Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Biology

Unit B3: Using Biology

Foundation Tier

Sample Assessment Material
Time: 1 hour

Paper Reference
5BI3F/01

You do not need any other materials.

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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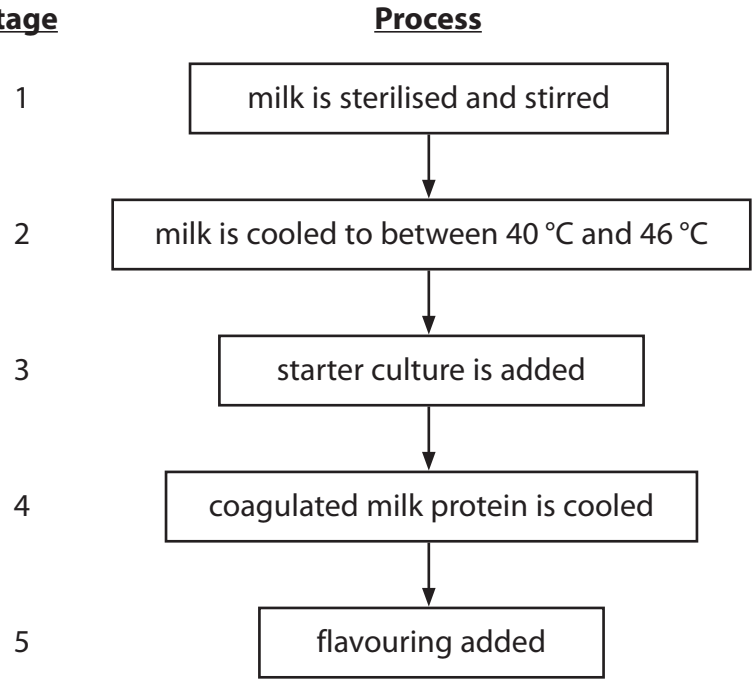
Answer ALL questions

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 ☒.

Making yogurt

1 The flow chart shows the stages in making yogurt.



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

(i) Why is it important that the milk is sterilised in stage 1?

(1)

☒ **A** to prevent bacteria being introduced in stage 3

☒ **B** to provide the optimum temperature for enzymes

☒ **C** to kill any harmful bacteria present in the milk

☒ **D** to provide the right temperature for useful bacteria

(ii) Why is the starter culture added at stage 3?

(1)

☒ **A** to remove bacteria

☒ **B** to thicken the milk and for flavouring

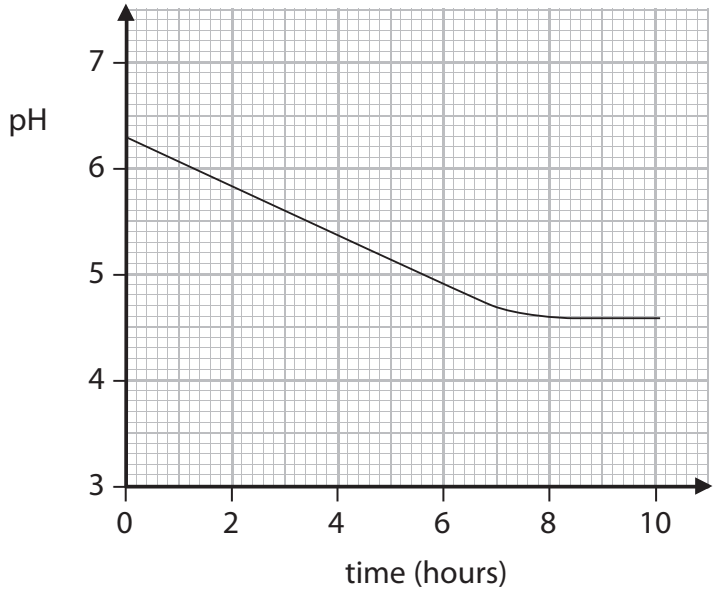
☒ **C** to increase the pH

☒ **D** to maintain optimum conditions

(b) During yogurt production the following reaction takes place:

lactose ⟶ lactic acid

The graph shows how the pH of the milk changes during the yogurt-making process.



