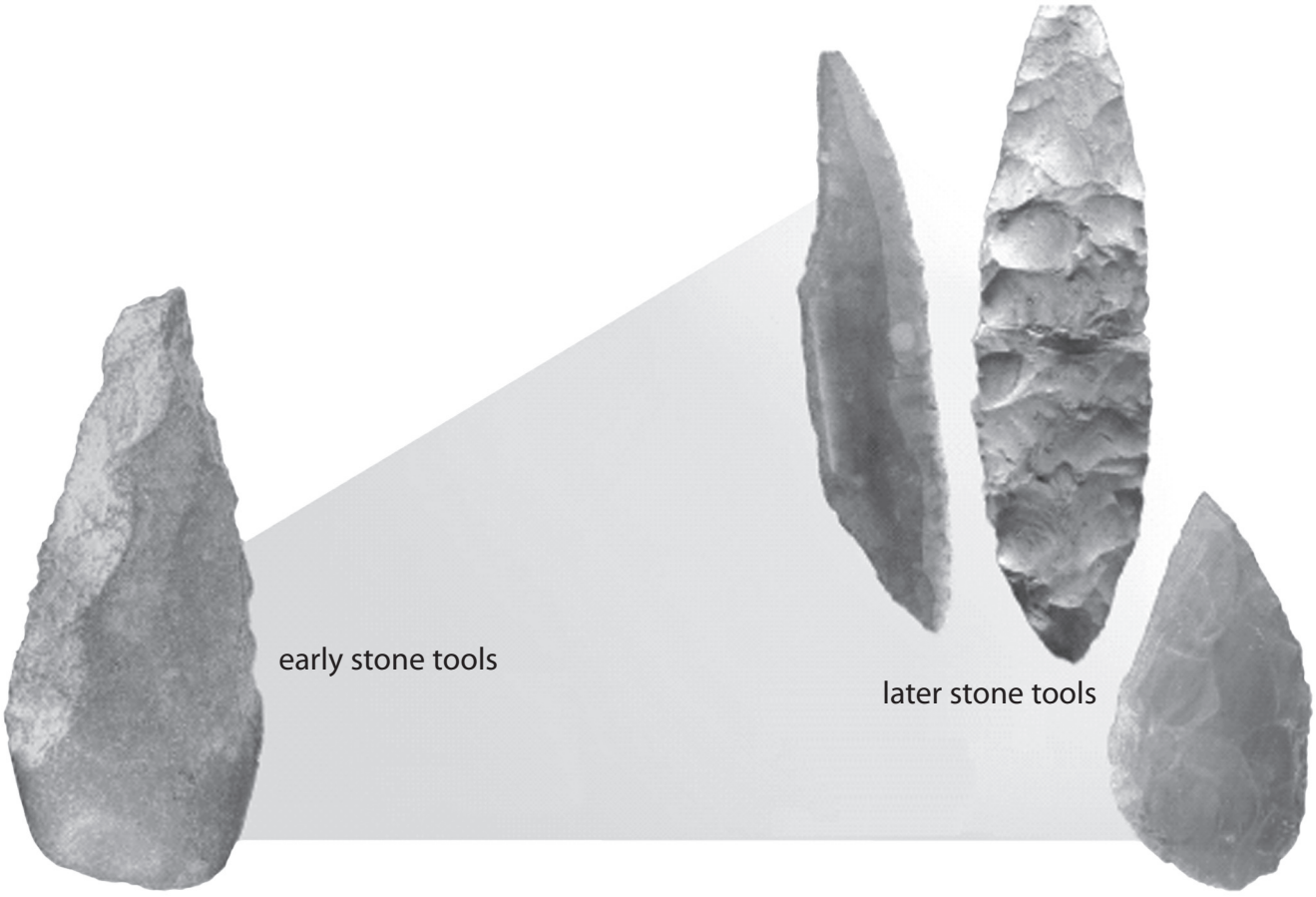
(iii) Describe **one** structural difference in another part of these skulls.

(1)

.....

.....

(b) The photograph shows some stone tools from different times in the Earth's history.



Suggest why there are differences in these stone tools.

(2)

.....

.....

.....

.....

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*(c) Describe the evidence for human evolution, based on fossils.

Include reference to specific early human fossils in your answer.

(6)

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE in Biology (5BI3F) Paper 01

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Summer 2014
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General Marking Guidance

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-

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- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	**A** courtship		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	• visual signal e.g. flapping wings, display red breast (1) • chemical signal (1)	Accept body language Accept pheromones Accept other methods of communication such as nest building/ tapping Ignore singing	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b) (i)	5 ÷ 12 (1) 42 (%) / 41.7 (%) /41.66 (%)	2 marks for the correct answer Accept 41.6%	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	A suggestion including two from • provides food (1) • protects from (named) predator (1) • provide warmth (1)	Accept incubate Ignore generalisations such as 'to keep safe'	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking two of the following: • camouflage / to hide (1) • from (named) predators (1) OR • cooler (on the dark side) (1) • to prevent over-heating (1) OR • more damp (on dark side) (1) • to prevent drying out/ dehydration (1)		**(2)**

