CCEA GCSE SCIENCE: SINGLE AWARD (MODULAR)

SCIENCE



EXAM QUESTION PACK

MODULE 2 HIGHER TIER GSC22 PAPERS

STEMUP

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

GSC22

TUESDAY 15 MAY 2012, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

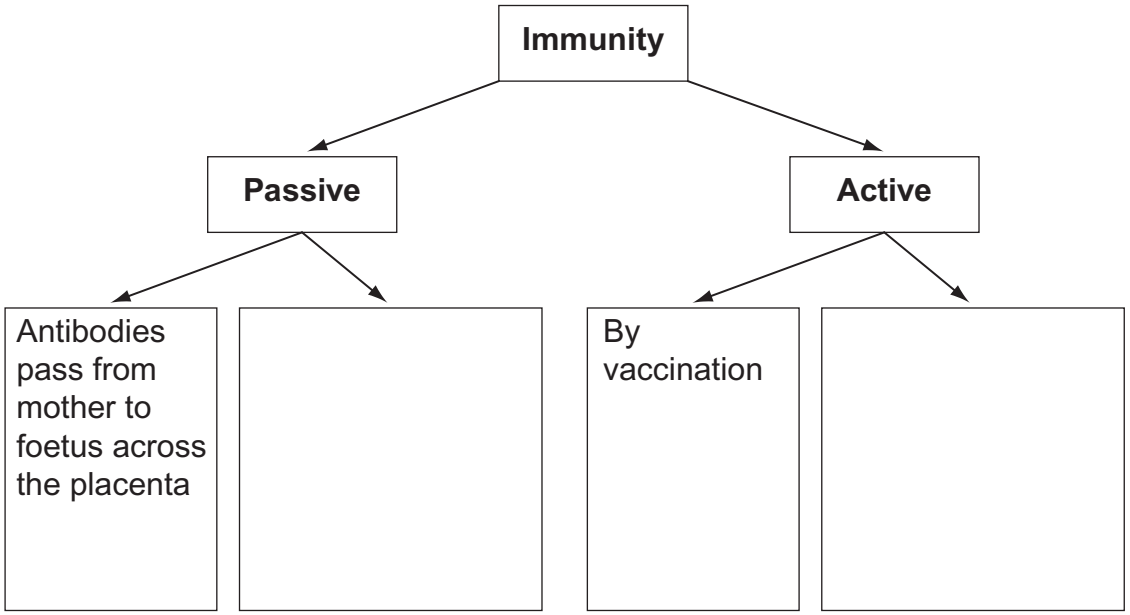
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** The following flow chart shows one way that passive immunity is achieved and one way that active immunity is achieved.



(i) Complete the diagram by giving one other way that each type of immunity can be achieved. [2]

(ii) Give one advantage and one disadvantage of passive immunity.

Advantage _____

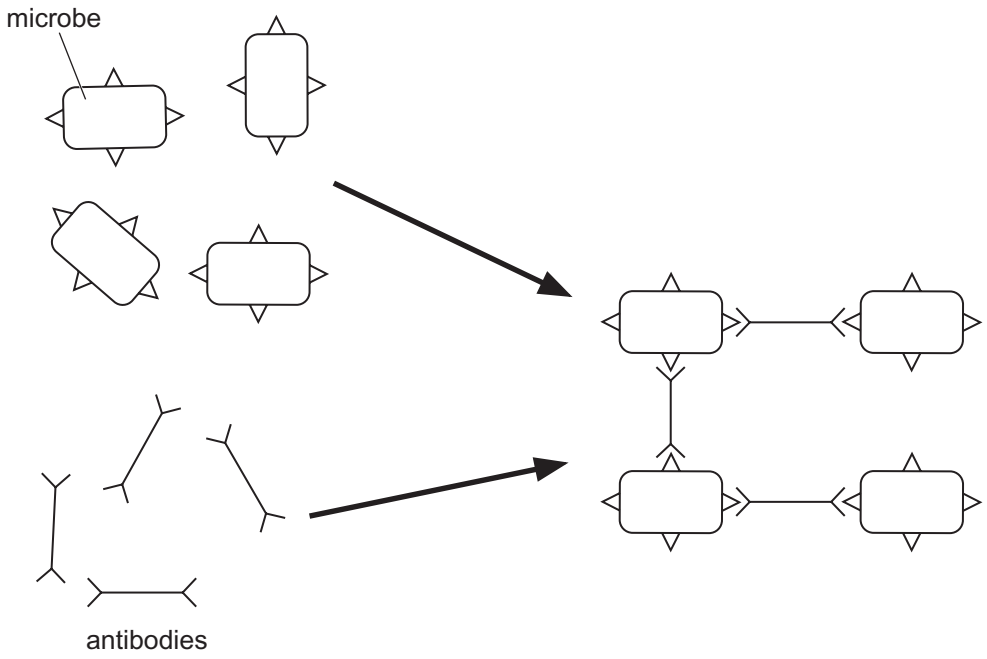
_____

Disadvantage _____

_____ [2]

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(b) The diagram below shows how antibodies combat microbes.



(i) Use the diagram and your knowledge to explain how antibodies combat microbes.

_____

_____

_____

_____

_____

_____ [3]

(ii) Name the process in which white blood cells engulf and digest microbes.

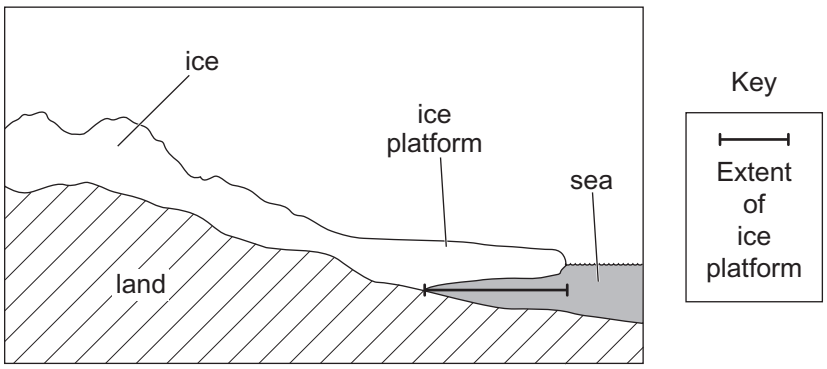
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** Polar bears hunt seals from ice 'platforms'.



The table below shows the maximum distance that the ice platform extended beyond an island in the Arctic from 1950–2010.

Year	Extent of ice platform/km
1950	3.5
1960	3.25
1970	2.8
1980	2.6
1990	2.4
2000	2.3
2010	2.2

(i) State the trend shown by the information given in the table.

_____

_____ [1]

(ii) It is thought that the change in the ice platform is due to global warming. Explain fully the cause of global warming and how this information shows evidence that it is happening.

_____

_____

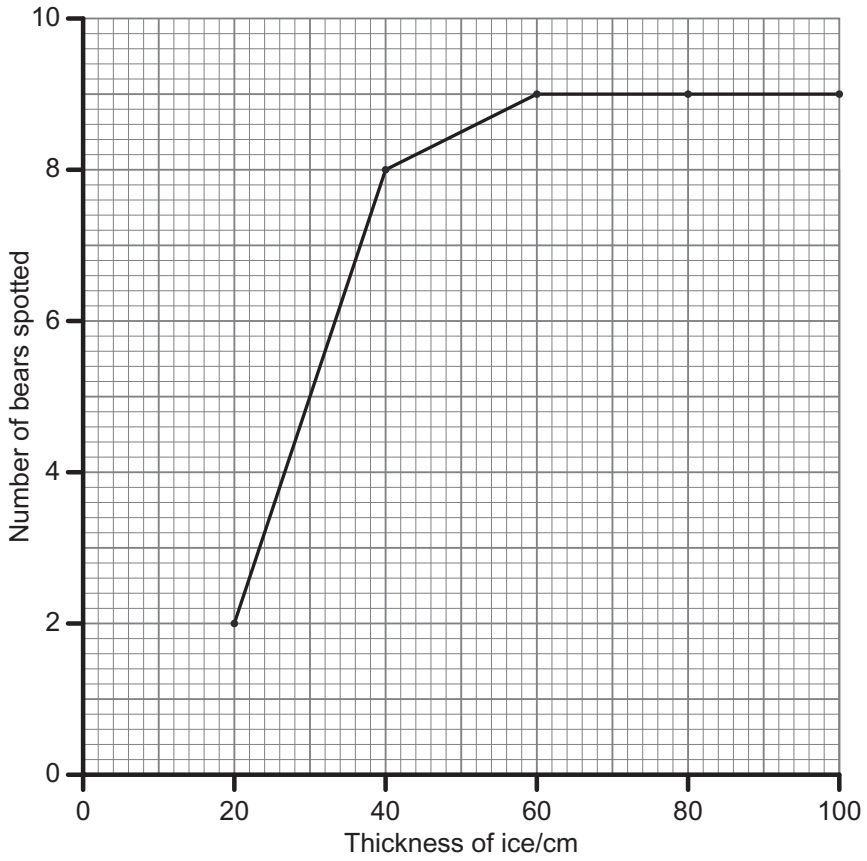
_____

_____

_____ [3]

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(b) Scientists also found that the platforms are getting thinner and this has affected the number of polar bears on the ice. The graph below shows the number of polar bears spotted on different thicknesses of ice.



(i) Suggest a reason why no polar bears have been spotted on ice below 20 cm in thickness.

_____ [1]

(ii) Suggest what will happen to polar bears if the ice thickness continues to decrease.

_____ [1]

The extent and thickness of ice are examples of abiotic factors.

(iii) What is meant by the term **abiotic**?

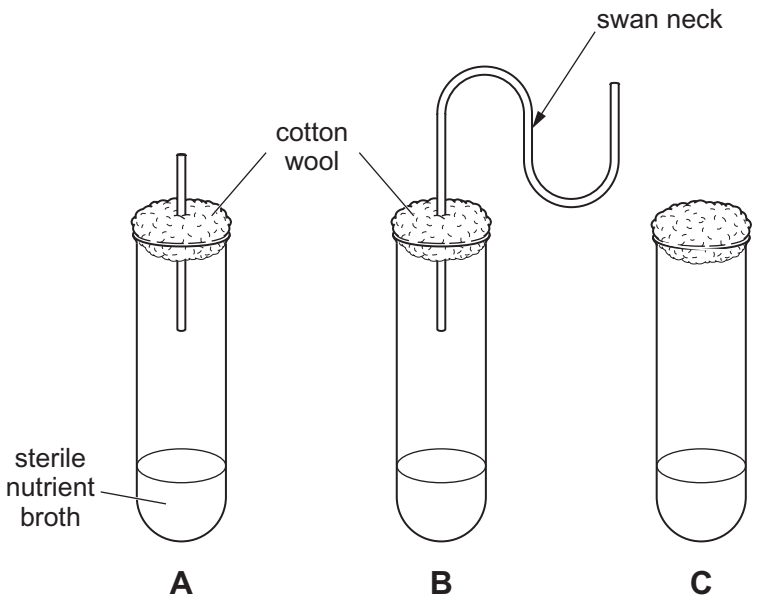
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 **(a)** An investigation about microbial growth in nutrient broth was set up as shown.



(i) Which tube(s) (**A**, **B** or **C**) will contain contaminated broth over a period of time?

_____ [1]

(ii) In the table below place a tick (✓) beside any action that must be taken to give valid results (to ensure a fair test is carried out).

Action	**Tick**
Same type of broth used in all tubes	
Same volume of broth used in all tubes	
Tubes kept in darkness during the investigation	
Tubes kept in bright light during the investigation	
Tubes kept at the same temperature during the investigation	
Tubes left for same length of time during the investigation	

[2]

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(b) Other investigations into microbes led to the discovery of penicillin. Describe how penicillin was discovered.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** Most textbooks describe acid rain as an example of air pollution.

(i) Suggest why describing acid rain as an example of **air** pollution is not a completely accurate description.

_____

_____ [1]

(ii) Suggest why some countries that have very little industry are affected by acid rain.

_____

_____ [2]

(b) Air pollution is also caused by people smoking.

The table below shows the results of a survey of men who smoke. The survey was taken in a large town.

Year	Percentage of each age group who smoke			
	15–20	**21–40**	**41–60**	**60+**
1990	25	33	32	28
2010	25	26	25	18

(i) Describe the relationship between age and smoking in 2010.

_____

_____

_____ [2]

(ii) Calculate the percentage change in the 60+ age group between 1990 and 2010.

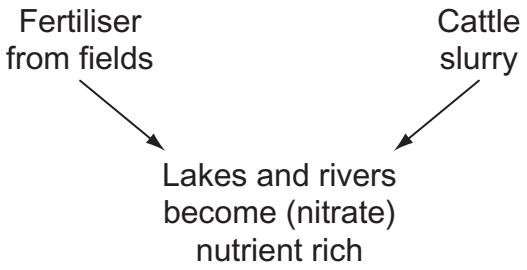
_____ [1]

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(iii) Most smokers would like to give up smoking but they find stopping difficult. Name the chemical in cigarette smoke that makes stopping difficult.

_____ [1]

(c) The diagram below shows how some farming activities can cause water pollution.



(i) Use the flow diagram and your knowledge to explain how the European Nitrates Directive helps reduce water pollution.

_____

_____

_____

_____ [3]

(ii) Suggest **one** consequence of lakes and rivers becoming nitrate rich.

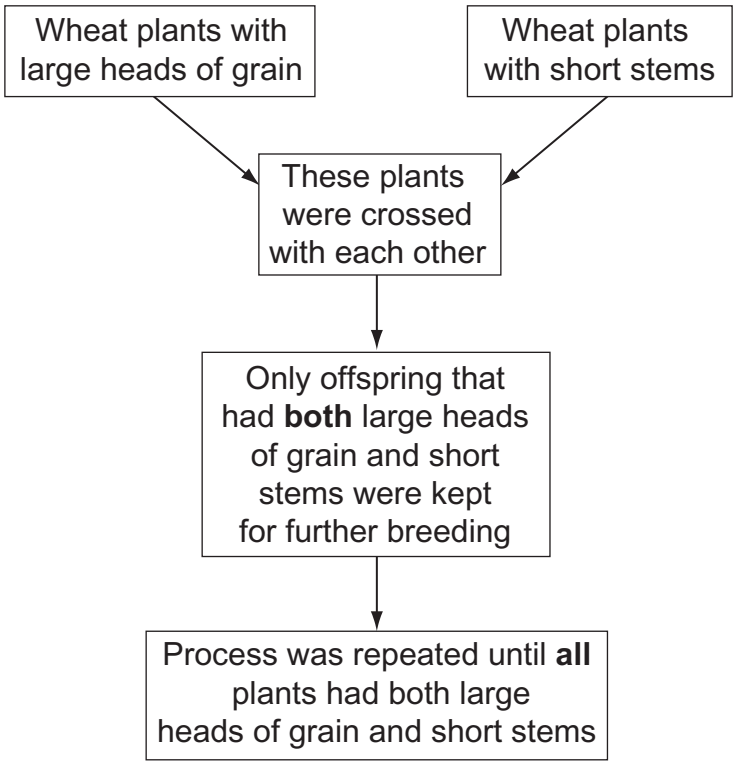
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The following flow chart shows how modern wheat plants were produced from ancient varieties by artificial selection.



(i) Describe and explain **two** advantages to the farmer of using modern wheat instead of the ancient varieties.

1. _____

_____

_____

2. _____

_____

_____ [4]

(ii) Suggest **one** difference between the type of selection described in wheat and natural selection.

_____

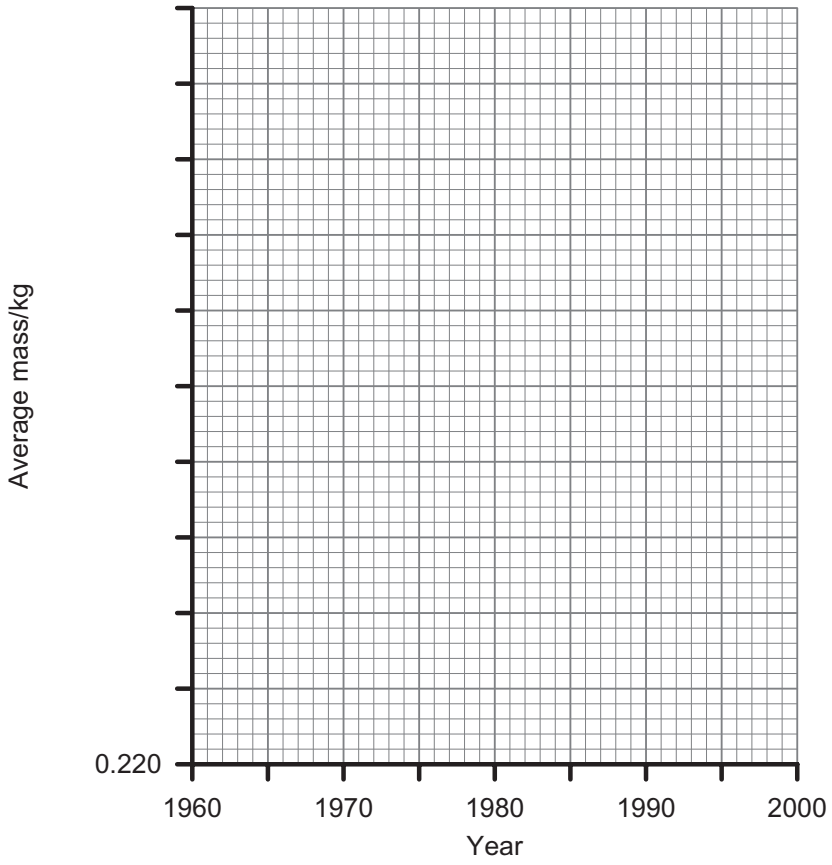
_____ [1]

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(b) Carrots have undergone selection in a similar process to wheat. The table below shows how the average mass of one type of carrot has changed between 1960 and 2000.