(i) Describe the trend shown by the graph between 0 and 10 hours.

(2)

(ii) The reaction shown by the graph took place at 45 °C.
Draw another line on the graph to show how the pH would change if the reaction took place at 20 °C.

(2)

(iii) Explain why the pH of the milk changes.

(2)

(Total for Question 1 = 8 marks)

2 (a) The photograph shows a wolf.

(i) Suggest **one** way in which the wolf is communicating.
Use the photograph to support your answer.

(1)

.....

.....

(ii) Suggest what the wolf is communicating.

(1)

.....

.....

(iii) Give **one** other way, **not** shown in the photograph, in which animals communicate.

(1)

.....

.....

(b) Wolves live in packs.

Usually only the alpha male and alpha female breed. They produce one litter of pups each year.

Suggest **one** benefit to the pack of only producing one litter a year.

(2)

(c) Wolves that live near airports are less likely to run away from loud sounds compared to those that live in the wilderness.

Explain how the behaviour of the wolves near the airport shows habituation.

(2)

(d) Sniffer dogs have been trained to detect illegal substances.

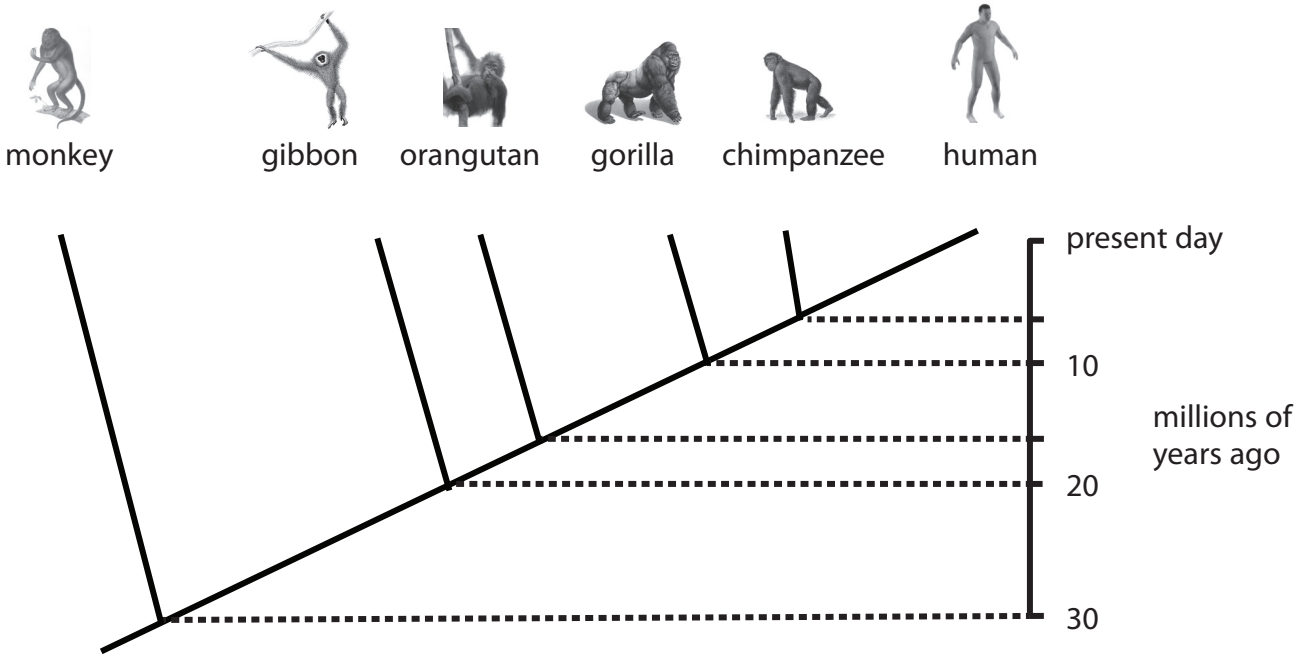
Describe how this type of behaviour is learned.