(Total for question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	**C** sperm problems		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	**two** of the following: • donation of eggs (1) • donation of sperm (1) • IVF treatment (1) • use of a surrogate mother (1) • hormone treatments (1)	Accept named example	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	A acrosome; B nucleus;	Answers must be in the correct order	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	An explanation linking **three** of the following points: • mitochondria provide / supply energy (1) • by the process of respiration (1) • to enable the sperm to move / swim (to the egg) (1)	Reject mitochondria produce/create energy	**(3)**

(Total for question 2 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
3 (a)(i)	• (antiseptic / plant extract) kills the bacteria	Inhibits bacterial growth	**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (b)(i)	3.14 x 50 x 50 (1) 7850 (mm^2)	2 marks for correct answer Accept π x 50 x 50 (1) 7853 / 7853.98 / 7854 (mm^2)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (b)(ii)	Any two of the following: • C is the most effective / best (1) • B is the least effective /worst (1) • A is more effective than B / less effective than C (1)	Ignore reference to size of area/size of circle/number of bacteria	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (c)	A suggestion linking the following: • antiseptics kill plant pathogens (1) • prevents damage to the plant / protection from damage (1)	accept pests for pathogens accept crops for plants	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (d)(i)	sun / light / day length / hours of darkness		**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (d)(ii)	An explanation linking **two** of the following: • produce flowers/seeds at the correct time of the year (1) • to ensure it germinates at the right time (1) • stimulates growth (1) • open/close leaves / stimulates leaf-drop (1)	to ensure the plant reproduces at the correct time (1)	**(2)**

(Total for question 3 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	An explanation including **two** of the following linked points: • (40°C is) the optimum temperature(1) • (optimum temperatures) for enzymes to work (1) • if too hot then enzymes denatured (1) • if too cold the reaction will be slow (1)	Accept best temperature	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	lactose (1) thicken (1)	Answers must be in this correct order	**(2)**

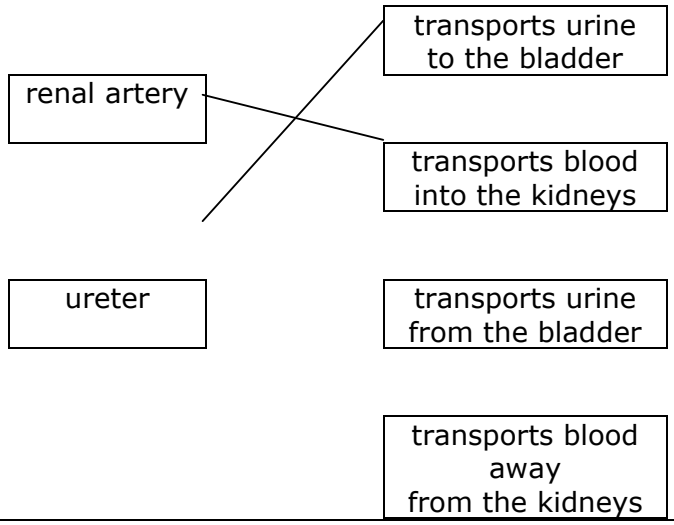
Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	An explanation linking the following: • kill/ destroy (1) • microorganisms/bacteria (1)	Ignore 'get rid of' / remove	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iv)	**D** Louis Pasteur		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	**B** invertase		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)	An explanation linking **three** of the following points: • (enzymes) can break down biological stains (1) • example of enzyme (1) • at low temperatures (1) • reduces energy use / cost	Accept a named biological stain e.g. blood, grass, fats Ignore 'dirt'	**(3)**

(Total for question 4 – 11 mark)

Question Number	Answer	Acceptable answers	Mark
5 (a)			**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (b)	C liver		**(1)**

Question Number	Answe	Acceptable answers	Mark
5 (c)(i)	3600 ÷ 3 / 3600 x 1/3 (1) 1200	2 marks for the correct answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (c)(ii)	people have two kidneys / only need one kidney to survive (1)		**(1)**

<table>
<tr><th colspan="2">Question Number</th><th>Indicative Content</th><th>Mark</th></tr>
<tr><td>QWC
5(d)</td><td>*</td><td>An explanation linking the following

• male is XY
• female is XX
• male genotype is X^HY / H-
• female genotype X^HX^h / X^hX / Hh
• correct Punnett square or genetic diagram

<table><tr><td></td><td>X^H</td><td>X^h</td></tr><tr><td>X^H</td><td>X^HX^H</td><td>X^HX^h</td></tr><tr><td>Y</td><td>X^HY</td><td>X^hY</td></tr></table>
• 50% / 1 in 2 males are affected/have haemophilia
• 50% / 1 in 2 males are unaffected/no disease
• 50% / 1 in 2 females are carriers of the haemophilia allele
• 50% / 1 in 2 females are homozygous dominant/ unaffected</td><td>(6)</td></tr>
<tr><td>Level</td><td>0</td><td colspan="2">No rewardable content</td></tr>
<tr><td>1</td><td>1 - 2</td><td colspan="2">• a limited explanation which includes the genotype of at least one parent
• the answer communicates ideas using simple language and uses limited scientific terminology
• spelling, punctuation and grammar are used with limited accuracy</td></tr>
<tr><td>2</td><td>3 - 4</td><td colspan="2">• a simple explanation which includes the genotype of both parents and the offspring
• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately
• spelling, punctuation and grammar are used with some accuracy</td></tr>
<tr><td>3</td><td>5 - 6</td><td colspan="2">• a detailed explanation which includes the genotypes of both the parents and the offspring and includes probabilities of haemophilia inheritance
• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately
• spelling, punctuation and grammar are used with few errors</td></tr>
</table>