Year	Average mass/kg
1960	0.220
1970	0.245
1980	0.250
1990	0.280
2000	0.320

(i) Plot this data as a line graph on the axes below.
(You need to complete the scaling for average mass.)



[4]

As well as becoming heavier the carrots have become more evenly-sized.

(ii) Suggest **one** advantage of this to the farmer.

_____ [1]

Examiner Only

Marks	Remark

6 Describe and explain the processes involved in drug testing before drugs are licensed for use.

[4]

Examiner Only	
Marks	Remark

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112905

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

TUESDAY 15 MAY 2012
9.15 am–10.00 am

MARK SCHEME

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				AVAILABLE MARKS
1	(a)	(i)	Passive – injection of antibodies/mother's milk; Active – catching the disease/named disease/illness [2]	
		(ii)	passive immunity is faster acting; passive immunity lasts for a shorter period of time/ not permanent [2]	
	(b)	(i)	antibodies same shape/complementary to antigens; combine with antigen/microbe; clump bacteria together/stop them spreading in body [3]	
		(ii)	phagocytosis [1]	8
2	(a)	(i)	extent of ice platform decreases with time [1]	
		(ii)	ice platform decreases/less ice/ice melting; increased carbon dioxide levels in atmosphere/traps heat; increased combustion/ deforestation/reduced photosynthesis [3]	
	(b)	(i)	ice too thin (to support weight)/ice breaks/polar bears too heavy [1]	
		(ii)	endangered/extinct [1]	
		(iii)	non-living factor [1]	7
3	(a)	(i)	tube A [1]	

(ii)

Action	Tick
Same type of broth used in all tubes	✓
Same volume of broth used in all tubes	neutral (either alternatives allowed)
Tubes kept in darkness during the investigation	
Tubes kept in bright light during the investigation	
Tubes kept at the same temperature during the investigation	✓
Tubes left for same length of time during the investigation	✓

(all correct = 2; 1 mistake = 1) [2]

(b) Fleming; observed that (substance diffusing from) fungus restricted growth/killed bacteria; substance isolated/purified *(any two)* [2] — 5

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					AVAILABLE MARKS
4	**(a)**	**(i)**	affects trees/fish (organisms in water or on land)/buildings	[1]	
		(ii)	SO_2 dissolves/(acid rain) forms in clouds; clouds move	[2]	
	(b)	**(i)**	little difference between 15-20, 21-40, 41-60 groups; 60+ group lower	[2]	
		(ii)	10% decrease	[1]	
		(iii)	nicotine	[1]	
	(c)	**(i)**	cannot spray near water; no spraying in winter/closed periods; when plants can't grow/when too wet/rain forecast/frozen fields; efficient storage of fertiliser/slurry; prevents/reduces leaching/ run-off into rivers *(any three)*	[3]	
		(ii)	growth of algae/harms/death of fish/eutrophication/affects taste/ harmful to babies	[1]	11
5	**(a)**	**(i)**	better 'heads'/crop/better quality/better harvest; more profit; shorter plants/more even heights; easier to harvest/less likely to suffer wind damage;	[4]	
		(ii)	Artificial selection is faster/caused by man	[1]	
	(b)	**(i)**	Axis scaled = 1; all points accurately plotted = 2; (one error = 1; line accurately drawn point to point = 1	[4]	
		(ii)	easier to process/harvest/package/more marketable	[1]	10
6	*in vitro* testing is testing on cells/in laboratory; animal testing as whole body system/avoids human testing; (clinical) tests on patients/volunteers; for side effects/effectiveness (applies to 2nd or 3rd point)			[4]	4
			Total		**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Tier

[GSC22]

GSC22

MONDAY 27 FEBRUARY 2012
11.00 am–11.45 am

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

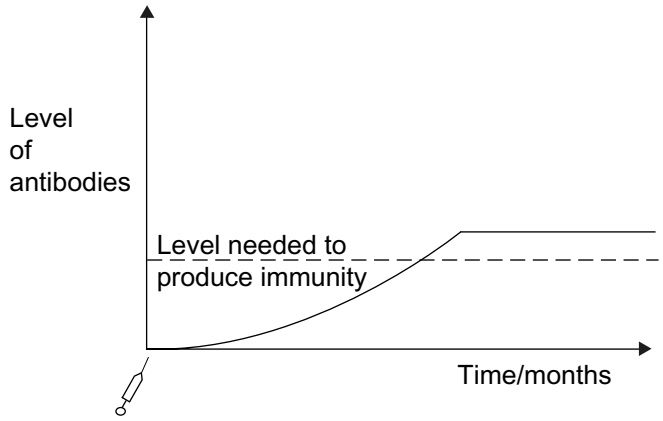
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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** The following graph shows how the levels of antibody change in the blood following a vaccination.



Use **only** the information provided to answer parts **(i)** and **(ii)**.

(i) Give **one** reason why vaccinations for common illnesses are given to babies and young children many months before they are likely to come in contact with infections.

_____ [1]

(ii) What is the evidence that vaccinations provide long-term protection?

_____ [1]

(b) Colin got the flu vaccination in September. He gets infected with the flu virus in February. Explain how the vaccination stops him getting ill.

_____

_____

_____

_____

_____

_____ [4]

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Examiner Only	
Marks	Remark

(c) (i) Travellers to certain foreign countries have to get a number of 'travel' vaccinations before they travel.

Explain why these travel vaccinations are necessary.

_____

_____

_____ [2]

(ii) Name the type of immunity that travel vaccinations provide.

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** Zebra mussels are an example of a competitive invasive species.



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http://archive.nics.gov.uk/env/050701b-env.htm

They have spread across most of the major waterways in Northern Ireland and are damaging natural habitats. Zebra mussels were accidentally introduced into Ireland as a result of human activity. They produce a sticky substance that allows them to attach to hard objects such as rocks and the bottom of boats.

(i) Suggest **one** way that man has helped zebra mussels spread to Ireland.

_____ [1]

(ii) Name **one** other competitive invasive species.

_____ [1]

(iii) State **two** characteristics of competitive invasive species.

_____

_____ [2]

(b) We can monitor the health of the environment by using abiotic and biotic information.

(i) What is meant by a biotic factor?

_____ [1]

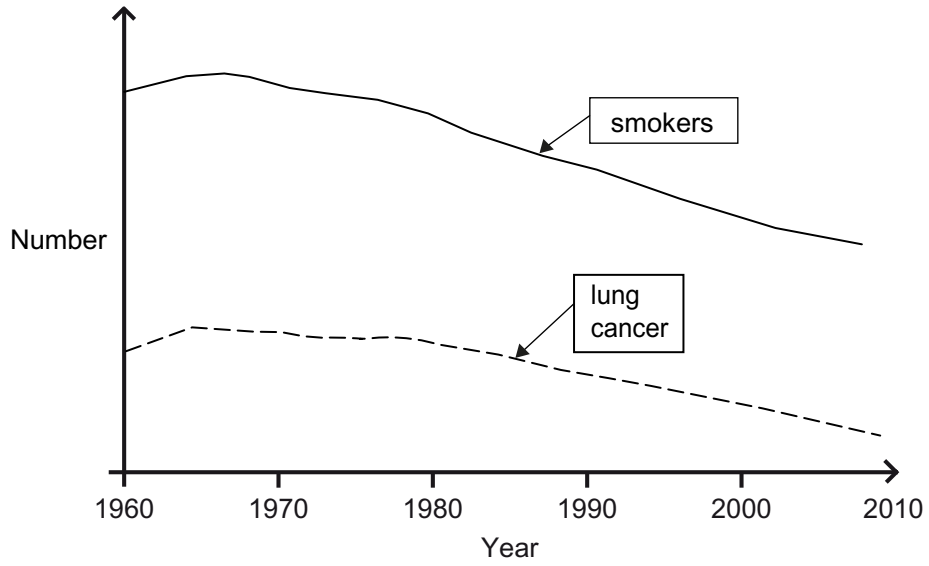
(ii) Name **one** organism that can be used to monitor pollution levels.

_____ [1]

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Examiner Only	
Marks	Remark

3 **(a)** The following graph shows trends for smoking and lung cancer in men between 1960 and 2010.



(i) Suggest **one** reason why the number of men smoking has fallen in recent years.

_____ [1]

(ii) Over 80% of the men who got lung cancer smoked tobacco. Suggest **one** reason why a non-smoker could get lung cancer.

_____ [1]

(iii) Name **one** other lung disease caused by smoking.

_____ [1]

(b) In an effort to reduce the harm caused by alcohol the Government relaxed the law on closing times for bars and clubs. Many remain open much later than they used to and the bars and clubs in a city centre do not all close at the same time.

Suggest **one** reason how this could help reduce the harm caused by alcohol.

_____

_____ [1]

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Examiner Only	
Marks	Remark

4 **(a)** The table below shows the number and average weight of fish caught by one boat in 2000 and 2010.

Year	Number/ thousands	Average weight/ kg
2000	13.7	0.67
2010	9.8	0.96

(i) Calculate the increase in the average weight of fish caught from 2000 to 2010.

_____ kg [1]

(ii) Suggest a reason for this change.

_____ [1]

(iii) Use the information to suggest why the fishermen are able to make as much profit in 2010 as in 2000 even though they caught fewer fish.

_____ [1]

(b) We need to maintain world food stocks to feed an increasing human population.

Give **two** reasons why the human population is increasing.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

5 **(a)** Complete the carbon cycle showing how the processes of photosynthesis, respiration, fossilisation and combustion remove and add carbon dioxide to the air.

Carbon dioxide in the air

[3]

(b) Global warming occurs because the carbon cycle has become 'unbalanced' over the last 150 years leading to a rise in atmospheric levels of carbon dioxide.

Give **two** reasons why the carbon cycle has become 'unbalanced'.

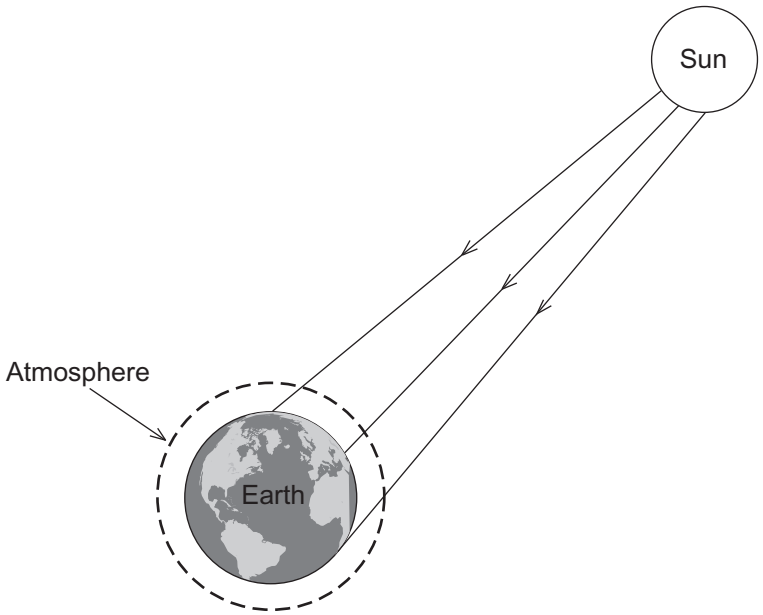
_____

_____

_____ [2]

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(c) Complete the diagram below to show how rising carbon dioxide levels cause global warming.



[1]

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(d) The Kyoto protocol (1997) was an international agreement aimed at slowing down global warming.

Give **one** reason why another agreement is necessary to replace the Kyoto protocol.

_____

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** The picture below shows a group of animal rights protesters.



© Alex Macnaughton / Rex Features Ltd

(i) Name the stages immediately before and immediately after animal testing in drug development.

Before _____ After _____ [1]

(ii) Apart from ethical considerations, give **one** advantage and **one** disadvantage of using animals in drug development.

_____

_____

_____ [2]

(iii) Give **one** alternative to animal testing.

_____ [1]

(b) With progress in the genetic profiling of humans (working out each individual's unique DNA – a sophisticated and costly process) it will soon be possible to 'tailor' drug treatment to individual patients. This will mean that the types and strengths of drugs used will be unique to individual patients, i.e. 'designer drugs'.

Suggest **one** advantage and **one** disadvantage of 'designer drugs'.

Advantage _____

_____

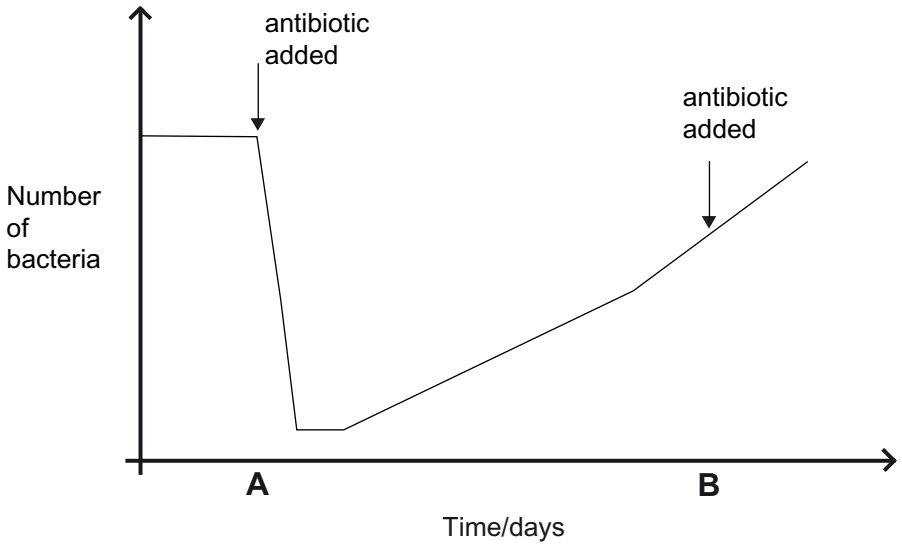
Disadvantage _____

_____ [2]

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Examiner Only	
Marks	Remark

7 The following graph shows the effects of an antibiotic on the number of bacteria growing in a Petri dish.



The same type and strength of antibiotic was added to the Petri dish at times A and B.

(a) What is the evidence that a very small percentage of the bacteria were antibiotic resistant at the start of the experiment?

_____

_____ [1]

(b) How does the graph demonstrate:

(i) natural selection?

_____

_____ [2]

(ii) evolution?

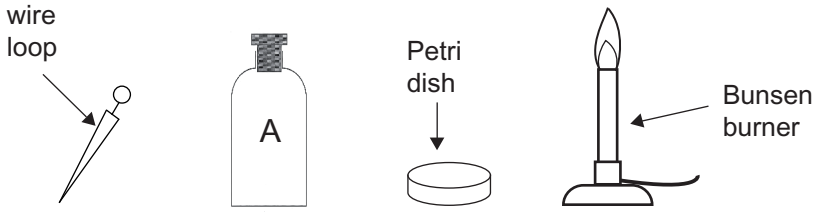
_____

_____ [2]

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Examiner Only	
Marks	Remark

(c) When carrying out experiments on bacteria it is important to use aseptic technique.



The apparatus in the diagram above is used to transfer bacteria from culture bottle A to the Petri dish. State **three** things you would do during the transfer to avoid contamination.