(2)

(Total for Question 2 = 9 marks)

The history of humans

3 The diagram shows a possible evolutionary tree for primates.



(a) Use information in the diagram to answer the questions which follow.

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

(i) Which species evolved 16 million years ago?

(1)

☒ **A** chimpanzee

☒ **B** gorilla

☒ **C** orangutan

☒ **D** monkey

(ii) Which species is most closely related to humans?

(1)

☒ **A** chimpanzee

☒ **B** gorilla

☒ **C** orangutan

☒ **D** monkey

(b) These pictures are of two stone tools. One is much older than the other.

Explain how these stone tools could provide evidence for human evolution.

(2)

(c) Fossils also provide evidence for human evolution.

Give the name and date of one hominid fossil found in the past 5 million years.

(2)

(d) In an Ice Age, the temperature of the Earth becomes lower.

Describe how humans changed their behaviour to survive during the last Ice Age.

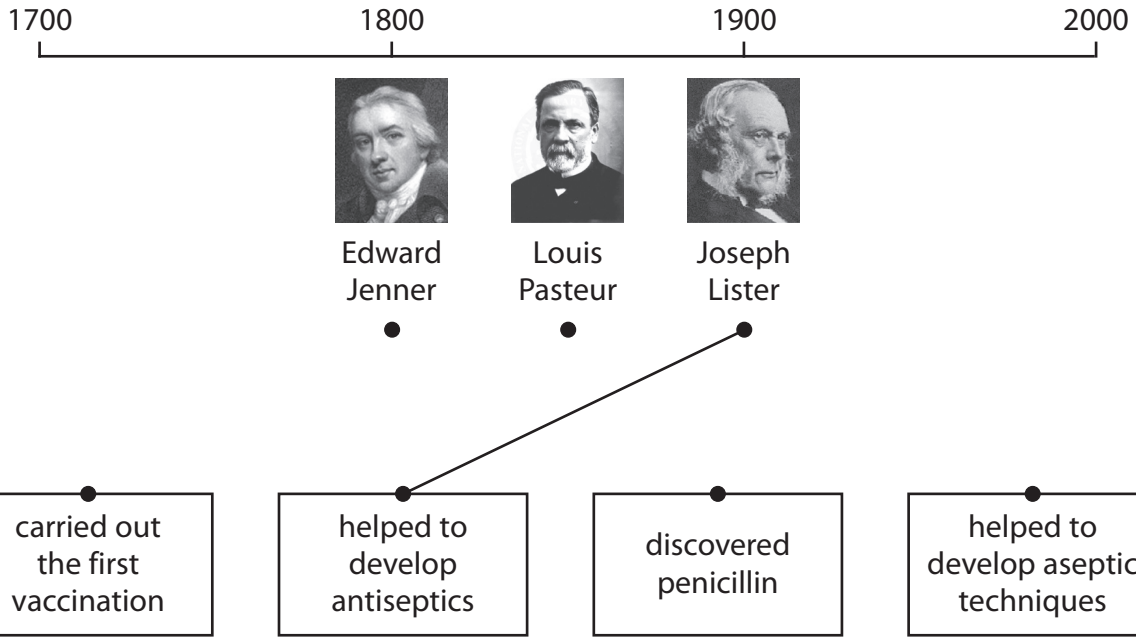
(3)

(Total for Question 3 = 9 marks)

Disease prevention and treatment

4 (a) Draw **one** straight line from each scientist to their contribution to science.
One has already been done for you.