(Total for question 5 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	**D** 3- 4 million years before present		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	*Australopithecus afarensis* had a smaller brain (1)	*ORA Homo erectus* had a larger brain	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	A description of an observable structural feature. The description must identify which skull is being referred to.	e.g. *A. afarensis* has a more protruding jaw *A. afarensis* has a narrower forehead *A. afarensis* has larger teeth *A. afarensis* has lower jaw angled forwards ORA *H. erectus*	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	A suggestion to include two of the following points: • (later tools) show more complex manufacturing methods(1) • to allow more specialised tasks(1)	later tools show more developed thought/dexterity in their manufacture Accept examples e.g. arrow heads for hunting, sharp edges for cutting	**(2)**

Question Number		Indicative Content	Mark
QWC 6(c)	*	A description of how fossils provide evidence of human evolution including: • fossils can be dated • different fossil evidence occurs at different periods of time • comparison of fossils indicates how humans changed over time • human fossils have been found dating back to 4.4 million years ago • the oldest known human fossil is known as Ardi • Ardi is a fossil of *Ardipithecus ramidus* • Lucy is another fossil that was discovered • Lucy is a fossil of *Australopithecus afarensis* • Lucy has been dated at 3.9 to 2.9 million years ago • more recent discoveries by Leakey • have dated fossils of human origin up to 1.6 million year ago	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description of general fossil evidence • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple description which includes general fossil evidence and reference to one or more named human fossil finds, e.g. *A. africanus*, *A. afarensis* • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed description which includes general fossil evidence and reference to the 'Lucy', 'Ardi' or Leakey fossil finds (Turkana boy). • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for question 6 = 11 marks)

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Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Biology

Unit B3: Using Biology

Foundation Tier

Monday 20 May 2013 – Afternoon
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.
- 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 1 9 3 4 A 0 1 2 0

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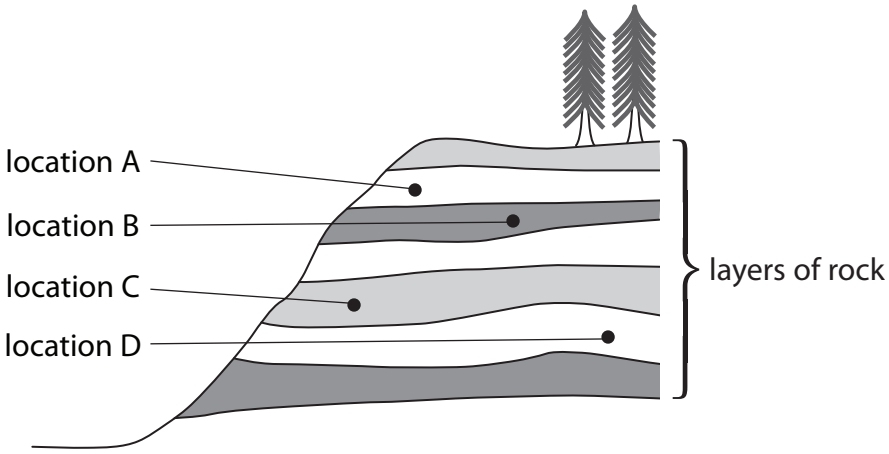
Answer ALL questions

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 ☒.

Human Evolution

1 Stone tools found in layers of rock can show evidence for human evolution.

The diagram shows four locations, A, B, C and D, where stone tools were found.



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

The oldest tools were most likely to be found at

(1)

- ☒ **A** location A
- ☒ **B** location B
- ☒ **C** location C
- ☒ **D** location D

(ii) Suggest **two** possible ways in which stone tools were used.

(2)

1 .....

.....

2 .....

.....

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(b) The table gives information about some stages of human evolution.

	Australopithecus afarensis	***Homo habilis***	***Homo erectus***	***Homo sapiens***
				
lived between / millions of years ago	3.6 – 2.8	2.4 – 1.4	1.8 – 0.5	0.2 – to present day
average adult male height / m	1.5	1.2	1.6	1.8
average brain size / cm^3	400	650	1040	1350

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

The species which lived 2.1 million years ago is

(1)

☒ **A** *Australopithecus afarensis*

☒ **B** *Homo erectus*

☒ **C** *Homo habilis*

☒ **D** *Homo sapiens*

(ii) Using the information in the table, describe the changes in body structure that have occurred during human evolution.

(2)

.....

.....

.....

.....

(iii) A fossil bone from a different early human, *Australopithecus africanus*, was dated to be 2.5 million years old.

Using the information in the table, suggest the brain size of *Australopithecus africanus*.