_____

_____

_____

_____ [3]

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Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Tier

[GSC22]

MONDAY 27 FEBRUARY
11.00 am – 11.45 am

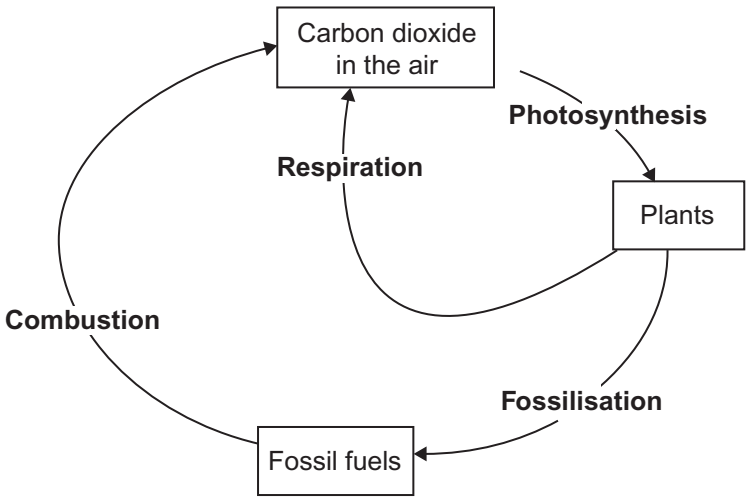
MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	length of time to produce (enough) antibodies/reach immunity	[1]	
		(ii)	number remains constant/no or very small reduction with time/ lasts months/stays above line	[1]	
	(b)		modified (flu-causing) microbes; antibodies produced by body; complementary to antigen/microbe; attach/form clumps of microbes/ immobilisation; phagocytosis; memory cells remain (any four)	[4]	
	(c)	**(i)**	new microbes/antigens/diseases; no antibodies to combat/ new antibodies needed	[2]	
		(ii)	active	[1]	9
2	**(a)**	**(i)**	spread by boats or other acceptable method	[1]	
		(ii)	rhododendron/grey squirrel	[1]	
		(iii)	non-native/introduced by man; spread/number rising/grow quickly/ reproduce fast; damage habitats/native species/more successful/ dominant than native species (any two)	[2]	
	(b)	**(i)**	living/plant and animal	[1]	
		(ii)	lichens	[1]	6
3	**(a)**	**(i)**	education/advertising/cost	[1]	
		(ii)	passive smoking/hereditary factors/industrial chemicals	[1]	
		(iii)	bronchitis/emphysema	[1]	
	(b)		people less likely to binge drink/reduced violence (as smaller crowds on street)	[1]	4
4	**(a)**	**(i)**	0.29 kg	[1]	
		(ii)	larger mesh sizes/fishing later in the season	[1]	
		(iii)	larger fish (sell for more)/overall mass more/fewer fish so cost increases	[1]	
	(b)		living longer; better medical care; better sanitation/hygiene; better nutrition/diet (any two)	[2]	5

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		AVAILABLE MARKS
5	**(a)** all stages/processes shown = 3, each stage clearly shown 1 mark each [max 3]	



[3]

(b) more burning of fossil fuels; deforestation/fewer trees [2]

(c) continue rays to show some reflecting back from atmosphere/ not escaping from atmosphere [1]

(d) some countries opted out/targets too low/not met/global warming still occurring (must imply Kyoto not working) [1] — 7

6 **(a)** **(i)** in vitro testing – clinical trials [1]

(ii) advantage – whole body system/no risk to humans/less testing on humans
disadvantage – species differences [2]

(iii) advanced in vitro testing/computer modelling [1]

(b) advantage – more effective/fewer side effects
disadvantage – cost/shortage of specialists [2] — 6

7 **(a)** not all bacteria killed when antibiotic first used [1]

(b) **(i)** non resistant bacteria killed; antibiotic resistant bacteria survive [2]

(ii) change in bacteria over time; second antibiotic shows that all surviving bacteria are antibiotic resistant [2]

(c) sterilise loop; replace lid in A/heat neck of bottle; partially open Petri dish lid only/replace lid quickly; carry out procedure beside lit Bunsen burner to sterilise air (any three) [3] — 8

Total — **45**

STEMUP.CO.UK

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

TUESDAY 8 NOVEMBER 2011
2.30 pm–3.15 pm

GSC22

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 **Fig. A** shows newly emerged seedlings surrounding their parent tree.

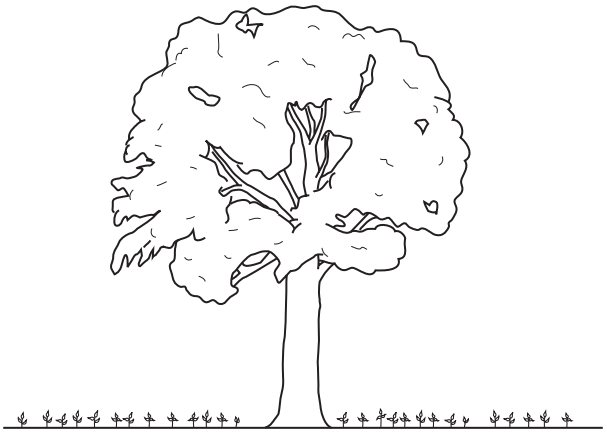


Fig. A

Fig. B shows the seedlings a year later under the same tree.

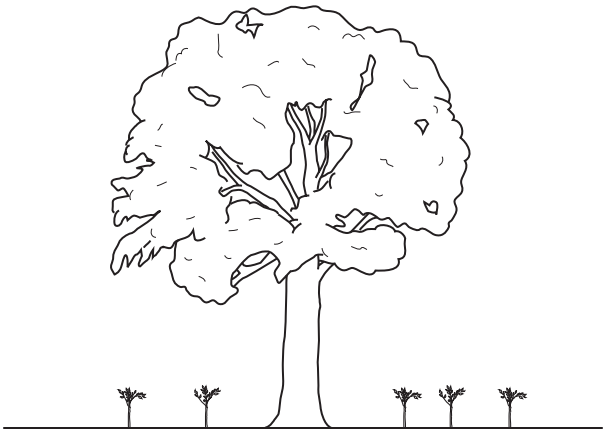


Fig. B

Describe and explain the differences in the number and distribution of seedlings between **Figs. A** and **B**.

_____

_____

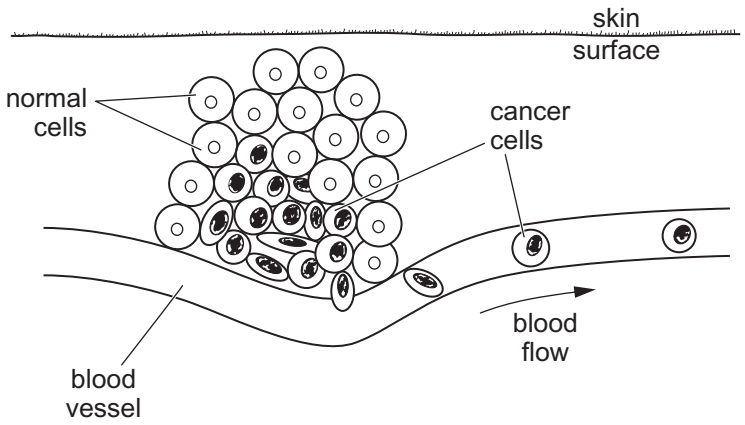
_____

_____ [4]

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Examiner Only	
Marks	Remark

2 **(a)** The following diagram represents skin cancer.



(i) Use the diagram to suggest how cancer can spread to other parts of the body.

_____

_____ [1]

(ii) Explain how skin cancer cells develop.

_____

_____

_____

_____ [3]

(iii) Suggest one reason why the number of people from Northern Ireland getting skin cancer is increasing.

_____ [1]

(b) Name the condition caused by having one extra chromosome in **each** body cell.

_____ [1]

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(c) Siobhan is to visit Africa for the first time.

Examiner Only	
Marks	Remark

(i) Suggest why she should have a number of new vaccinations before travelling.

_____

_____

_____ [2]

(ii) Explain why these vaccinations have to be given several weeks before she goes on holiday.

_____ [1]

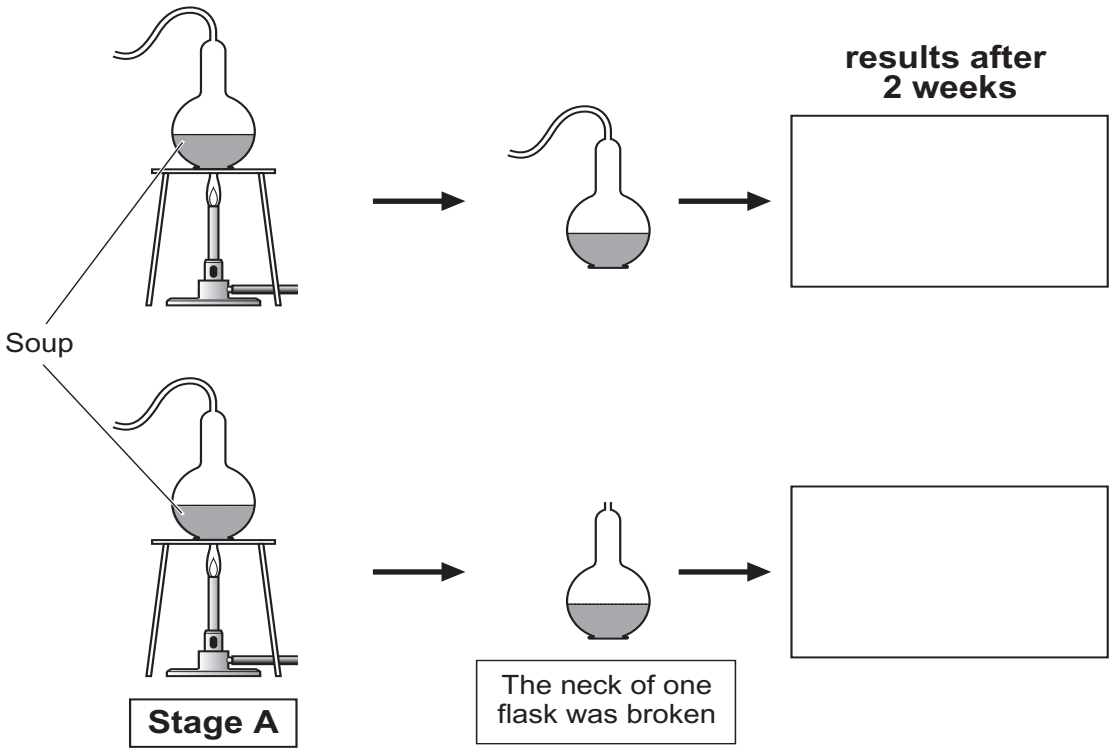
(iii) Suggest why vaccinations such as MMR are free but many travel vaccinations have to be paid for.

_____ [1]

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Examiner Only	
Marks	Remark

3 The following experiment was carried out in a science class.



Adapted from: © GCSE biology for CCEA by R McIlwaine & J Napier, page 69, published by Hodder & Stoughton, 2003. ISBN 9780340858257. Reproduced by permission of Hodder Education

(a) Explain why the flasks and their contents are boiled for 10 minutes in **Stage A**.

_____ [1]

(b) Complete the boxes on the diagram to describe the results you would expect after two weeks. [2]

(c) About one hundred and fifty years ago Louis Pasteur carried out a similar experiment. Explain fully the conclusion he made from his experiment.

_____

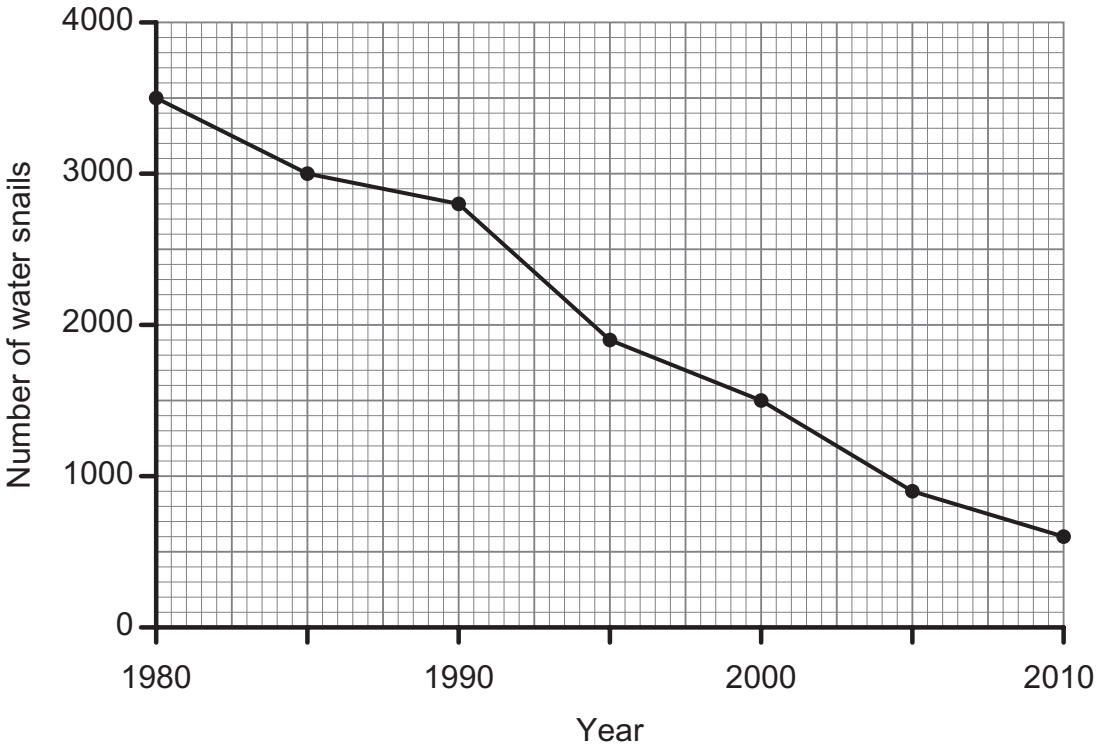
_____

_____ [2]

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Examiner Only	
Marks	Remark

4 The graph below shows how the number of water snails has changed in a Northern Ireland river over the last thirty years.



(a) On average the number of snails is falling by around 100 per year. Based on this trend in which year will the snails become extinct in this river?

Year _____ [1]

(b) It is thought that the water snail is an endangered species due to nitrate pollution.

(i) Snail numbers is an example of a biotic factor. What is meant by the term biotic?

_____ [1]

(ii) Suggest one source of nitrate pollution and state how the amount of pollution from this source could be reduced.

_____

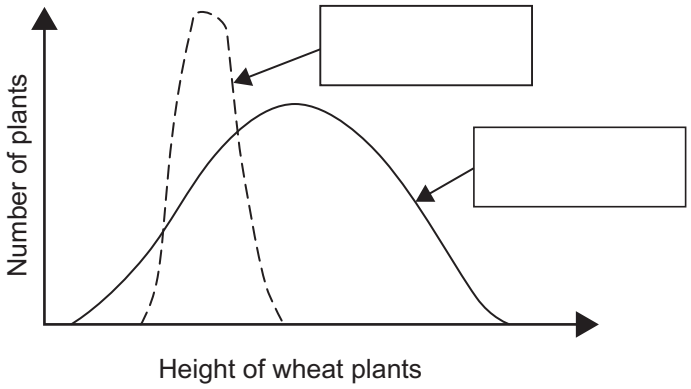
_____ [2]

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Examiner Only	
Marks	Remark

5 **(a)** Over thousands of years man has cultivated wheat with the result that modern wheat plants are much less variable in height than ancient wheat.

(i) On the graph below, label the curves for ancient and modern wheat. [1]



(ii) Use the information provided and your knowledge to describe and explain one advantage of growing the modern wheat variety.

_____

_____

_____ [2]

(iii) Name the type of selection involved.

_____ [1]

(iv) Modern wheat also has a bigger 'grain head' compared to ancient wheat. Explain why this is an advantage.

_____ [1]

(b) **(i)** Name the scientist who developed the theory of evolution.

_____ [1]

(ii) Give one reason why the theory of evolution has remained controversial.

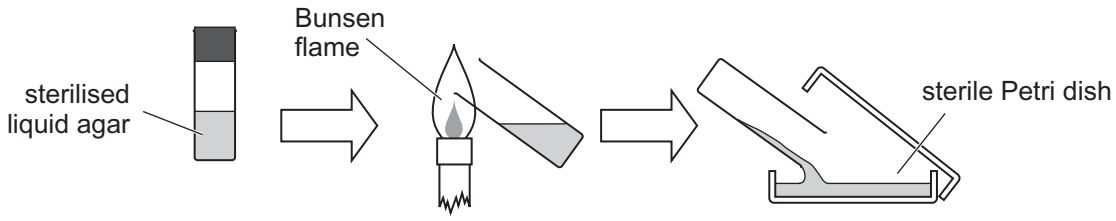
_____

_____ [1]

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Examiner Only	
Marks	Remark

6 **(a)** The diagram shows how to pour an agar plate.



(i) Use the diagram to state one thing done to avoid contamination from the air.

_____ [1]

Once the agar hardens the next stage is to transfer bacteria from a culture bottle to the Petri dish.

(ii) Describe how you would do this.

_____

_____

_____

_____ [3]

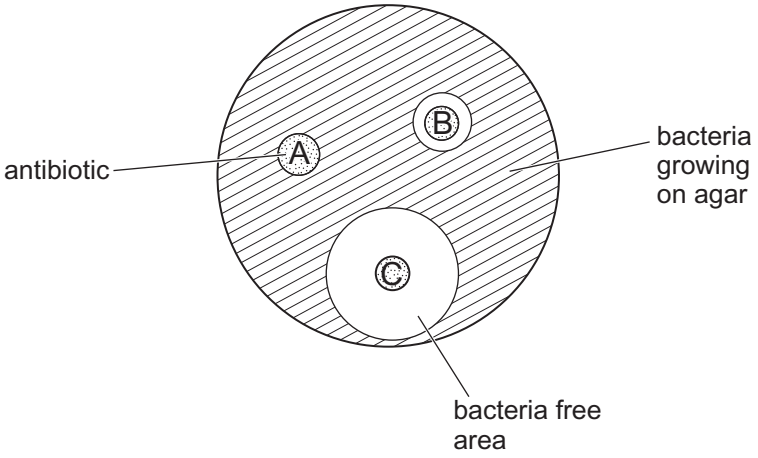
(iii) Why should the Petri dish be incubated at no more than 25 °C?