(1)



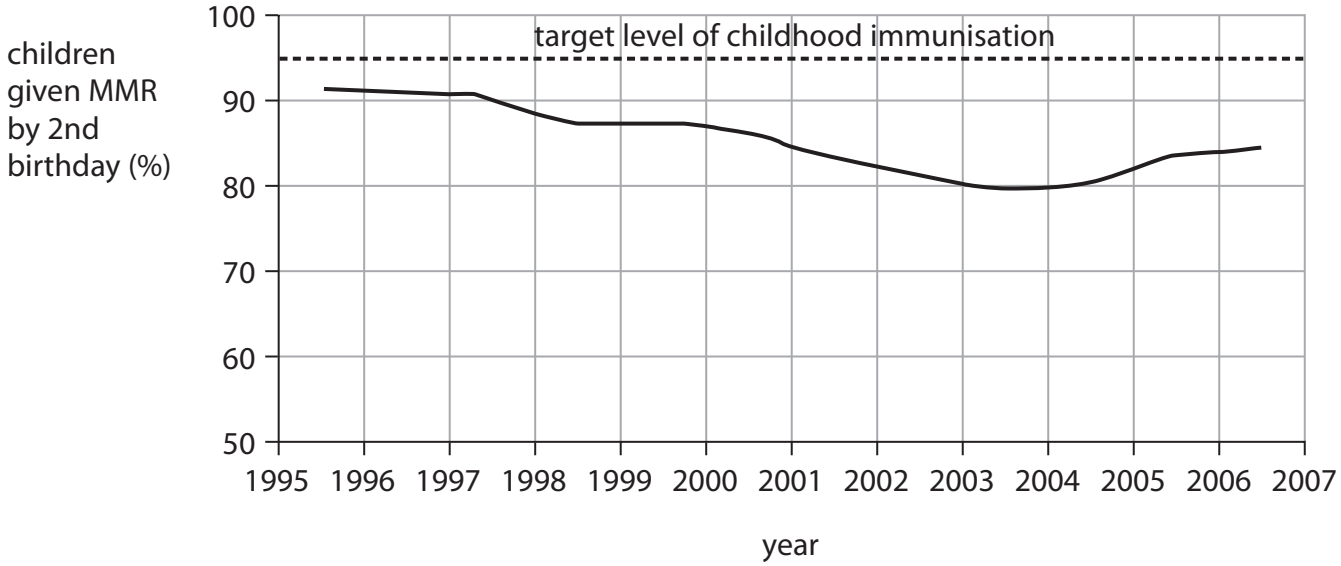
Immunisation can be used to prevent people getting a disease.

(b) Describe how the body responds to immunisation.

(3)

MMR is an immunisation that protects people from measles, mumps and rubella.

The graph shows the percentage of children who had been given the MMR immunisation by the time they were two years old.



Data: Health Protection Agency

In 1997 a doctor announced that the MMR immunisation could be harmful.

(c) Use the graph to describe the effect that this announcement has had on the number of children immunised with MMR since 1997.

(2)

.....

.....

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.....

(d) (i) Kidney infections can be caused by bacteria.
State **two** functions of the kidneys.

(2)

1 .....

.....

2 .....

.....

(ii) Nephritis is a kidney disease which can lead to kidney failure.

Describe a treatment for nephritis.

(2)