(1)

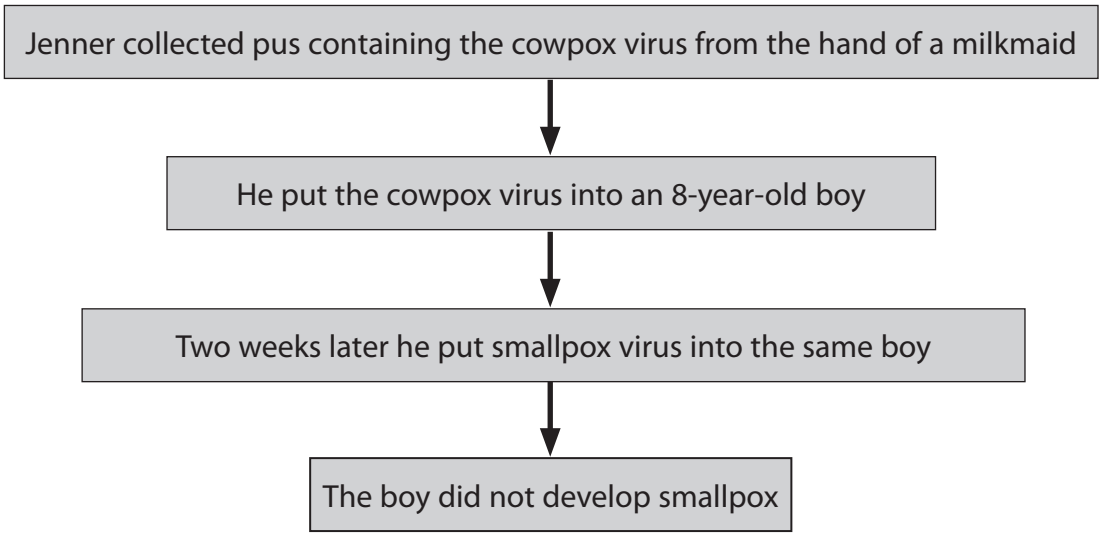
.....cm^3

(Total for Question 1 = 7 marks)

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Viruses and bacteria

2 The flow diagram is about Edward Jenner's work on vaccines.



(a) Use words from the box to complete the sentences about vaccines.

(2)

antibodies	aseptic	hormones
immune	pathogens	

The cowpox virus from the milkmaid caused the boy to become

..... to smallpox.

His body produced ..... which stopped the smallpox

virus from causing an infection.

(b) This newspaper extract is from 2012.

> As a parent, you have to think about the advantages and risks when making the decision about whether your child should be immunised.

Suggest why a parent might decide **not** to have their child immunised.

(2)

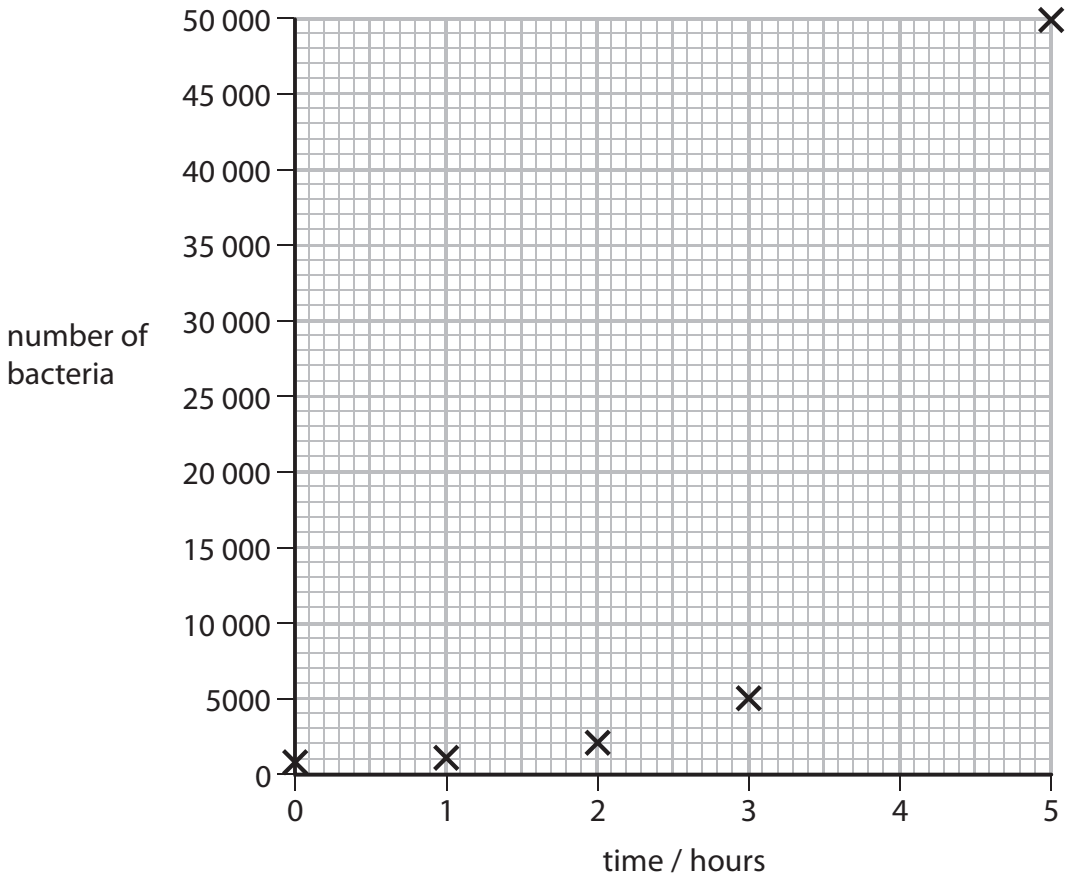
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(c) The graph shows the number of bacteria growing in a fermenter during a period of five hours.