_____ [1]

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Examiner Only	
Marks	Remark

(b) The following diagram shows the effect of three different antibiotics, A, B and C, on a type of bacteria that causes septic throats in humans.



(i) Based only on the information in the diagram, suggest which antibiotic (A, B or C) scientists would recommend for use in treating patients with septic throats.

_____ [1]

(ii) Suggest one other factor that would have to be taken into account before recommending the use of this antibiotic to treat patients with septic throats.

_____ [1]

(iii) If scientists repeated the experiment, using the same antibiotics, with a 'superbug' such as MRSA, suggest what results they would get.

_____ [1]

(c) Our immune system also helps us defend against disease. Describe the role of phagocytosis in defending against disease.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

7 A landowner is keen to play his part in helping the environment. He plans to either grow willow in one of his fields as a bio-fuel or to allow the field to revert to 'set-aside'. Willow can be grown and harvested in 3–4 year cycles but it can take up to 20 years for the full range of habitats to regenerate in 'set-aside'.

Outline the benefits of each option for the environment.

Growing willow

_____

_____

_____

_____

'Set-aside'

_____

_____

_____

_____ [5]

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111954

Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Paper

[GSC22]

TUESDAY 8 NOVEMBER 2011
2.30 pm–3.15 pm

MARK SCHEME

STEMUP.CO.UK

					AVAILABLE MARKS
1	fewer seedlings; not as close together/more spread; some died/didn't grow; due to competition/for light/water/space/minerals/nutrients			[4]	4
2	**(a)**	**(i)**	through the blood system	[1]	
		(ii)	Any **three** from: mutations; in chromosome/genes/DNA; divide uncontrollably; due to UV light	[3]	
		(iii)	(more) continental holidays/(more) sunbed use	[1]	
	(b)		Down syndrome	[1]	
	(c)	**(i)**	new different/foreign diseases/antigens; does not have antibodies/memory cells	[2]	
		(ii)	for antibody level (to build up)/reach immunity level	[1]	
		(iii)	choice/not needed if not travelling/travel in luxury/not everyone goes on holiday	[1]	10
3	**(a)**		sterilise/kill microbes	[1]	
	(b)		no change/soup remained fresh; soup goes cloudy/ contaminated	[2]	
	(c)		Any **two** from: microbes cause contamination; need access; refuted spontaneous generation	[2]	5
4	**(a)**		2016	[1]	
	(b)	**(i)**	living	[1]	
		(ii)	sewage/slurry/fertiliser: better storage/not spreading fertiliser in wet weather/frozen ground/winter [**not** restrict time of spread]	[2]	4
5	**(a)**	**(i)**	curves correctly identified	[1]	
		(ii)	shorter/more even height; less likely to suffer damage/easier harvest	[2]	
		(iii)	artificial [not selective breeding]	[1]	
		(iv)	higher yields/more profit	[1]	
	(b)	**(i)**	Darwin	[1]	
		(ii)	conflict with religious beliefs	[1]	7

				AVAILABLE MARKS
6	(a)	(i)	culture tube flamed/Petri dish lid only partially opened ajar has cap [1]	
		(ii)	Any **three** from: flame loop/use disposable sterile loop; allow loop to cool; take bacteria from culture bottle; and **spread** over Petri dish; flame/dispose of loop; seal/cover Petri dish [3]	
		(iii)	avoid culturing pathogenic microbes/not growing microbes at body temperature [1]	
	(b)	(i)	C [1]	
		(ii)	side effects/how long it takes to work/costs [1]	
		(iii)	no clear areas/no antibiotic has any effect on bacteria [1]	
	(c)		phagocyte eats/engulfs microbe; digests/breaks down/kills/destroys microbe in cell [2]	10
7			**willow:** (when growing) photosynthesis/take carbon dioxide from air; less carbon dioxide given out/carbon neutral/less global warming; saves fossil fuel reserves; Any **five** from: **set-aside:** (only) takes carbon dioxide from air/photosynthesis; creates/provide habitats; increased/maintains biodiversity/range of species/plants/animals [5]	5
			Total	**45**

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

GSC22

FRIDAY 20 MAY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

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Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

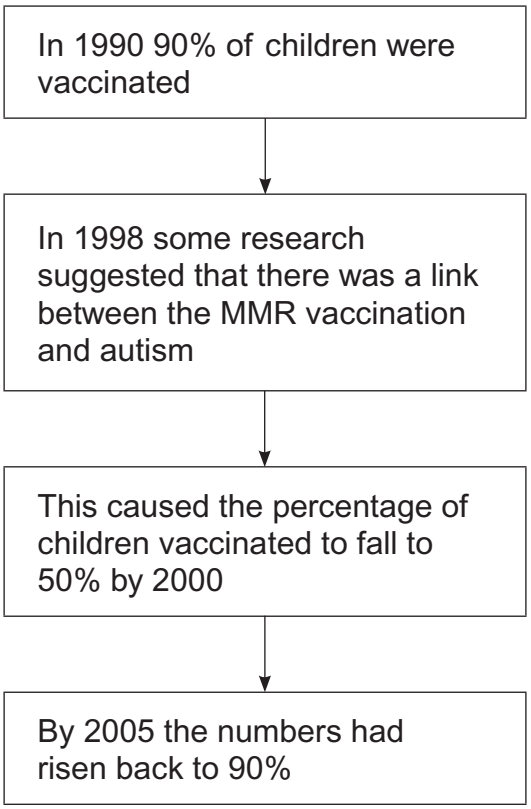
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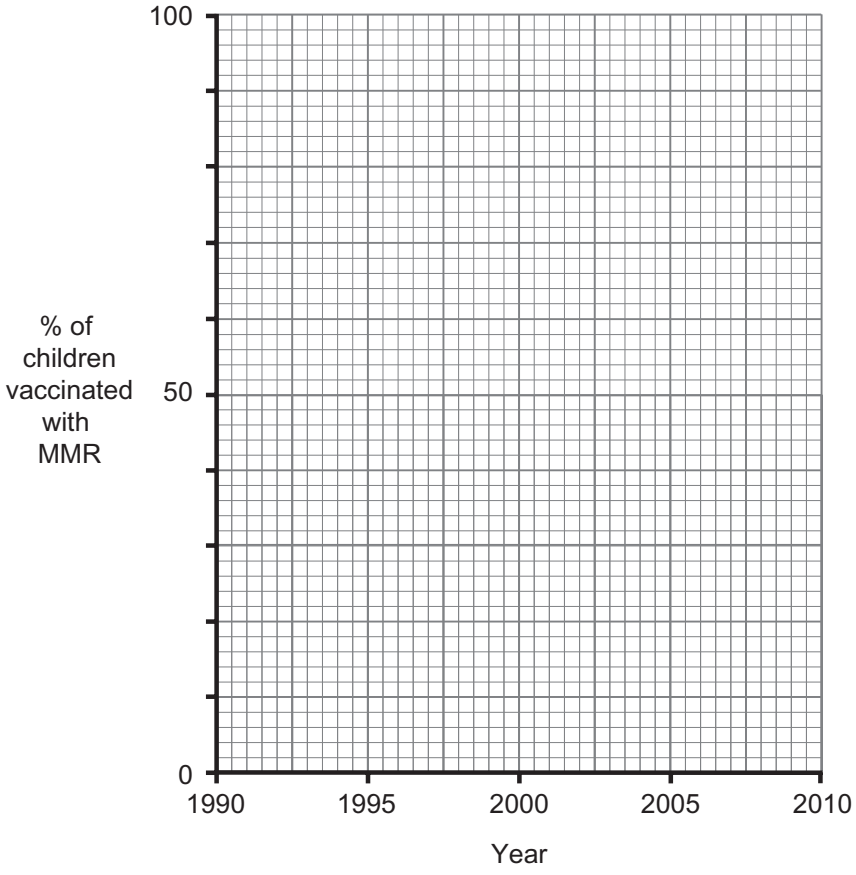
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Examiner Only	
Marks	Remark

1 **(a)** The following flowchart outlines how the number of children being vaccinated for MMR changed between 1990 and the present.



(i) Use the information provided to complete the graph below to show the change in percentage of children being vaccinated.



[2]

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(ii) Explain why the percentage of children being vaccinated for MMR has returned to the 1990 level.

_____ [1]

(b) Explain how the following help defend against harmful microbes.

Mucous membranes in the nasal cavity _____

_____ [1]

Blood clotting _____

_____ [1]

(c) Explain how antibodies protect against disease.

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** The primrose plant used to be very common in Northern Ireland; it has pretty flowers and people picked them in large numbers. It grows best in natural unfertilised grassland where it is not in the shade of other plants.



É CCEA

Its numbers have decreased for a number of reasons including the use of fertiliser to increase grass growth for cattle.

(i) Explain fully how the widespread use of fertiliser could lead to a reduction in primroses.

_____

_____ [2]

(ii) Apart from reducing the use of fertiliser on grassland, suggest **two** things that can be done to help protect the primroses from extinction.

_____

_____

_____ [2]

(b) Name **one** other endangered species and suggest one reason why it is at risk of extinction.

_____

_____ [2]

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

3 The environment can be monitored through counting the number of lichens growing on trees.



É Wildscape/Alamy

Lichen is an example of a biotic factor.

(a) What is meant by a biotic factor?

_____ [1]

(b) John investigated the number of lichen plants on ash trees at different distances from two towns (Leafyacre and Coalville).
He only counted lichens up to 2 metres from ground level and only 5 trees at each distance.

His results are shown in the table below.

	Average number of lichens on each tree	
Distance from town centre/km	**Leafyacre**	**Coalville**
0	8	0
5	7	2
10	9	3
15	8	4
20	9	5

Lichens do not grow in very industrial (polluted) areas and grow best when pollution levels are low.

(i) Describe the results for Coalville and give a suggested explanation.

_____

_____ [2]

(ii) Describe the results for Leafyacre and give a suggested explanation.

_____

_____ [2]

(iii) State two things John could have done to increase the reliability of his results.

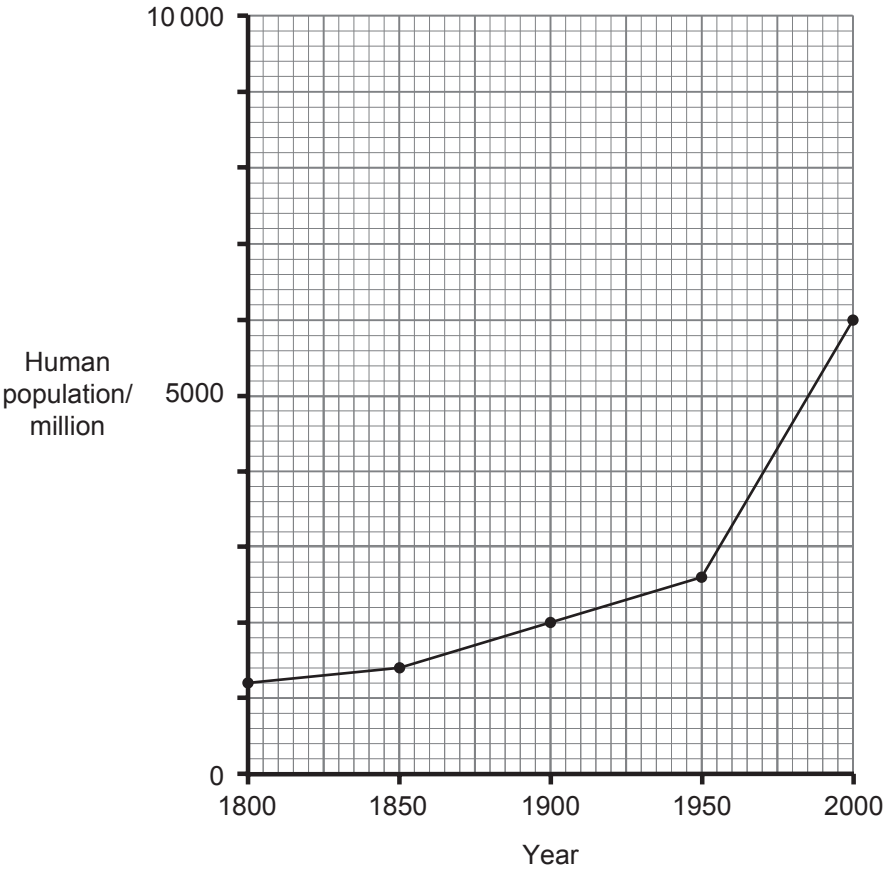
1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** The following graph shows how the world human population has risen over the last 200 years.



Most governments are becoming concerned about the potential conflict between human population growth and harm caused to the planet.

(i) State two ways in which the human population growth harms the planet.

1. _____ [1]

2. _____ [1]

Many governments are trying to reduce the rate of increase in human population growth, but without real success.

(ii) Suggest **one** reason why it is proving very difficult to slow down the increase in human population.

_____ [1]

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(b) Higher human populations are putting great stress on the ability of governments to produce enough food for their people. Using wheat as an example, explain why artificial selection increases food yields.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** It used to be common practice that intensively farmed animals were routinely given antibiotics even though they were not ill.

(i) Suggest how this benefits the farmer.

_____

_____ [1]

(ii) The practice of giving antibiotics to healthy livestock has been banned in most European countries. Apart from being regarded as unethical it can contribute to the development of antibiotic resistance in bacteria.

Explain how antibiotic resistance in bacteria develops.

_____

_____

_____

_____ [3]

(b) Suggest **one** reason why antibiotic resistant bacteria are particularly likely to cause epidemics and pandemics.

_____

_____ [1]

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(c) The development of medicines and drugs involve a number of stages. These include:

clinical testing : in vitro testing : licensing : animal testing

(i) Place the stages in the correct order.

_____

_____

_____

_____ [1]

(ii) Apart from ethical considerations give **one** argument for and **one** argument against testing new drugs on animals.

For _____

_____ [1]

Against _____

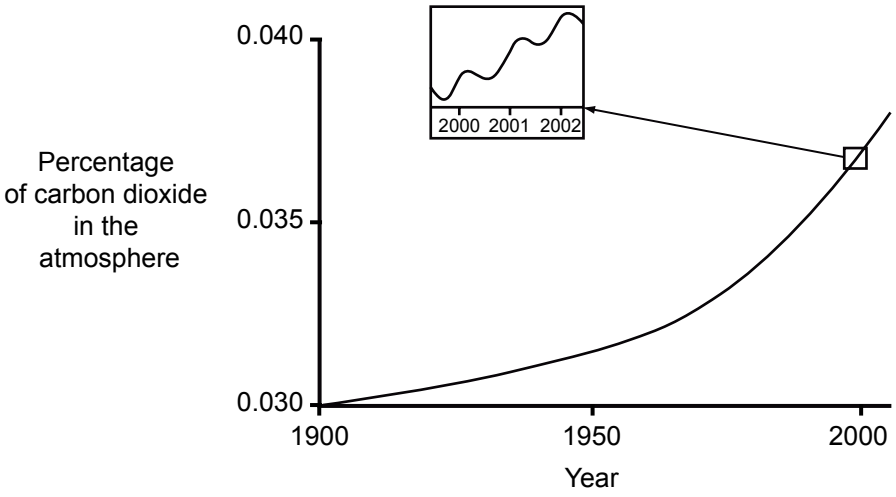
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** The following graph shows how atmospheric carbon dioxide levels are rising.



(i) Give **one** reason for the increase in the **rate** of atmospheric carbon dioxide build-up.

_____ [1]

(ii) Suggest an explanation for seasonal fluctuations in carbon dioxide levels as shown between 2000–2002.

_____

_____

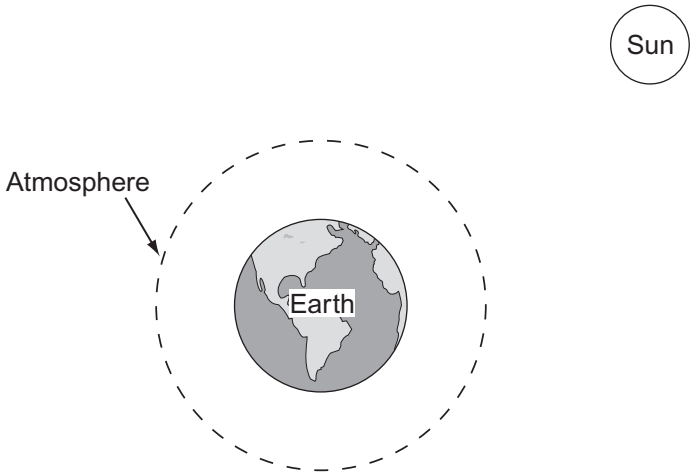
_____ [2]

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Examiner Only	
Marks	Remark

(b) Global warming is caused by heat radiation from the Sun being trapped in the 'greenhouse blanket' created due to the build-up of carbon dioxide.

(i) Complete the diagram below to show how heat radiation from the Sun is trapped within the Earth's atmosphere.



[1]

(ii) The Kyoto agreement was an attempt by governments to reduce global warming.

Explain fully why there have been recent attempts to replace the Kyoto agreement.

_____

_____ [2]

(c) Most scientists argue that global warming is harming the biodiversity on Earth.

(i) Explain what is meant by the term biodiversity.

_____ [1]

(ii) Explain fully how global warming can reduce biodiversity.