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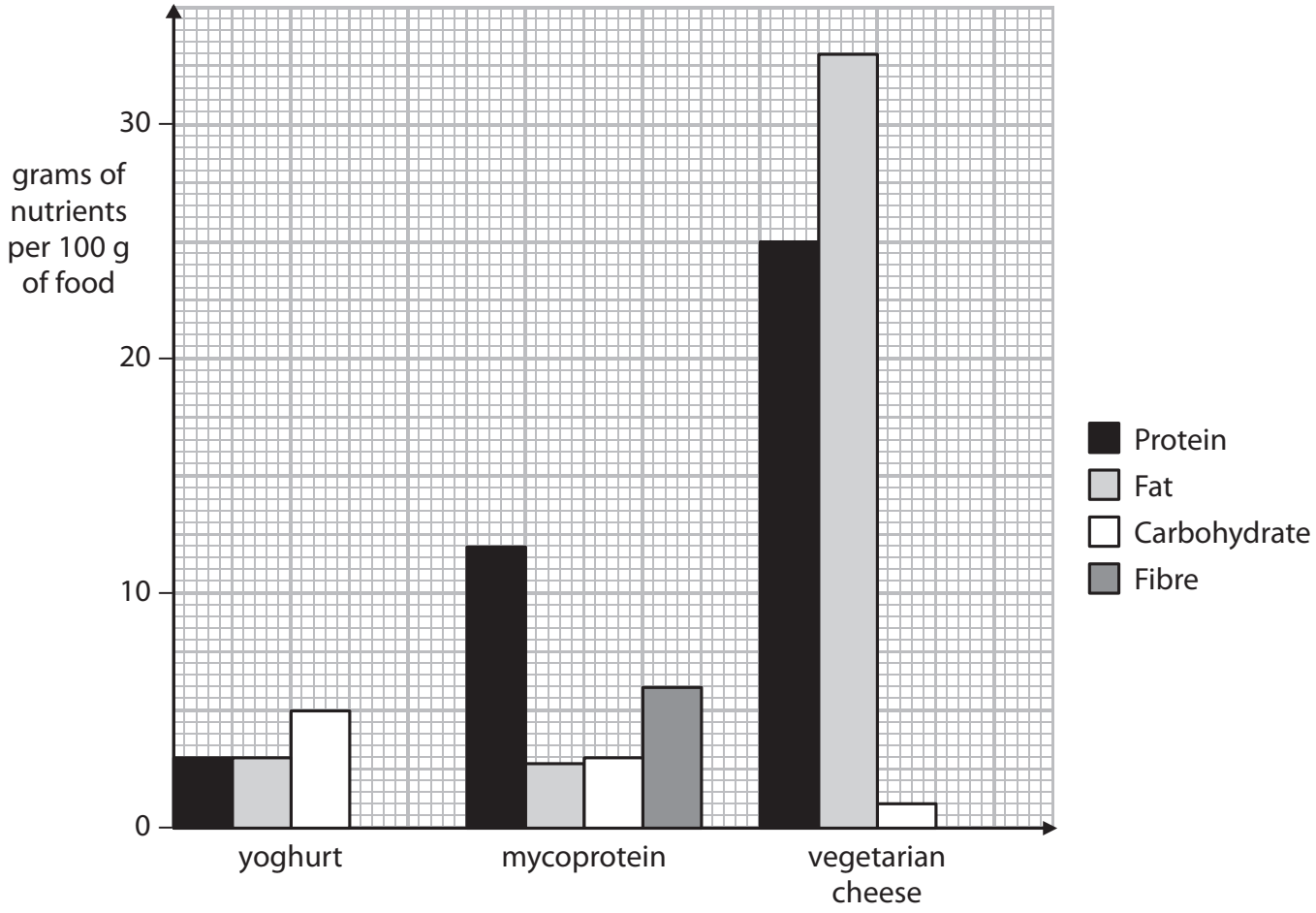
(Total for Question 4 = 10 marks)

Useful microbes

5 The graph shows some of the nutrients present in three types of food.



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

(i) How much more protein does 100 g of vegetarian cheese contain compared to 100 g of mycoprotein?

(1)

☒ **A** 12 g

☒ **B** 13 g

☒ **C** 23 g

☒ **D** 25 g

(ii) Which substance is used in the manufacture of vegetarian cheese?

(1)