(i) Draw the curve of best fit on the graph.

(1)

(ii) Use your curve of best fit to estimate the number of bacteria at four hours.

(1)

(iii) Describe the trend shown in the graph.

(1)

(d) Describe the optimum conditions for the rapid growth of bacteria.

(2)

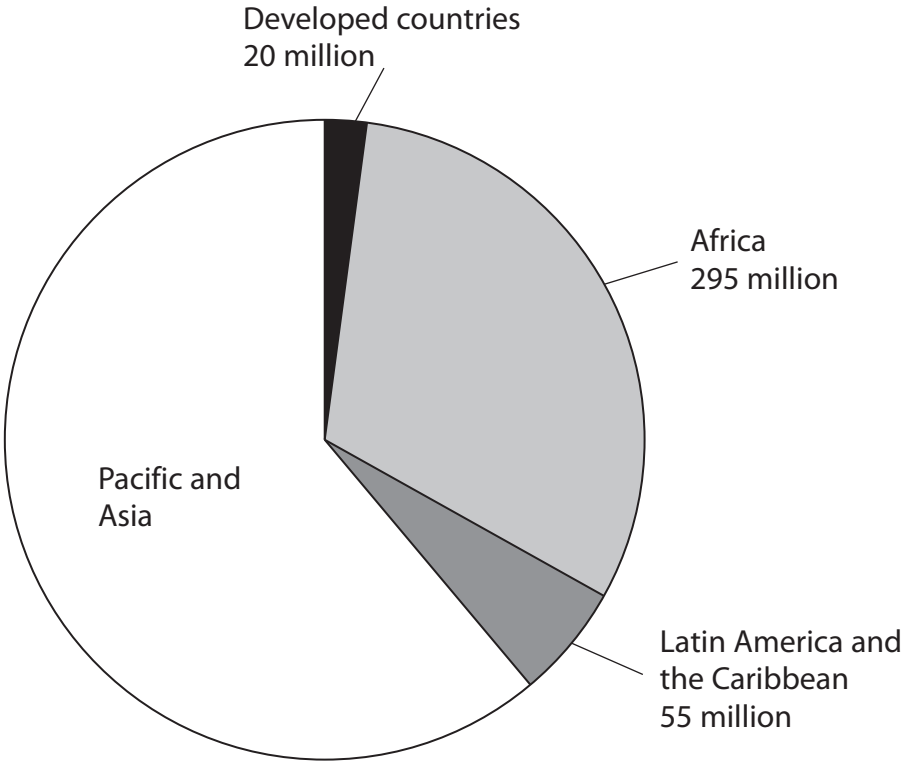
(Total for Question 2 = 9 marks)

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Plant uses

3 (a) There are 950 million people living in the world who do not have enough food.

The pie chart shows the regions of the world where these people live.



(i) Calculate the number of people living in the Pacific and Asia region who do not have enough food.

(2)

.....million

(ii) Suggest why a country may not have enough food for its population.

(1)

.....

(b) The fungus *Beauveria bassiana* can be used to kill insects on crop plants.

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

The use of *Beauveria bassiana* is an example of a

(1)

☒ **A** type of crop rotation

☒ **B** genetic modification programme

☒ **C** pest management strategy

☒ **D** plant breeding programme

(ii) Explain **one** benefit to the farmer of using this fungus to kill insects on crop plants.

(2)

.....

.....

.....

.....

(c) (i) Plants can be used to make biofuels.

Explain why growing plants for biofuels can cause food shortages.

(2)

.....

.....

.....

.....

(ii) Explain **one** advantage of using plants to make biofuels.

(2)

.....

.....

.....

.....