_____

_____

_____ [2]

(d) Some landowners convert part of their agricultural land to woodland as a conservation measure. Describe and explain **one** way in which this is of benefit to the environment.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

FRIDAY 20 MAY 2011, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	**(i)**	graph showing fall after 1998; to 50%; then rise to 90% by 2005 (all 3 points correct = 2; 1 or 2 points correct = 1) [2]	
		(ii)	link with autism proved false/there is no link [1]	
	(b)		mucous membranes ⟶ *traps* microbes [1] blood clotting ⟶ prevents entry of microbes [1]	
	(c)		antibodies produced when having been infected/vaccinated/by lymphocytes/white blood cells complementary shape to microbe/antigen/can fit together; antibody antigen link/attach/latch on; microbes immobilised/clump; memory cells (any **three**) [3]	8
2	**(a)**	**(i)**	grass grows rapidly/tall; outcompetes/covers primrose/stops light [2]	
		(ii)	laws to prevent them being picked/do not pick; create new habitats/conserve current habitats (any **two**) [2]	
	(b)		any example, e.g. panda with reason, e.g. habitat destruction [2] (second mark only if first mark correct)	6
3	**(a)**		living [1]	
	(b)	**(i)**	more lichens with distance from centre; pollution decreases with distance/Coalville polluted/industrialised [2]	
		(ii)	no change in lichens with distance; no or little pollution [2]	
		(iii)	more distances used/more of each tree used/more trees (at each distance) (any **two**) [2]	7
4	**(a)**	**(i)**	more pollution/pollution named; resources used up; habitat damage (any **two)** [2]	
		(ii)	lack of education/personal choice/Governments not willing to legislate/people living longer/advances in medical care [1]	
	(b)		larger heads of grain; no variation/less wastage/easier to harvest [2] *or* same height; less wastage/easier to harvest *or* short stalk; less wastage/easier to harvest	5

				AVAILABLE MARKS
5	(a)	(i)	more growth/more profit/animals never ill [1]	
		(ii)	mutation; provides resistance to antibiotic; other bacteria eliminated; resistant bacteria increase in number as non-resistant eliminated (any **three**) [3]	
	(b)		no resistance in population/people remain infected for longer/ antibiotics do not work [1]	
	(c)	(i)	invitro testing – animal testing – clinical testing – licensing [1]	
		(ii)	For – whole body/similar to humans/check for side effects/test on animals before humans [1] Against – different species to humans/may react differently [1]	8
6	(a)	(i)	*more* combustion/(more) deforestation/increased industrialisation [1]	
		(ii)	summer and winter/or seasons described; – more/less combustion/more/less photosynthesis [2]	
	(b)	(i)	rays from Sun reach Earth and reflect back and (some) trapped by atmosphere [1]	
		(ii)	some countries did not sign up; some dropped out; targets too low; not as successful as hoped (any **two**) [2]	
	(c)	(i)	range of species/types of plants of animals [1]	
		(ii)	flooding; species drown; loss of habitat; land drying out; species become extinct or any suitable answer [2]	
	(d)		*more* trees/*more* photosynthesis; reduces global warming; (more) habitats; (more) biodiversity/conservation of (endangered) species [2]	11
			Total	**45**

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

GSC22

THURSDAY 24 FEBRUARY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

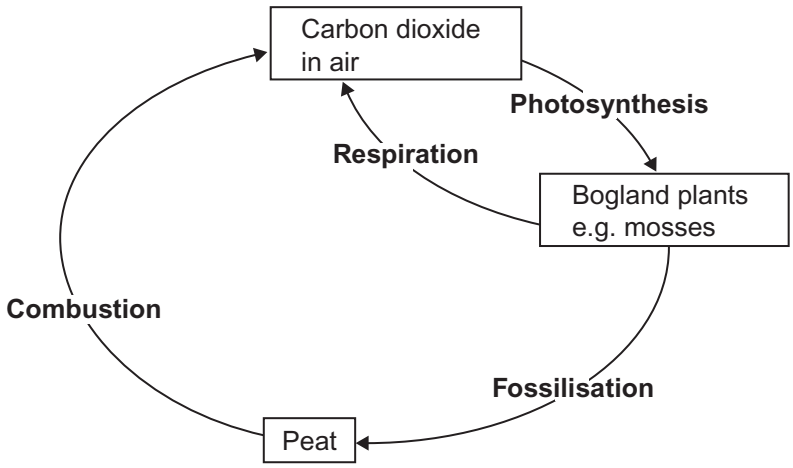
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Total Marks	

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Examiner Only	
Marks	Remark

1 The following diagram shows the role peat (a fossil fuel) plays in the carbon cycle.



(a) Name **two** processes in the diagram that return carbon dioxide to the air.

_____ and _____ [2]

(b) Using the diagram and your knowledge explain what causes global warming.

_____

_____

_____ [2]

Another fuel is the willow plant which grows rapidly and can be harvested after three years.

(c) Use the information provided and your knowledge to explain why using willow, rather than peat, is better for the environment.

_____

_____

_____

_____

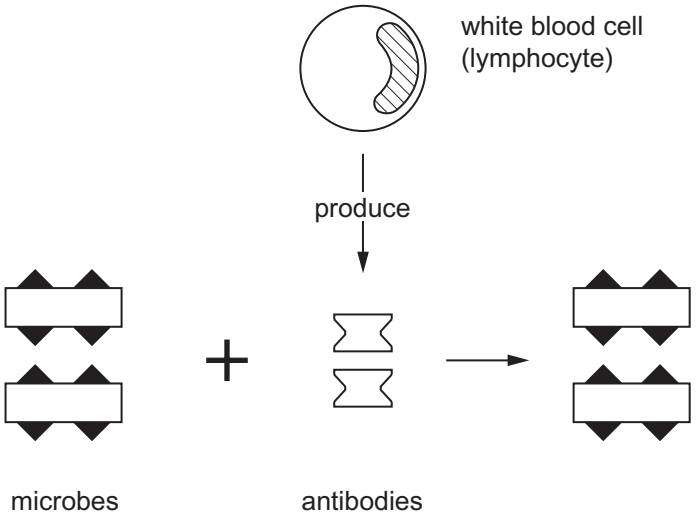
_____ [3]

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Examiner Only	
Marks	Remark

2 **(a)** When microbes enter our body some blood cells produce antibodies. The antibodies work by clumping the microbes together and immobilising them. This is called active immunity.

(i) Complete the diagram to show how the antibodies cause the microbes to clump together.



[1]

(ii) Name the process by which the clumped microbes are destroyed.

_____ [1]

(iii) Suggest why we have different antibodies for each type of disease.

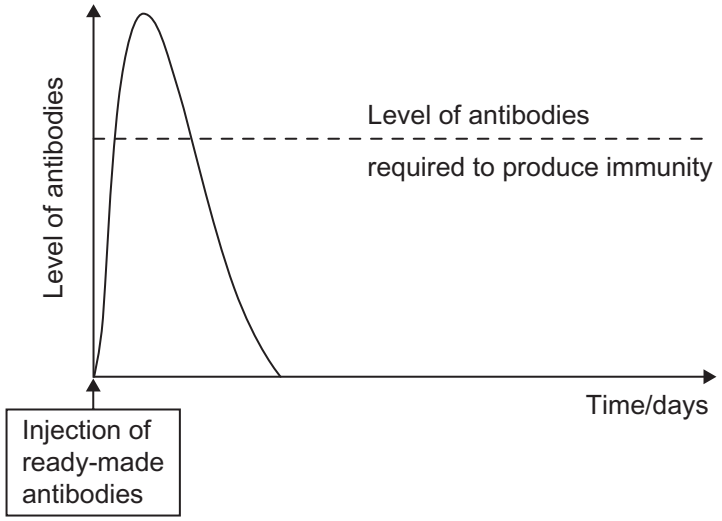
_____ [1]

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Examiner Only	
Marks	Remark

(b) We can also protect ourselves by having antibodies injected directly into the body. This will give us **passive** immunity.

The following graph shows how the number of antibodies in the blood changes during passive immunity.



Use the graph and your knowledge to describe two ways in which passive immunity differs from active immunity.

1. _____

2. _____ [2]

(c) Many people in Britain have an annual flu vaccination at the start of winter. This is to prevent them catching the flu over the winter season.

Explain fully why a vaccination is used rather than having the antibodies injected directly into the body.

_____

_____ [2]

3 The theory of spontaneous generation proposed that microbes suddenly appeared out of nowhere. However, Louis Pasteur conducted an experiment around 1860 that proved this was incorrect. He showed that contamination could only occur if microbes could gain access to food or drink.

Describe and explain how Pasteur showed that contamination could only occur if microbes could gain access to food or drink.
(You may use diagrams in your answer.)

_____

_____

_____

_____

_____

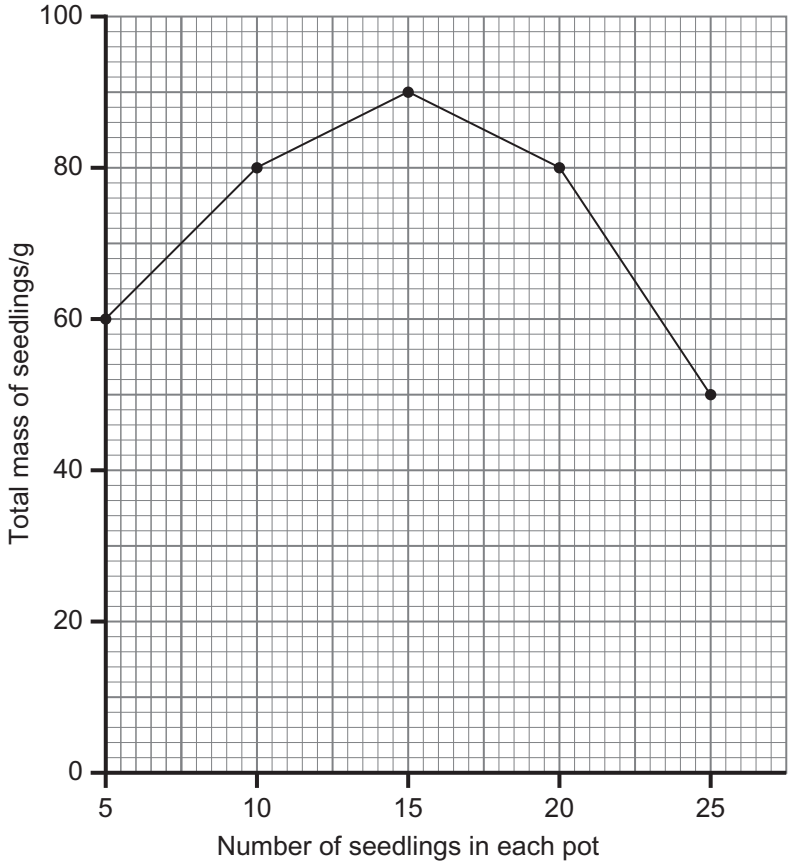
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Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** Joanna investigated how the number of cress seeds planted in a pot affected the mass of the seedlings. Her teacher gave her five plant pots and a packet of seeds. After planting the seeds she left the plants for three weeks. After weighing the seedlings Joanna plotted the following graph.



(i) Use the information in the graph to complete the table below.

Number of seedlings in each pot	Average mass of each seedling/g
5	
10	8
15	6
20	4
25	2

[1]

Use the information provided and your knowledge to answer parts **(ii)** and **(iii)** below.

Examiner Only	
Marks	Remark

(ii) Joanna likes to add cress to her lunchtime sandwiches. Which planting density (5, 10, 15, 20 or 25) should she use to provide her with the greatest overall mass of cress?

_____ [1]

(iii) Describe and explain the results for the **average mass** of each seedling at a planting density of 25 seedlings per pot.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

(b) The zebra mussel is an example of a competitive invasive species. It has been accidentally introduced from Eastern Europe by man.



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The mussel has spread throughout many of the waterways in Northern Ireland and its numbers are rapidly increasing. The mussel attaches to hard objects such as rocks but can also attach to the bottom of boats. It feeds on very small organisms in the water and as a result many of our native species are at risk of becoming endangered or extinct.

(i) Competitive invasive species spread rapidly and increase in numbers. From the information give two other characteristics of competitive invasive species.

1. _____

2. _____ [2]

(ii) Suggest how pleasure boating could increase the spread of the zebra mussel across the waterways of Northern Ireland.

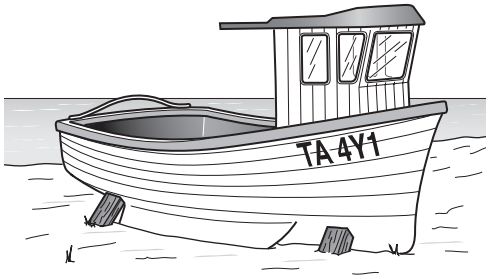
_____

_____ [2]

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Examiner Only	
Marks	Remark

5 **(a)** Fish stocks of cod and other popular species around the British Isles have suffered a sharp fall in recent decades due to over-fishing. One way to help conserve fish stocks is the decommissioning of some boats in the fishing fleets. In many decommissioning schemes owners of fishing boats are able to apply for compensation in return for the scrapping of their boats and the surrender of their fishing licence.



(i) Suggest why it is important that owners surrender their fishing licence as well as scrapping their boat as part of the scheme.

_____ [1]

(ii) Using large mesh sizes in fishing nets is another strategy for conserving fish stocks. Explain fully how this helps conserve fish stocks.

_____

_____ [2]

(b) Fish stocks of inland waterways (rivers, lakes) can also be harmed by over-fishing, but are also at risk due to pollution. However, progress is being made as some types of pollution are being reduced.

(i) Describe and explain one way in which pollution due to acid rain has been reduced in recent years.

_____

_____ [2]

(ii) Give **two** reasons how the European Nitrates Directive can reduce pollution of rivers and lakes.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

6 **(a)** AIDS is a medical condition that results from infection by the HIV virus – at present there is no cure. The HIV virus can be rapidly spread from person to person by a number of methods.

The HIV virus mutates very rapidly ensuring that the body's defences and scientists seeking cures cannot defend effectively against it. The virus evolves so rapidly that it can mutate and become resistant to a particular drug within a very short time and even during a course of drug treatment for a particular patient – the drug resistant strains survive and multiply as the non-resistant strains are eliminated.

(i) Use the information provided and your knowledge to explain how the development of drug resistance in AIDS demonstrates natural selection and evolution.

Natural selection _____

_____

_____ [2]

Evolution _____ [1]

(ii) Use the information provided to suggest **one** reason why the spread of AIDS has become a pandemic.

_____ [1]

(b) The development of drugs to stop or slow down the development of AIDS in a patient is a key method in reducing its effect. Normally treatment involves a combination of different drugs rather than just one type.

(i) Suggest why a combination of drugs is used rather than a single type of drug.

_____ [1]

(ii) Some of the drugs used to treat patients with AIDS have very unpleasant side effects. Suggest why these drugs are still licensed and used even though they have unpleasant side effects.

_____ [1]

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(iii) The first stage in the development of a new drug is *in vitro* testing. What is *in vitro* testing?

_____ [1]

(c) *In vitro* testing of new drugs involves the use of aseptic technique. Aseptic techniques are also essential when culturing microbes in the school laboratory.

(i) Define the term **aseptic technique**.

_____

_____ [1]

(ii) Complete the table below to explain why the following aseptic techniques are used.

Aseptic technique	Reason for technique
Heating the metal loop until red hot before transfer of microbes to Petri dish	
Cooling the metal loop after heating before the transfer of microbes	
Incubating Petri dishes below 30°C	

[3]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

THURSDAY 24 FEBRUARY 2011, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	combustion; respiration	[2]	
	(b)	**increase** in combustion/**reduction** in photosynthesis; carbon dioxide levels increase/trap heat/rays	[2]	
	(c)	**willow** renewable; takes in carbon dioxide; during photosynthesis; so no increase/reduced increase in carbon dioxide/carbon neutral Any **three** **or** **peat** not renewable; doesn't take in carbon dioxide; from photosynthesis; so increases carbon dioxide/global warming Any **three**	[3]	7
2	**(a)**	**(i)** antibodies linked accurately to microbes/antigens	[1]	
		(ii) phagocytosis	[1]	
		(iii) each disease-causing microbe/antigen different **shape**	[1]	
	(b)	passive immunity is faster acting; lasts short period of time; antibodies not produced by body Any **two**	[2]	
	(c)	vaccination lasts throughout winter/longer; flu could strike at any time over the winter	[2]	7
3		flask with swan neck; flask with broken neck/control; no contamination in flask with swan neck or converse; as microbes trapped in S bend; any one controlled variable, e.g. same temperature/same food/left for same length of time [must be specific]	[4]	4
4	**(a)**	**(i)** 12	[1]	
		(ii) 15	[1]	
		(iii) lowest mass; competition; for light/space/nutrients/water	[3]	
	(b)	**(i)** introduced by man; harms native species	[2]	
		(ii) movement of **boats**; mussel **attach and detach**/reproduce in new areas	[2]	9

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				AVAILABLE MARKS
5	(a)	(i)	if not surrendering licence could buy another boat/stops them fishing [1]	
		(ii)	small fish not caught; allowed to mature and reproduce [2]	
	(b)	(i)	filters; less sulphur dioxide/gases causing acid rain produced **or** alternative fuels; less sulphur dioxide/gases causing acid rain produced [2]	
		(ii)	not spraying fertiliser in winter when wet/near lakes; better storage for slurry/silage; less run off into rivers Any **two** [2]	7
6	(a)	(i)	natural selection – drug resistant variety survives; non resistant variety killed; evolution – change in virus over time/mutates [3]	
		(ii)	easily spread/number of methods of spread/no cure (rapid)/ mutate rapidly [1]	
	(b)	(i)	due to drug resistance/chance that not resistant to one of the drugs [1]	
		(ii)	as no cure/no other chance of prolonging life [1]	
		(iii)	laboratory testing/working on cells [1]	
	(c)	(i)	culturing microbes without contamination [1]	
		(ii)	heating loop – to kill any microbes already present/sterilise; allowing loop to cool – to avoid killing the transferring bacteria; incubate at 30 ºC – to avoid culturing pathogenic microbes/ microbes that can survive at body temperature [3]	11
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Tier

[GSC22]

GSC22

THURSDAY 11 NOVEMBER 2010, AFTERNOON

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** MMR is a combined vaccination that protects against mumps, measles and rubella. In 1998 it was reported that there could be a link between taking the MMR vaccination and developing autism.