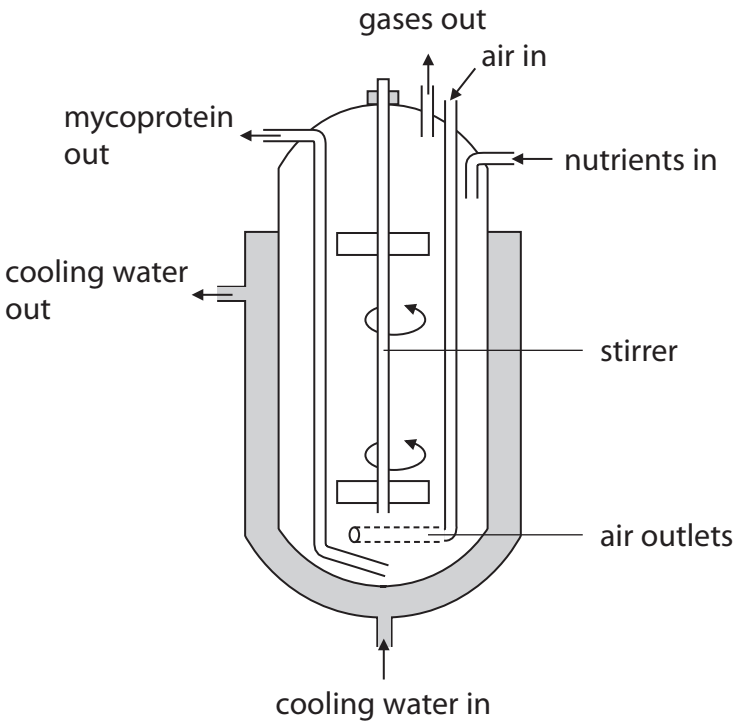
☒ **A** chymosin

☒ **B** invertase

☒ **C** ligase

☒ **D** *Agrobacterium tumefaciens*

(b) Mycoprotein is currently produced in large fermenters.
The process takes about 6 weeks.



(i) Explain why air is bubbled through the fermenter.

(2)

(ii) Explain why aseptic conditions are essential when setting up a fermenter.

(2)

*(c) Microorganisms are used to produce food such as mycoprotein.

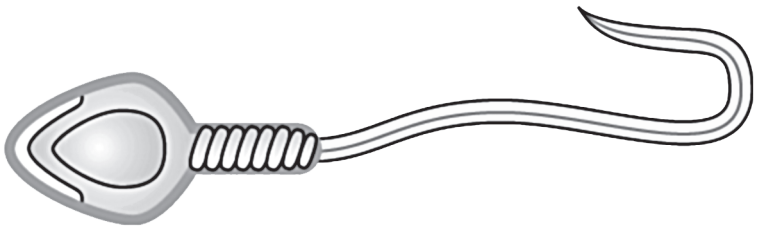
What are the advantages of using micro-organisms?

(6)

(Total for Question 5 = 12 marks)

A new life

6 (a) The diagram shows a human sperm.



(i) Label the acrosome on the diagram.

(1)

(ii) A species of mammal has 36 chromosomes in its body cells.

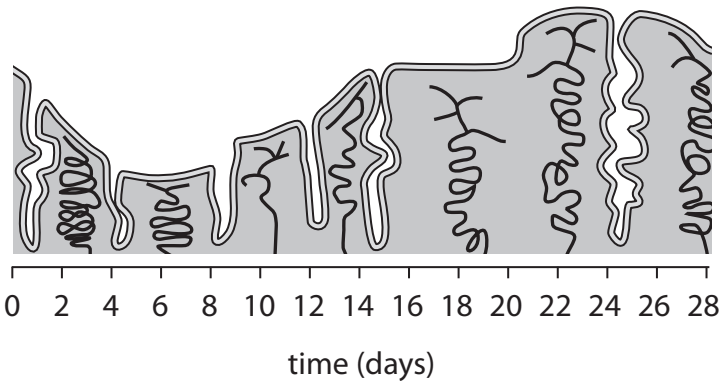
State the number of chromosomes in each sperm.

(1)

(iii) Explain why sperm contain many mitochondria.

(2)

(b) The diagram shows how the depth of the uterus lining (endometrium) changes during the menstrual cycle.



Use the diagram to explain the changes in depth of the uterus lining (endometrium) from day 0 to 14.

(2)

*(c) Explain how a sperm and ovum fuse and develop to produce a **male** embryo.
You may use a genetic diagram to help with your answer.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

Sample Mark Scheme

Unit B3: Using Biology (Foundation Tier)

Question number	Answer	Mark
1(a)(i)	**C**	**(1)**

Question number	Answer	Mark
1(a)(ii)	**B**	**(1)**

Question number	Answer	Mark
1(b)(i)	a description including **two** of the following: pH decreases (1) pH then levels off (1) correct manipulation of figures (1)	**(2)**

Question number	Answer	Acceptable answers	Mark
1(b)(ii)	line starting at pH 6.3 (1) finishing between pH 4.6 and pH 6.3 (1)	(+/- ½ square)	**(2)**