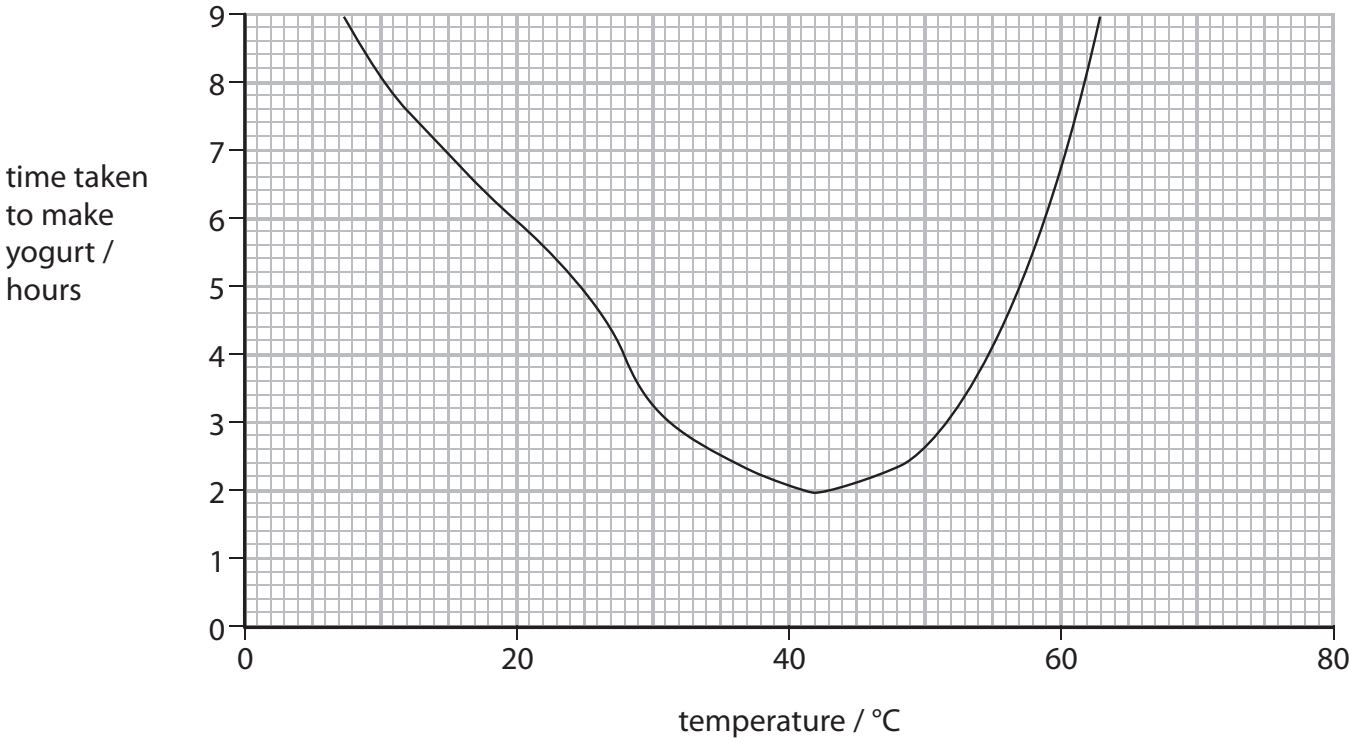
(Total for Question 3 = 10 marks)

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Question 4 is on the next page

4 (a) The graph shows the effect of temperature on the time taken to make yogurt.



(i) Use the graph to estimate the optimum temperature for yogurt production.

(1)

.....°C

(ii) Describe how microorganisms change milk into yogurt.

(3)

.....

.....

.....

.....

.....

.....

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

Yogurt can be produced in a fermenter.

Fermenters should be free from contamination by unwanted microorganisms.

Contamination can be prevented by

(1)

- ☒ **A** adding oxygen
- ☒ **B** agitation
- ☒ **C** controlling the temperature
- ☒ **D** using aseptic precautions

(c) Many other foods are made using microorganisms.

Describe the advantages of using microorganisms to produce food.

(2)

.....

.....

.....

.....

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

An enzyme produced by genetically modified yeast can be used in the production of cheese.

This enzyme is called

(1)

- ☒ **A** chymosin
- ☒ **B** invertase
- ☒ **C** lipase
- ☒ **D** protease

(ii) Describe the advantages of making cheese using the enzyme produced by genetically modified yeast.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

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Egg cells

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

Sperm cells and egg cells contain sex chromosomes.

Egg cells contain

(1)

☒ **A** one X chromosome

☒ **B** one Y chromosome

☒ **C** two X chromosomes

☒ **D** two Y chromosomes

(b) (i) Complete the Punnett square to show how the sex of a child is inherited.

(2)

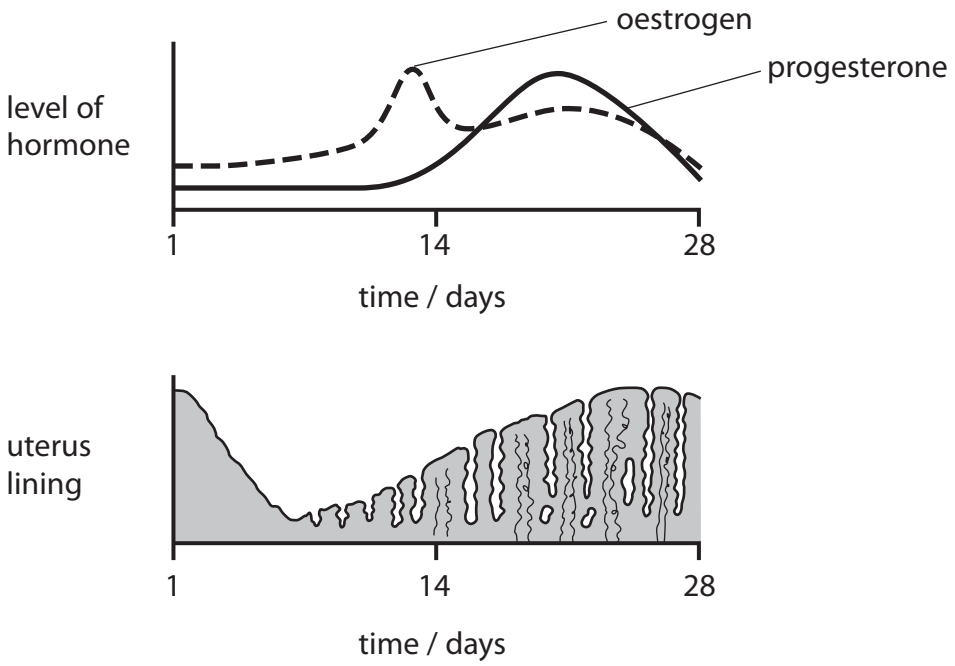


(ii) Calculate the percentage chance that a child will be female.