(i) Suggest how this reported link affected the number of children being vaccinated with MMR in 1998.

_____ [1]

(ii) Suggest how this affected the number of children catching measles in the years following 1998.

_____ [1]

(iii) The number of children being vaccinated now for MMR has returned to pre-1998 levels. Suggest why this has happened.

_____ [1]

(b) Sasha had a throat infection and was feeling very unwell. Her doctor was sure it was caused by some type of bacteria and prescribed an antibiotic.

(i) Give **two** reasons why she was prescribed an antibiotic and not a vaccination.

_____

_____

_____ [2]

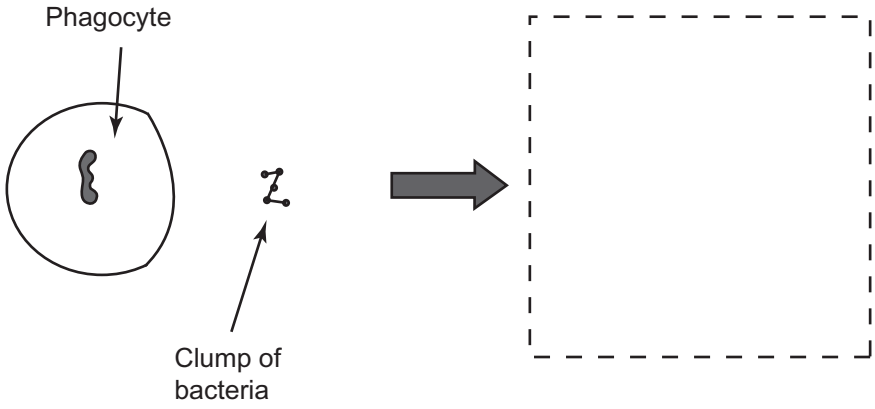
(ii) Suggest why it is important that antibiotics are not overused.

_____ [1]

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Examiner Only	
Marks	Remark

(c) The diagram shows a phagocyte (type of white blood cell) and a clump of bacteria.



(i) Complete the diagram above to show what happens next. [1]

(ii) Name the process shown.

_____ [1]

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Examiner Only	
Marks	Remark

2 Willow is a fast growing biofuel that can be harvested after as little as three years growth.

(a) Explain fully why the use of willow as a biofuel is an example of **sustainable** development.

_____

_____ [2]

(b) Some scientists think that growing willow and using it as a biofuel doesn't contribute to climate change.

Explain fully why they make this claim.

_____

_____

_____

_____ [3]

(c) Suggest one way the Government could encourage farmers to grow willow.

_____ [1]

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Examiner Only	
Marks	Remark

3 **(a)** The population of Northern Ireland has risen to almost 1.8 million, mainly because people are living longer.

Give **two** reasons why people are living longer.

1. _____ [1]

2. _____ [1]

(b) Larger population sizes require greater efficiency in food production. One way of developing greater efficiency in farming is to add antibiotics to the food of intensively farmed livestock.

(i) Explain fully how the addition of antibiotics can increase yield.

_____

_____ [2]

(ii) Give **two** reasons why the routine addition of antibiotics to the food of livestock has been banned in many countries.

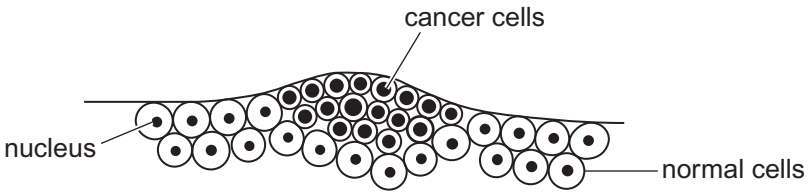
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_____ [2]

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Examiner Only	
Marks	Remark

4 **(a)** The following diagram represents skin cancer, a condition which affects many people in Northern Ireland.



(i) Use the diagram to give **two** ways in which the cancer cells are different from normal cells.

_____

_____ [2]

(ii) Explain how some skin cells become cancerous.

_____

_____

_____ [3]

(b) Explain why someone travelling to Asia for the first time needs to take a number of **new** vaccinations before travelling.

_____

_____

_____ [2]

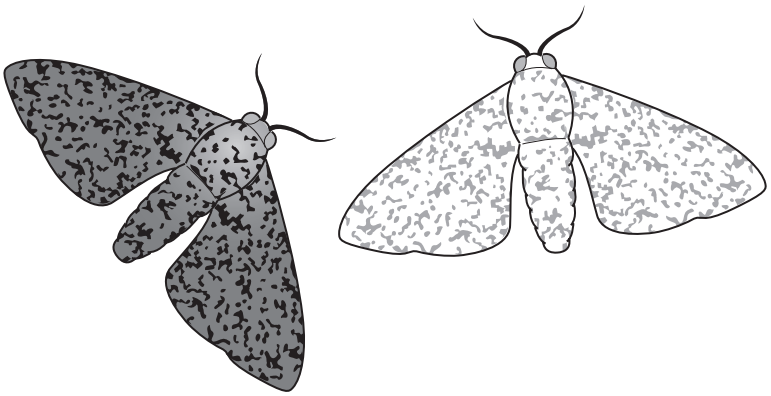
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Examiner Only	
Marks	Remark

5 **(a)** There are two genetically different varieties of peppered moth; light and dark forms as seen in the following diagram. Both rest on tree trunks and are a favourite food for birds.



The following table shows how the percentage of dark moths changed between 1800 and 1900.

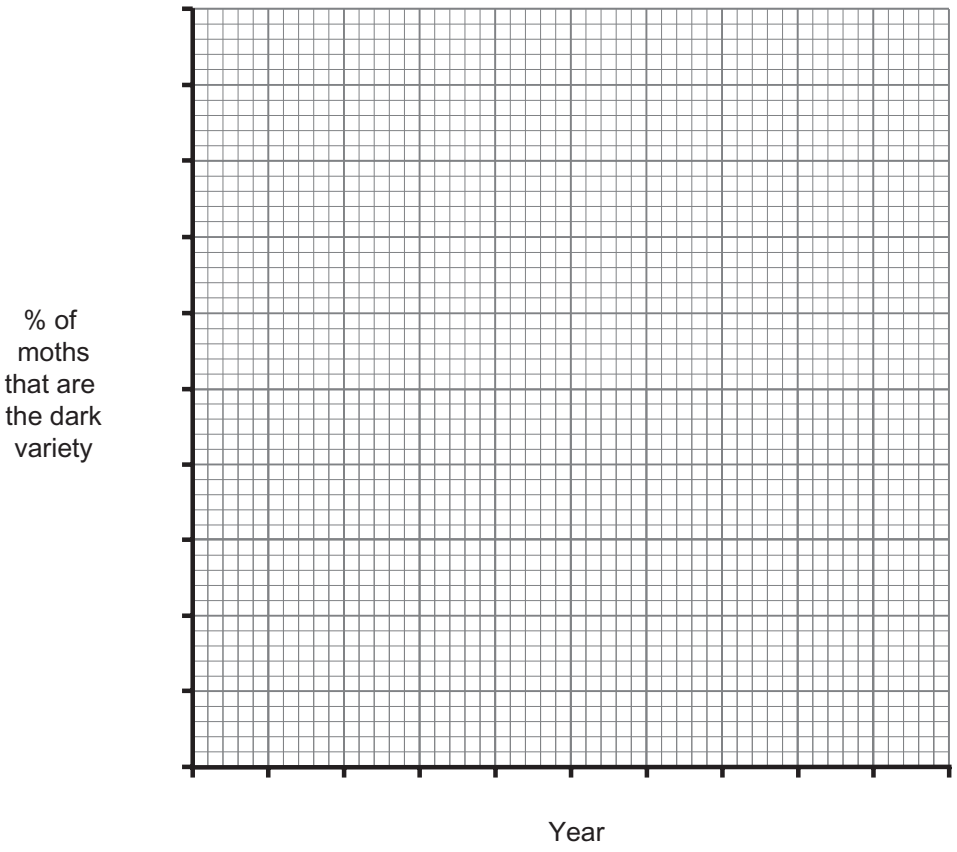
(i) Complete the table by calculating the percentage for the light variety.

	% moths	
Year	Dark variety	Light variety
1800	2	
1825	5	
1850	5	
1875	55	
1900	95	

[1]

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(ii) On the grid below scale the axes, plot and draw a line graph of the percentage of moths that are **dark coloured** from 1800–1900.



[3]

Between 1800 and 1900 the tree trunks became darker due to smoke (soot) pollution.

(iii) Describe and explain the change in the number of **light coloured** moths during this time.

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

(b) Artificial selection has been used to produce the wheat shown below.



In a field of modern wheat all the stems are of a similar height and the heads contain many seeds.

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Using wheat as an example, describe the process of artificial selection and explain its advantage to farmers.

_____

_____

_____

_____

_____ [3]

(c) Name the scientist who proposed the theory of evolution.

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** Nature reserves are areas often designated with the specific purpose of maintaining or enriching biodiversity (the range of plant and animal species present).

Some nature reserves are open to the public and in others public access is not permitted.

Recent research has suggested that in some nature reserves, allowing public access to the reserve has resulted in a decrease of biodiversity.

(i) Suggest **one** way that public access can lead to a reduction of biodiversity.

_____ [1]

(ii) Plan an investigation to check if public access does affect biodiversity in a nature reserve.

_____

_____

_____

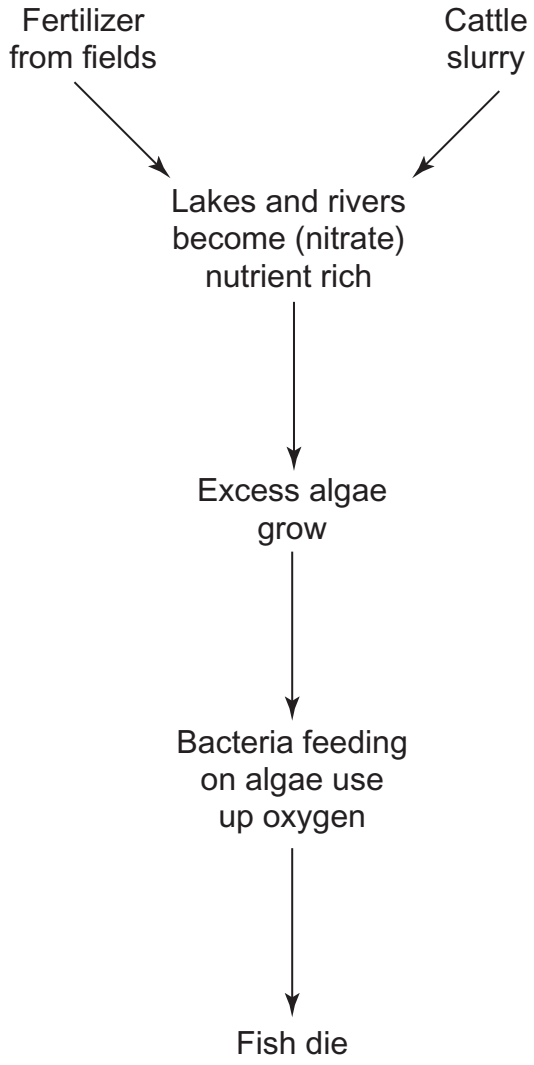
_____

_____

_____ [3]

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(b) The diagram below shows how nitrates entering waterways can lead to water pollution and the death of fish.



Use the diagram and your knowledge to explain how the European Nitrates Directive helps reduce water pollution.

_____

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

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Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Paper

[GSC22]

THURSDAY 11 NOVEMBER 2010, AFTERNOON

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	reduction in number of children vaccinated	[1]	
		(ii)	more catching measles/numbers went up	[1]	
		(iii)	vaccine proved to be safe/link with autism not proven	[1]	
	(b)	**(i)**	antibiotic not specific/combats range of bacteria; antibiotic faster acting	[2]	
		(ii)	development of antibiotic resistance/"superbugs"	[1]	
	(c)	**(i)**	bacteria inside white blood cell/phagocyte engulfing	[1]	
		(ii)	phagocytosis	[1]	8
2	**(a)**		fast growing/short life cycle; never runs out/renewable/regrows	[2]	
	(b)		link between climate change and global warming; carbon dioxide both produced and used; equal amounts	[3]	
	(c)		subsidy **or** implied	[1]	6
3	**(a)**		better diet; hygiene/sanitation; health care Any **two**	[2]	
	(b)	**(i)**	fewer ill animals; growth promoter/faster growth; can be farmed at higher densities; Any **two** **not** just antibiotics kills bacteria	[2]	
		(ii)	ethical issues; bacterial resistance	[2]	6
4	**(a)**	**(i)**	larger nucleus; smaller cells	[2]	
		(ii)	UV light; mutations/damage to chromosomes; cells divide uncontrollably/multiply rapidly/form tumour	[3]	
	(b)		different/foreign/new diseases/antigens; don't have corresponding antibodies/memory cells	[2]	7

					AVAILABLE MARKS
5	**(a)**	**(i)**	98 – 95 – 95 – 45 – 5	[1]	
		(ii)	axis labels; all points correct; correct line	[3]	
		(iii)	decrease; by predation; camouflage	[3]	
	(b)		select **named** desirable qualities (e.g. more seeds/same size plants); many generations/breed; easier to harvest/greater yield/more profit/less wind damage	[3]	
	(c)		Charles Darwin	[1]	
6	**(a)**	**(i)**	trampling/picking flowers/clearing for paths/damage animals' habitat	[1]	
		(ii)	divide into part access, part no access; time; measure species number	[3]	
	(b)		slurry needs to be safely stored; no fertiliser in winter/when plants can't use it; less run off/fewer nutrients enter water	[3]	7
			Total		**45**

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

GSC22

THURSDAY 20 MAY 2010, AFTERNOON

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
Total Marks	

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Examiner Only	
Marks	Remark

1 The body has a number of layers of defence against disease.

(a) Complete the table to show how some parts of the body protect against microbes.

Body part	**Way in which it helps protect against microbes**
Skin	
Mucous membranes	

[2]

(b) Describe what a vaccine is, and explain how it works.

_____

_____

_____

_____

_____ [3]

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Examiner Only	
Marks	Remark

2 **(a)** Smoking tobacco, drinking alcohol and the misuse of drugs causes harm to people and society. The following table compares the effects of these substances on individuals.

Key Most effect = 3
Least effect = 1

Substance	**Can cause mental health problems**	**Can cause road traffic accidents**	**Can cause cancer**
Tobacco	1	1	3
Alcohol	3	3	2
Cannabis	2	2	1

(i) Tobacco and alcohol can legally be used by adults, but cannabis remains an illegal drug. Use the information in the table to explain how campaigners could suggest that taking cannabis should be made legal.

_____

_____

_____ [2]

(ii) Suggest why it is illegal for children to purchase cigarettes and alcohol, but legal for adults.

_____ [1]

(iii) Name the substance in tobacco smoke that:

1. is addictive _____ [1]

2. causes cancer _____ [1]

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(b) The following table shows the pattern of drinking of three teenagers over a seven day period. The values show the number of alcoholic units taken.

	Mon	Tue	Wed	Thurs	Fri	Sat	Sun	**Total**
John	1	2	3	2	2	2	0	
Tony	0	0	2	0	0	8	0	
Paul	0	0	0	0	2	2	0	

(i) Complete the table to show the total number of units each teenager had taken during the week. [1]

(ii) Name the teenager who was binge drinking.

_____ [1]

(iii) Suggest **two** reasons why the Government recommends that people do not binge drink.