Question number	Answer	Acceptable answers	Mark
1(b)(iii)	an explanation linking the following: (because) bacteria convert lactose to lactic acid (1) (but) slows down/stops because acid conditions then kill bacteria (1)	 lactic acid (produced) which lowers pH/increases acidity accept all lactose used up	**(2)**

TOTAL: 8 MARKS

Question number	Answer	Acceptable answers	Mark
2(a)(i)	baring teeth raised hackles/hair eye contact	accept rigid body	**(1)**

Question number	Answer	Acceptable answers	Mark
2(a)(ii)	aggression/anger/warning/fear	accept an example of a warning	**(1)**

Question number	Answer	Acceptable answers	Mark
2(a)(iii)	gestures/pheromones/sound / language /writing/sign language / posture	accept named examples	**(1)**

Question number	Answer	Acceptable answers	Mark
2(b)	an answer linking a pair of the following: fewer wolves need to stay with young (1) (so) pack strength is not depleted too much (1) resources/food for the pack often scarce (1) (so) too many young cannot be supported (1)	accept the idea that fewer young could be easier to protect for 1 mark	**(2)**

Question number	Answer	Acceptable answers	Mark
2(c)	an explanation linking the following: wolves have learned that loud noises are harmless (1) (therefore) they ignore the stimulus (loud noise) (1)		**(2)**

Question number	Answer	Acceptable answers	Mark
2(d)	a description including **two** of the following: dog exhibits desired behaviour/finds substances (1) desired behaviour/dog is rewarded/positive reinforcement (1) (leads to) (operant) conditioning (1)		**(2)**

TOTAL: 9 MARKS

Question number	Answer	Mark
3(a)(i)	**C**	**(1)**

Question number	Answer	Mark
3(a)(ii)	**A**	**(1)**

Question number	Answer	Mark
3(b)	an explanation linking the following: more recent tool is sharper/more defined/carved/shaped (1) (so) requires greater manipulation/dexterity/brain function (1)	**(2)**

Question number	Answer	Acceptable answers	Mark
3(c)	Ardi 4.4 million years or Lucy 3.2 million years	accept any named fossil discovered by Richard Leakey 1.6 million years ago	**(2)**

Question number	Answer	Acceptable answers	Mark
3(d)	a description including **three** of the following: migration to warmer areas (1) using more skins/fur for clothing (1) more/warmer shelters built (1) greater cooperation/communication (1) greater use of fire (1)	more hunting of animals (1)	**(3)**

TOTAL: 9 MARKS

Question number	Answer	Acceptable answers	Mark
4(a)	line from Jenner to 'carried out the first vaccination' line from Pasteur to 'helped to develop aseptic techniques'	no mark if more than one line drawn from either of the scientists if only one correct, no mark	**(1)**

Question number	Answer	Mark
4(b)	a description including **three** of the following in a logical order: (immunisation) introduces antigens/harmless/dead pathogens (1) targets an immune response (1) white blood cells produce antibodies (1) triggers the production of memory lymphocytes(1)	**(3)**

Question number	Answer	Acceptable answers	Mark
4(c)	a description including **two** of the following: initial decrease in percentage of children vaccinated (1) lowest level in 2003/2004 (1) since 2003/2004 percentage of children vaccinated has increased (1)	10% decrease	**(2)**

Question number	Answer	Acceptable answers	Mark
4(d)(i)	any **two** from: production/excretion of urine/urea (from the blood) (1) excretion of excess water (1) excretion of excess salts (1)	Accept osmoregulation	**(2)**

Question number	Answer	Mark
4(d)(ii)	a description linking **two** of the following: kidney dialysis (1) which filters blood of patient (1) OR kidney transplant (1) which replaces the faulty kidney (1)	**(2)**

TOTAL: 10 MARKS

Question number	Answer	Mark
5(a)(i)	**B**	**(1)**

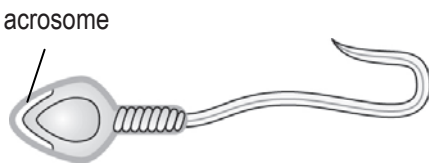
Question number	Answer	Mark
5(a)(ii)	**A**	**(1)**