(1)

percentage chance .....

*(c) The diagram shows the level of two hormones involved in the menstrual cycle and the thickness of the uterus lining.



Using the information in the diagram and your own knowledge, describe the stages of the menstrual cycle.

(6)

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(d) Explain what happens to the uterus lining if a woman becomes pregnant.

(2)

.....

.....

.....

.....

(Total for Question 5 = 12 marks)

Behaviour

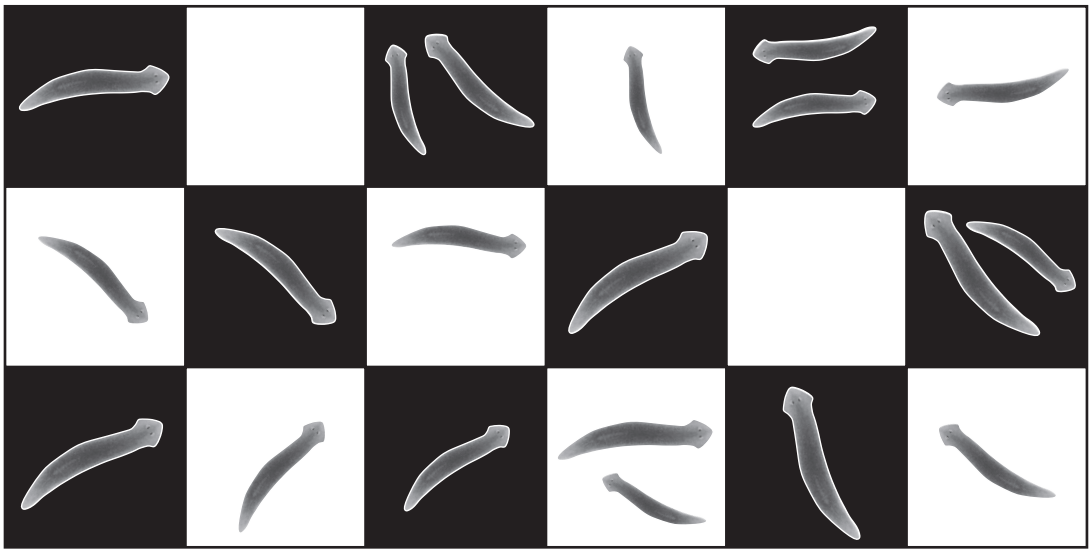
6 Flatworms are animals that live in freshwater streams.

20 flatworms were placed in the centre of a tray containing water.

The tray had black and white squares painted on the bottom.

The diagram shows the position of the flatworms one hour later.

Key  = flatworm



(a) (i) Calculate the percentage of flatworms found on the black squares.

(3)

.....%

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

The type of behaviour shown by the flatworms is

(1)

☒ **A** conditioning

☒ **B** habituation

☒ **C** imprinting

☒ **D** innate

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(iii) Suggest why this behaviour may help flatworms survive in the streams where they live.

(2)

*(b) Animals communicate in order to survive and during courtship.

Explain why animals use a variety of signals to communicate.

Use examples to support your answer.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Summer 2013