_____

_____

_____ [2]

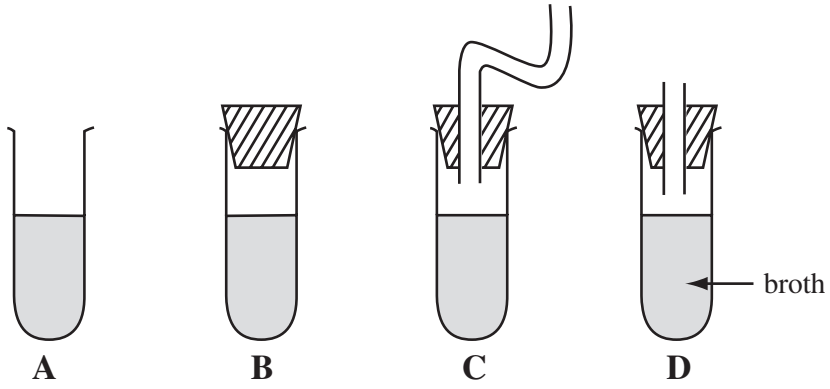
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** Jane carried out the following investigation.



The apparatus and the broth were sterilised before the investigation and the experiment was left for a period of time.

(i) Which tube(s) (**A**, **B**, **C** or **D**) will contain contaminated broth after a period of time?

_____ [1]

(ii) Name one **type** of organism that could have caused contamination in the broth.

_____ [1]

(iii) Name the scientist who used similar apparatus to investigate contamination.

_____ [1]

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(iv) Place a tick in the table below to identify what Jane must do to obtain valid results.

Action	Tick if essential to give valid results
Same volume of broth used in all tubes	
Same type of broth used in all tubes	
Tubes kept in the fridge during the investigation	
Tubes kept in bright light during the investigation	
Tubes kept at the same temperature during the investigation	
Tubes left for the same length of time during the investigation	

[2]

(b) Explain fully what is meant by the term **aseptic technique**.

_____

_____

_____ [2]

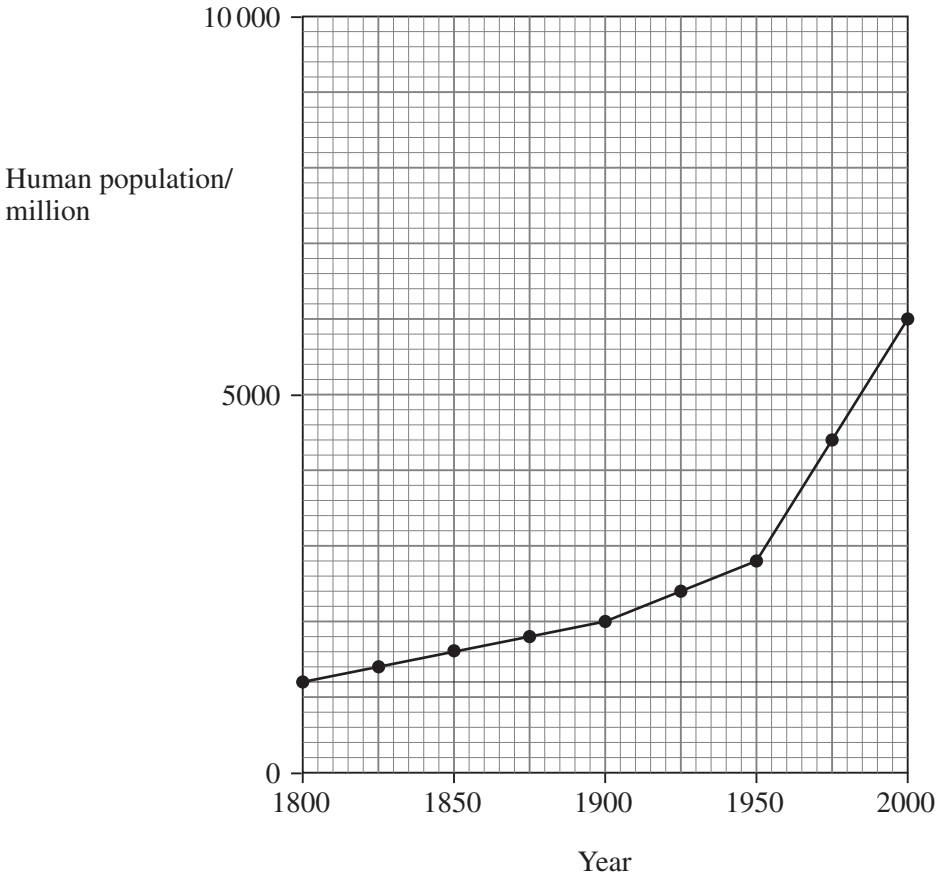
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** The following graph provides information about human population growth.



(i) Calculate the increase in population between 1900 and 2000.

_____ [1]

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The following table shows significant dates in human medical advances.

Human medical advances	Dates
First heart transplant	1960–70
The use of anaesthesia (pain relief) in surgery	1840–50
Development of first antibiotics	1940–50

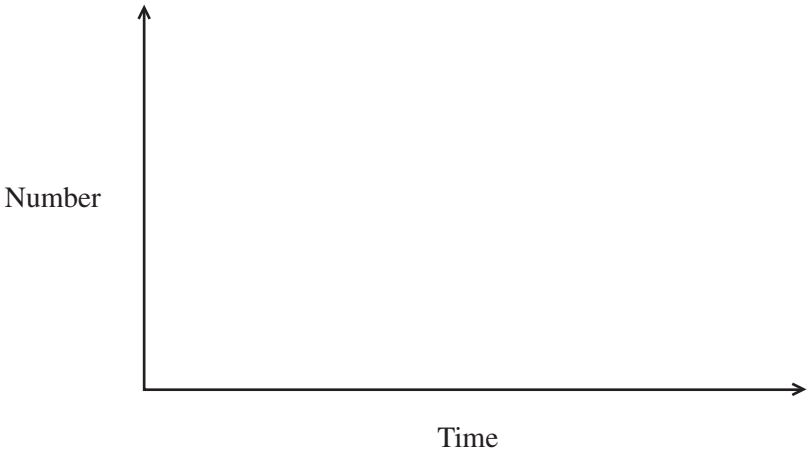
(ii) Suggest which of these medical developments had the greatest effect on population growth. Explain your answer.

_____

_____

_____ [2]

(b) (i) Sketch a line on the axes below to show how the number of a competitive invasive species, e.g. zebra mussel, normally changes over time when introduced into a new area.



[1]

(ii) Define fully the term **competitive invasive** species.

_____

_____

_____ [2]

Examiner Only

Marks	Remark

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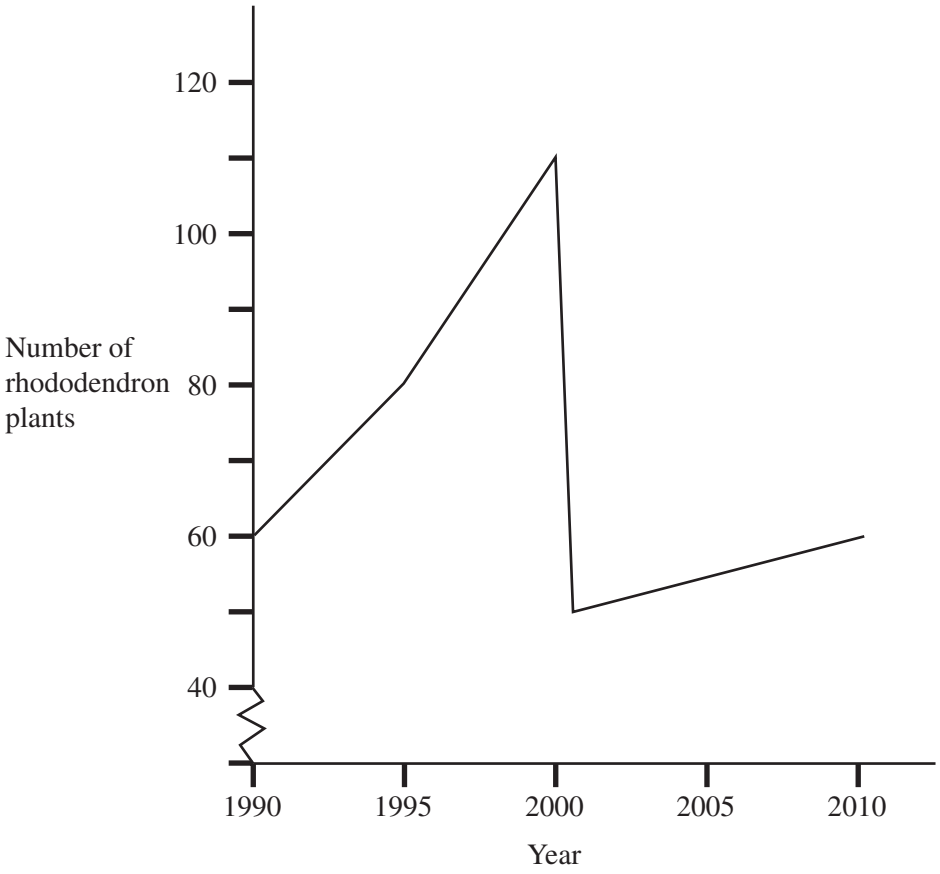
(c) Rhododendron is another example of a competitive invasive species.

Examiner Only	
Marks	Remark



© *James Osmond/Alamy*

The following graph shows how the number of rhododendron plants in a nature reserve changed over a twenty year period.



The nature reserve was created to conserve a number of delicate orchid species that require high light levels and grow at ground level.

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(i) Suggest what caused the fall in the number of rhododendron plants around the year 2000.

_____ [1]

(ii) Explain fully why it is important to keep the number of rhododendron plants controlled in this nature reserve.

_____

_____

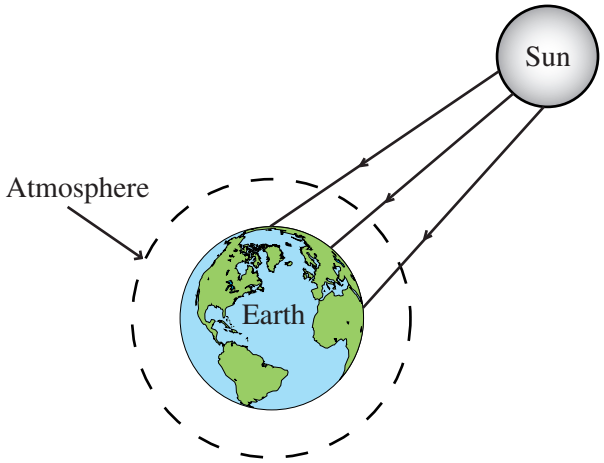
_____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

5 The following diagram shows the sun's rays reaching the Earth's surface.



(a) Complete the diagram above to show how some of the sun's rays get trapped by the 'greenhouse blanket', causing global warming. [1]

(b) Describe how a named **abiotic** indicator could be used to monitor the effects of global warming.

_____

_____

_____ [2]

(c) Explain how the destruction of large areas of forest could contribute to global warming.

_____

_____

_____ [2]

(d) The Kyoto agreement was intended to reduce global warming. However, it has not been as successful as originally hoped. Give **one** reason why the Kyoto agreement was not as successful as originally hoped.

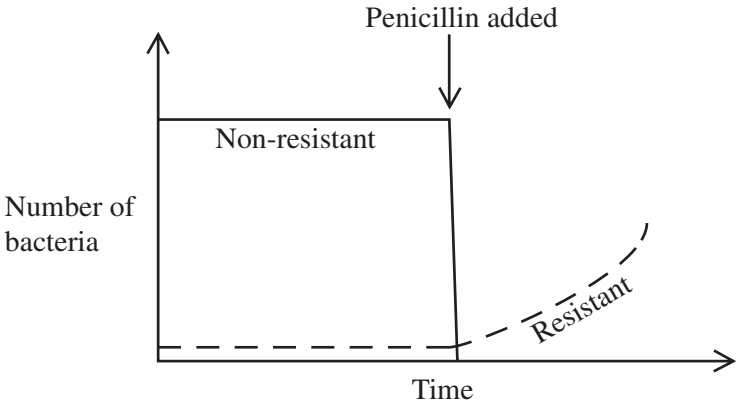
_____

_____ [1]

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Examiner Only	
Marks	Remark

6 **(a)** The following graph shows how the number of resistant and non-resistant bacteria changed in a Petri dish after penicillin was added.



(i) Describe and explain the changes that took place in the Petri dish after penicillin was added.

_____

_____

_____

_____ [3]

(ii) Resistant bacteria develop because of mutation. Explain the term **mutation**.

_____

_____ [1]

(iii) Suggest what other evidence you would need before you could describe the resistant bacteria in the Petri dish as a 'superbug'.

_____

_____ [1]

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(b) The following table shows some of the costs associated with the development of a particular drug.

Stage	Description	Cost/£ thousand
A	Clinical testing with volunteers	200
B	Licensed for use by the Government	2
C	*In vitro* testing	500
D	Animal testing	100

(i) Place the stages (A–D) in the correct order in which they would happen.

_____ _____ _____ _____ [1]

(ii) The photograph below shows *in vitro* testing.



© Ingram Publishing/Superstock

Suggest **two** reasons why *in vitro* testing is so expensive.

_____

_____

_____ [2]

(iii) Suggest **one** reason why a drug could be proved to be effective against a particular disease, yet is not licensed for use.

_____ [1]

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GCSE

Science: Single Award (Modular)

End of Module Tests

May 2010

Mark Schemes

Issued: October 2010

Rewarding Learning

General Certificate of Secondary Education
2009 – 2010

Science: Single Award (Modular)

Human Activity and Health
Module 2
Higher Tier

[GSC22]

THURSDAY 20 MAY 2010, AFTERNOON

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	Prevents entry of microbes / barrier; Catch/trap microbes that have gained entry		[2]	
	(b)	Any **three** from: Dead / modified microbes injected: causes lymphocytes / white blood cells; to produce antibodies; antibodies latch on to microbes / complementary shape; immobilised; creation of memory cells		[3]	5
2	**(a)**	**(i)**	Cannabis does less harm than alcohol/ no more than smoking; any comparative value(s) from table	[2]	
		(ii)	Adults better able to make decisions concerning lifestyle / risks / duty of care / children still developing	[1]	
		(iii)	nicotine – tar	[2]	
	(b)	**(i)**	12 – 10 – 4	[1]	
		(ii)	Tony	[1]	
		(iii)	Greater harm to health specified; harm to society specified	[2]	9
3	**(a)**	**(i)**	A and D	[1]	
		(ii)	Bacteria / Fungi	[1]	
		(iii)	Pasteur	[1]	
		(iv)	Rows 1, 2, 5, 6 (all correct = [2]; 2/3 correct = [1])	[2]	
	(b)	Process used in culturing microbes; to avoid contamination		[2]	7

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					AVAILABLE MARKS
4	**(a)**	**(i)**	4000 million	[1]	
		(ii)	Development of the first antibiotics; affected more people / greatest increase on graph	[2]	
	(b)	**(i)**	increase (no plateau)	[1]	
		(ii)	Species that out-competes /more successful than native species; and spreads through native habitats	[2]	
	(c)	**(i)**	Cutting by man / disease	[1]	
		(ii)	cover land / spread / reduce light / take space; damage / kill orchids	[2]	9
5	**(a)**		Rays get reflected back within atmosphere / at greenhouse boundary	[1]	
	(b)		example, e.g. ice field and named effect	[2]	
	(c)		less photosynthesis; less carbon dioxide removed from the atmosphere or burning forest; produces carbon dioxide	[2]	
	(d)		Some countries opted out / not all countries signed up / targets too low	[1]	6
6	**(a)**	**(i)**	Any **three** from: resistant form increased; non resistant form **eliminated**; resistant form able to survive antibiotic; non-resistant form killed by antibiotic	[3]	
		(ii)	change in chromosome / gene / DNA	[1]	
		(iii)	Resistance to other antibiotics	[1]	
	(b)	**(i)**	C–D–A–B	[1]	
		(ii)	Any **two** from: scientists' salaries; expensive equipment / chemicals; trial and error effect	[2]	
		(iii)	side effects	[1]	9
				Total	**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

GSC22

THURSDAY 25 FEBRUARY 2010, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

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Examiner Only	
Marks	Remark

1 Willow can be grown as a biofuel. It is very fast growing and can be harvested every three years. When growing, willow removes carbon dioxide from the air but when burnt, releases it back into the air and is described as being carbon neutral.

Use this information and your knowledge to answer the questions below.

(a) Describe and explain why using willow as a biofuel is an example of sustainable development.

_____

_____

_____ [2]

(b) Suggest what is meant by the term **carbon neutral**.

_____

_____ [2]

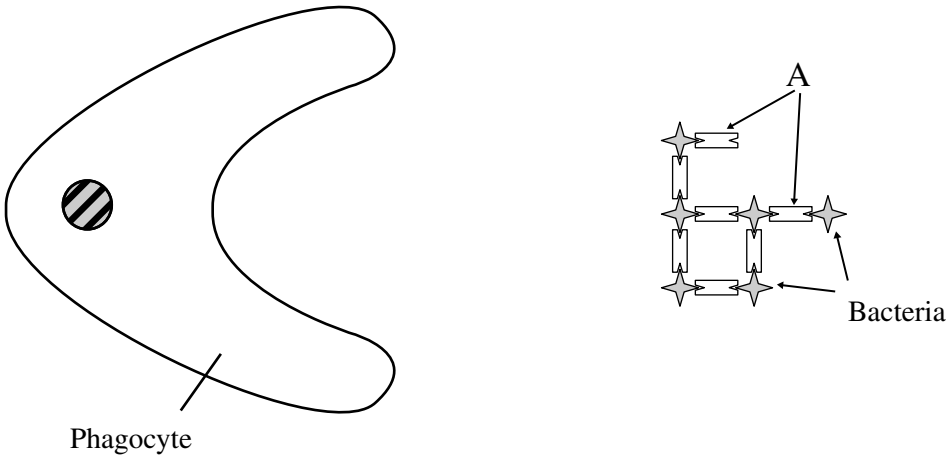
(c) Suggest **one** advantage of using carbon neutral fuel sources.