Question number	Answer	Mark
5(b)(i)	an explanation linking a pair of the following: fungi/*Fusarium* is 'aerobic' (1) (so) requires oxygen for respiration (1) to mix the culture (1) (which) reduces 'dead pockets'/areas of low nutrient level/areas of low oxygen level/areas of high waste products/heat (1)	**(2)**

Question number	Answer	Acceptable answers	Mark
5(b)(ii)	an explanation linking the following: sterilise/kill microorganisms (1) (so) culture doesn't compete for nutrients (1)	 (so) stops harmful/unwanted waste products contaminating product	**(2)**

Question number		Indicative content	Mark
***5(c) QWC**		an answer including some of the following: • contains less fat than other foods • contains more fibre than other foods/yogurt/vegetarian cheese • contains more protein than yogurt • high yields/large amounts produced in a short amount of time • cheaper to produce compared to growing crops/animal farming • production is independent of climate • less space needed to cultivate microbes/produce food • micro-organisms obtained/cultivated easily • micro-organisms can be easily genetically modified	**(6)**
Level	**0**	No rewardable material	
1	**1-2**	• information is brief with minimal coverage of indicative content • only one or two simple points mentioned • the response lacks clarity and organisation with the advantages not clearly emphasised • very limited use of scientific terminology. Spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• an incomplete description of the advantages of growing mycoprotein • some advantages will be vague but the response does cover several points to give clear advantages • may give correct calculations showing differences in amounts of nutrients • use of some scientific terms accurately and show some organisation of events. Spelling, punctuation and grammar are used with some accuracy	
3	**5-6**	• a complete description of the advantages and response may extend beyond points given to give a more in-depth description of some of the points • clearly indicates the advantages of growing mycoprotein and scientific terminology is used accurately throughout • may give correct calculations showing differences in amounts of nutrients • the response is coherent and organised. Spelling, punctuation and grammar are used accurately throughout	

TOTAL: 12 MARKS

Question number	Answer	Acceptable answers	Mark
6(a)(i)		label line to correct position even if word 'acrosome' not included	**(1)**

Question number	Answer	Mark
6(a)(ii)	18	**(1)**

Question number	Answer	Mark
6(a)(iii)	An explanation to include **two** of the following: • mitochondria are the site of aerobic respiration (1) • provide energy (1) for motility/swimming to the ovum (1)	**(2)**

Question number	Answer	Mark
6(b)	an explanation linking the following: (from day 0 to day 6), lining breaks down because of menstruation (1) (from day 6-8 to day 14) lining then repaired/built up/maintained to allow implantation and good blood supply (1)	**(2)**

Question number		Indicative content	Mark
***6(c) QWC**		an explanation including some of the following: • acrosome penetrates ovum • enzymes digest jelly wall • fertilisation • formation of zygote/fertilised ovum • sperm contains Y chromosome • egg/ovum contains X chromosome • chromosomes (from sperm and egg) mix/Y from sperm pairs with X from egg/ovum • XY is male • XX is female • cell division/mitosis • to form embryo • accept correct genetic diagram showing formation of correct male/female offspring genotypes and phenotypes for marking points 8 and 9	**(6)**
Level	**0**	No rewardable material	
1	**1-2**	• many of the stages missing with only one or two mentioned in simple language • lacks clarity and organisation with stages not in any order • very limited use of scientific terminology. Spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• an incomplete explanation of events that lead to formation of a male embryo • some of the stages will be missing but the explanation would lead to the formation of a male embryo • use of some scientific terms accurately and shows some organisation of events • spelling, punctuation and grammar are used with some accuracy	
3	**5-6**	• a complete explanation of the stages, in order, leading to the formation of a male embryo • the response is coherent and organised • scientific terminology is used accurately throughout. Spelling, punctuation and grammar are used accurately throughout	

TOTAL: 12 MARKS