GCSE Biology (5BI3F)
Paper 01

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Question Number	Answer	Acceptable answers	Mark
1(a)(i)	**D** ☒ location D		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	Any **two** from • hunting (1) • collecting food (1) • preparing food (1) • farming (1) • building (1)	 weapons/to kill skinning animals accept cutting/chopping accept sharpening tools/shaping other objects accept starting fires	 **(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	**C** ☒ *Homo habilis*		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	A description including any **two** of • increased brain capacity (1) • (stand/walking) upright (1) • increasing height (1) • feet facing forward(1)	 taller/larger/longer legs accept descriptions of changes to facial/skull shape accept descriptions of changes to the arm to leg ratio ignore references to changes in the shape of feet and hands	 **(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	any size from 400 to 650 (cm^3)		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)	immune (1) antibodies (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)	A suggestion including any **two** from • side effects (1) • <u>allergic</u> reactions (1) • unlikely to catch the disease (1) • may get **mild form** of the disease (from the inoculation) (1)	named side effect already had the disease/already immune/herd immunity accept scared of needles ignore vague references to risks/harm to the child/may be killed /become ill/(immunisation) not working	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	a smooth curve through all the points.		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	10 000 to 25 000	correct value from their graph	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(iii)	(the number of bacteria) increases	ignore number of bacteria double every hour	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	A description including **two** of the following • warm (1) • moist (1) • correct pH (1) • supply of nutrients (1)	suitable temperature accept oxygen	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	(295+55+20) = 370 (1) OR 950-295-55-20= (1) (950 – 370) = 580 (million)	2 marks for the correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	Any **one** from **increased** population / reduced availability of food e.g. crop failure, war / reduced availability of land for farming /	lack of space for crops ignore not enough money unless qualified	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	**C** ☒ pest management strategy		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	An explanation linking **two** of the following • prevent insects destroying crops (1) • increased yield (1) • more profit (1) OR • no need to spray crops (with chemicals) (1) • reduced chemical levels in food (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	An explanation linking the following • take up (farm) land (1) • which could have been used to grow food crops (1)	less space for food crops = 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	An explanation linking the following • renewable energy resource (1) • appropriate reference to fossil fuels/can be re-grown quickly (1) OR • remove CO_2 from air when growing • carbon neutral/doesn't increase atmospheric CO_2 level (1)	sustainable reduces global warming/greenhouse gas levels	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a) (i)	42 ± 1 (^{o}C)	accept any whole number or decimal between 41.0 and 43.0	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	A description including **three** of the following • bacteria (1) • change lactose (1) • into lactic acid (1) • lowers the pH (1) • which changes the shape of milk proteins /coagulate proteins (1)	ferment lactose sets/thickens/clots the milk/curdles ignore: milk solidifies / hardens	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)	**D** ☒ using aseptic precautions		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)	A description including **two** of the following • (microorganisms) grow quickly (1) • independent of climate (1) • easy to manipulate/modify (1) • use waste products as food source (1) • vegetarian alternative to meat (1)	quicker to produce anywhere in the world	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(i)	**A** ☒ chymosin		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(d)(ii)	A description including **two** of the following • cheaper (1) • more availability of enzyme (to make more cheese) (1) • suitable for vegetarians (1) • fewer religious objections (1) • animal rights / no calves killed (1)	ignore making the cheese faster	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)	**A** ☒ one X chromosome		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	correct gametes (1) correct offspring (1) 2 <table><tr><td></td><td>X</td><td>Y</td></tr><tr><td>X</td><td>XX</td><td>XY</td></tr><tr><td>X</td><td>XX</td><td>XY</td></tr></table> marks 1 <table><tr><td></td><td>X</td><td>X</td></tr><tr><td>X</td><td>XX</td><td>XX</td></tr><tr><td>Y</td><td>XY</td><td>XY</td></tr></table> mark	<table><tr><td></td><td>Y</td><td>X</td></tr><tr><td>X</td><td>XY</td><td>XX</td></tr><tr><td>X</td><td>XY</td><td>XX</td></tr></table> 2 marks <table><tr><td></td><td>X</td><td>X</td></tr><tr><td>Y</td><td>YX</td><td>YX</td></tr><tr><td>X</td><td>XX</td><td>XX</td></tr></table> 1 mark Please note: XY or YX are both correct. The letters can be written in either order. letters can be upper or lower case. female offspring must be shown as XX and not a single large X ecf – If the gametes are reversed then the Punnett square must be completed correctly and show the valid offspring genotypes, two XX and two XY.	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	50(%)		**(1)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	A description including some of the following points: Uterus lining • menstruation occurs between day 1 and 5/6 • this is when the lining of the uterus is shed • the lining of the uterus is then built back up • at day 14 ovulation occurs • the lining of the uterus is maintained/thickened • to prepare for a fertilised ovum • if the ovum is not fertilised • the cycle starts again Hormones involved • oestrogen levels are low in the early part of the cycle • oestrogen levels increase prior to ovulation • after ovulation oestrogen levels drop • the oestrogen levels remain higher than before ovulation • from day 1 – 14 progesterone levels are low • progesterone levels rise after ovulation • hormone levels drop if the ovum is not fertilised	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of the changes in the lining of the uterus wall OR the hormone levels over the 28 day period • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description of the changes in the lining of the uterus wall AND a mention of the role of least one of the hormones • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of the changes in the lining of the uterus wall AND the role of hormones related to ovulation or uterus lining thickness • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
5(d)	An explanation linking **two** of the following • uterus wall maintained/thickened (1) • progesterone levels remain high/increase(1)	accept to provide a place for the fertilised egg/embryo/fetus to develop	**(2)**

Question Number	Answer	Acceptable answers	Mark
6 (a) (i)	12 (1) 12/20 (1) 60 (%)	3 marks for correct bald answer	**(3)**

Question Number	Answer	Acceptable answers	Mark
6 (a)(ii)	**D** ☒ innate		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a) (iii)	A suggestion including any **two** from • flatworms are a similar colour as darker rocks (1) • so are camouflaged (1) • less likely to be seen (by predators) (1)	accept less likely to be eaten	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)**	An explanation including some of the following points Sound signals • to attract a mate • to warn about predators • to scare predators away/other animals • to locate young/parents • to establish territory • to maintain social groups Visual signals • to attract a mate • to scare off other animals • to show emotions • feeding of young Chemical signals • to attract a mate • to scare off other animals • to mark territory	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of at least one type of signal OR one use of signal animals use to communicate • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description of at least two types of signals animals use to communicate OR a detailed description of one using an example • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of at least two different types of signals animals use to communicate with examples • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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