_____ [1]

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Examiner Only	
Marks	Remark

2 **(a)** The following diagram shows a phagocyte about to engulf (destroy) a clump of bacteria.



(i) Name the process described above.

_____ [1]

(ii) Name the structures labelled A on the diagram.

_____ [1]

(iii) Use the diagram and your knowledge to describe how the body's defences caused the bacteria to form in a clump.

_____

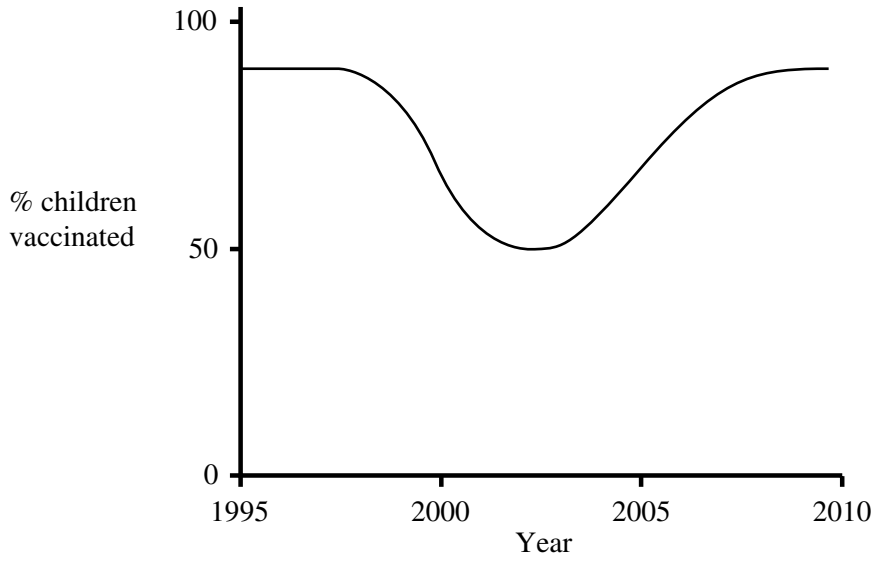
_____

_____

_____ [3]

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(b) The following graph shows how the percentage of children being vaccinated against MMR has changed over the last 15 years.



(i) Describe how the percentage of children being vaccinated against MMR has changed over the last 15 years. Explain why these changes took place.

_____

_____

_____

_____ [3]

(ii) Suggest **one** reason why it is unlikely that there will ever be 100% uptake with any vaccination programme.

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** There are four types of human blood groups. A survey of 200 people in Belfast produced the following results.

Blood group	Number of people
A	40
B	54
AB	66
O	

(i) Complete the table to show the number of people who are blood group O. [1]

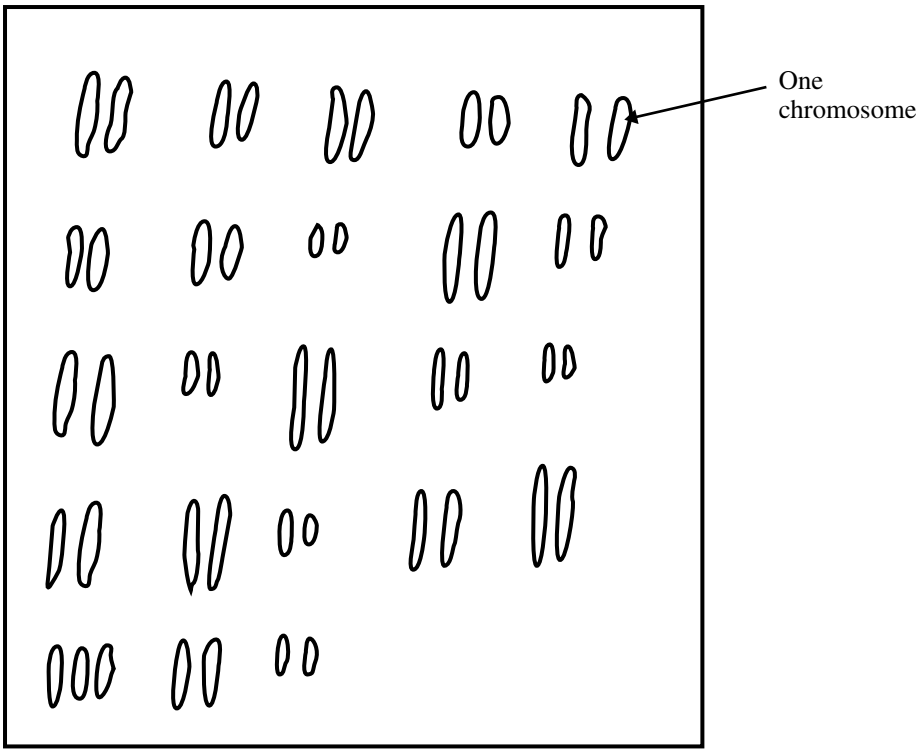
(ii) Name the type of variation shown by human blood groups.

_____ [1]

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Examiner Only	
Marks	Remark

(b) Mutations can cause harm to the cells of the body. The drawing below shows the chromosomes in John's body cells.



(i) Name the condition that John is suffering from.

_____ [1]

(ii) Skin cancer is caused by mutations in the cells of the skin. Explain what cancer is.

_____

_____ [2]

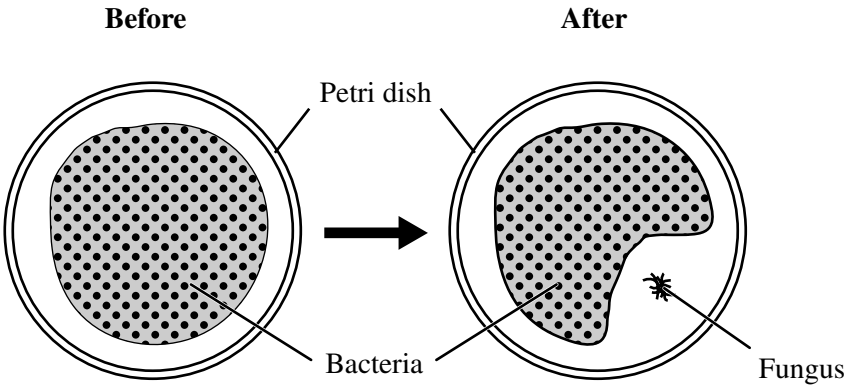
(iii) Name the environmental factor that causes skin cancer.

_____ [1]

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Examiner Only	
Marks	Remark

4 The following diagram shows what Alexander Fleming observed when an agar plate containing bacteria was contaminated by a fungus.

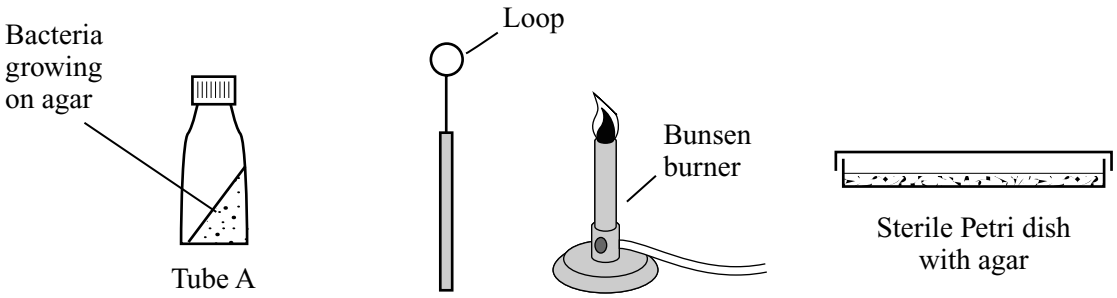


(a) Describe fully what Fleming concluded from this observation.

_____

_____ [2]

(b) In a laboratory experiment Kathryn transferred bacteria from tube A to a Petri dish. She attempted to use aseptic techniques but her method was incorrect and produced contaminated results. Given below is an account of her method.



Kathryn removed the lid from the Petri dish and left it to one side. She then held the metal loop in the Bunsen flame for 30 seconds. While it was still hot she dipped it into tube A and transferred the bacteria, spreading it over the agar in the Petri dish. She replaced and sealed the lid on the Petri dish and incubated it at 20 °C for two weeks. When Kathryn opened the Petri dish she found that none of the bacteria from tube A had grown, but other types of microbes were growing on the agar.

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Examiner Only	
Marks	Remark

(i) Why is it important that the Petri dish is sterilised before the start of the experiment?

_____ [1]

(ii) Suggest **one** reason why the bacteria from tube A had not grown.

_____ [1]

(iii) Suggest **one** reason why the Petri dish had become contaminated.

_____ [1]

(c) Medical drugs are initially tested in a laboratory.

(i) What name is given to the laboratory testing of drugs?

_____ [1]

(ii) Name the stage that usually follows laboratory testing.

_____ [1]

(iii) Name the process that follows successful clinical testing of medicines before they can be sold to the public.

_____ [1]

(d) Antibiotics are sometimes given to intensively farmed animals even though they are not ill.

Give **one** advantage and **one** disadvantage of feeding antibiotics to animals farmed like this.

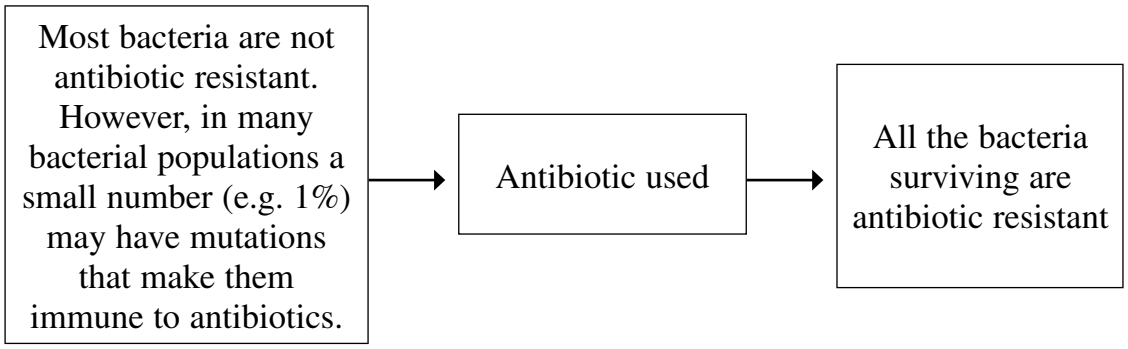
Advantage _____

Disadvantage _____ [2]

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Examiner Only	
Marks	Remark

5 **(a)** The following flow chart shows how antibiotic resistant bacteria develop.



(i) Use the information and your knowledge to explain how antibiotic resistance in bacteria demonstrates the processes of natural selection and evolution.

_____

_____

_____

_____

_____ [3]

(ii) Name the scientist who proposed the theory of evolution.

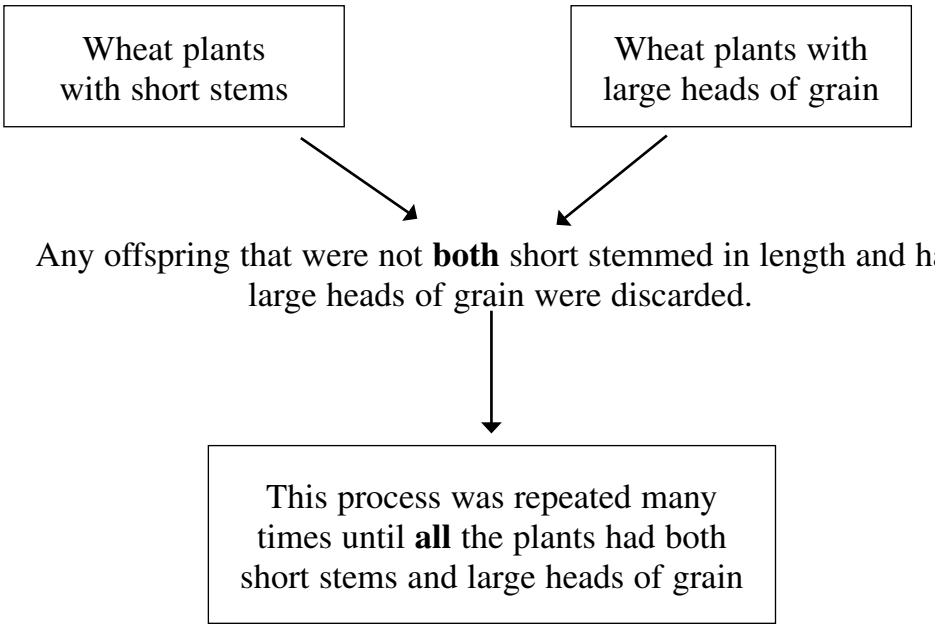
_____ [1]

(iii) State **one** reason why the theory of evolution is so controversial.

_____ [1]

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(b) The following flow chart shows how modern wheat plants were produced from ancient varieties by cross breeding.



(i) Name the type of selection that has taken place in wheat.

_____ [1]

(ii) Describe and explain **one** advantage to the farmer of using modern wheat instead of the ancient varieties.

_____

_____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 **(a)** Special Protection Areas (SPAs) are areas designated by European countries as being internationally important in the conservation of one or more bird species.

The sea cliffs of Rathlin Island and the surrounding marine environment is one of Northern Ireland's SPAs. The peregrine falcon is one species that this SPA is helping conserve. Peregrine falcons nest on the sea cliffs and they feed on ducks and other birds.



© Mike Langman (rspb-images.com)

(i) Suggest **one** reason why the peregrine falcon was selected as a species to be conserved at the Rathlin Island SPA.

_____ [1]

(ii) Suggest **one** reason why the rocky shore and sea surrounding the cliffs is also protected.

_____ [1]

(iii) The cliffs at Rathlin Island are the nesting sites of many species of birds. Suggest one advantage to nesting on cliffs.

_____ [1]

(b) The European Nitrates Directive is another measure designed to protect the environment. Describe and explain how it can help conserve biodiversity in rivers and lakes.

_____

_____

_____

_____

_____ [4]

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GCSE

Science: Single Award (Modular)

March 2010

Mark Schemes

Issued: May 2010

Rewarding Learning

General Certificate of Secondary Education
2009 – 2010

Science: Single Award (Modular)

Human Activity and Health
Module 2

Higher Tier

[GSC22]

THURSDAY 25 FEBRUARY 2010 MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	will not run out; fast growth / short life cycle	[2]	
	(b)	carbon dioxide both produced and used; amount used = amount produced	[2]	
	(c)	carbon dioxide in atmosphere doesn't increase / doesn't affect global warming	[1]	5
2	**(a)**	**(i)** phagocytosis	[1]	
		(ii) antibodies	[1]	
		(iii) white blood cells / lymphocytes; produce antibodies; antibodies join with antigen / microbe; reference to complementary shape (any three)	[3]	
	(b)	**(i)** fall around 1998 then rise back to original level; scare about autism / side effects; further research shows that MMR vaccination is safe	[3]	
		(ii) worry about side effects / personal choice / logistic issues / already had disease	[1]	9
3	**(a)**	**(i)** 40	[1]	
		(ii) discontinuous	[1]	
	(b)	**(i)** Down's syndrome	[1]	
		(ii) uncontrolled; cell division	[2]	
		(iii) UV light	[1]	6

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				AVAILABLE MARKS
4	(a)	a substance diffuses / spreads from the fungus; which kills / stops growth of bacteria [2]		
	(b)	(i) to prevent contamination / to ensure that only bacteria grown were those transferred [1]		
		(ii) temperature too low in incubator / loop not cooled after heating and hot loop kills bacteria [1]		
		(iii) lid left off for too long / microbes in air [1]		
	(c)	(i) in vitro [1]		
		(ii) animal testing [1]		
		(iii) licensing [1]		
	(d)	advantage – prevents disease / growth promoters disadvantage – encourages microbe resistance to antibiotics / not ethical / chemicals in food [2]		10
5	(a)	(i) when antibiotics used microbe resistant favoured / survive; normal bacteria die; evolution is change in genotype / change in bacterial population with time [3]		
		(ii) Charles Darwin [1]		
		(iii) contradicts the teaching of the Church / people believe its flawed [1]		
	(b)	(i) artificial selection [1]		
		(ii) better 'heads' / crop; more profit **or** shorter plants / more even heights; easier to harvest / less likely to suffer wind damage [2]		8
6	(a)	(i) important site for peregrines / endangered species / suitable habitat [1]		
		(ii) conserve food (ducks) / protect habitat of falcon [1]		
		(iii) safe from predators / persecution / able to see prey easily [1]		
	(b)	no spraying fertiliser in winter; efficient storage of fertiliser / slurry; (excess) nitrate cannot filter into waterways / to pollute / change habitat; kill fish or other wildlife [4]		7
			Total	**45**

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