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.

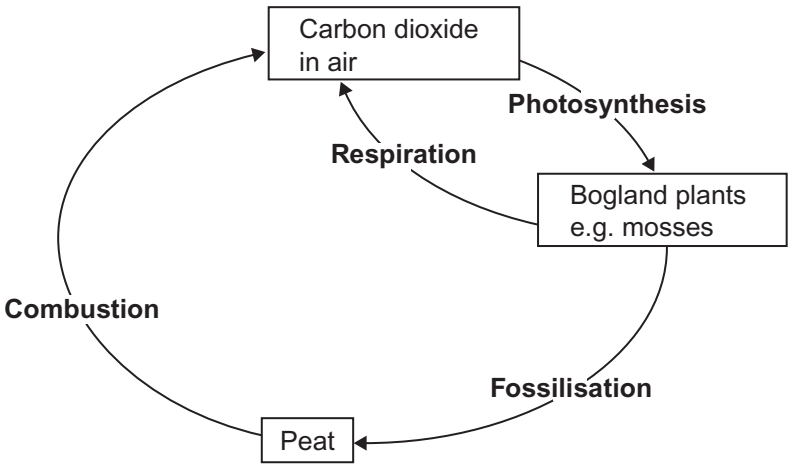
INFORMATION FOR CANDIDATES

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	

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.

_____

_____

_____

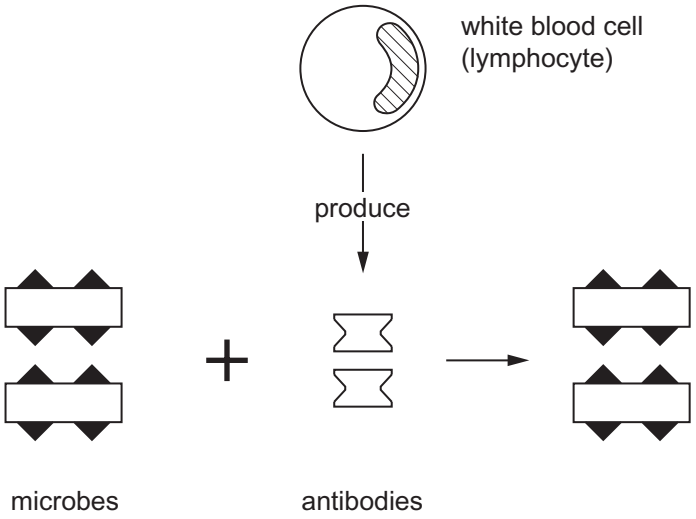
_____

_____ [3]

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]

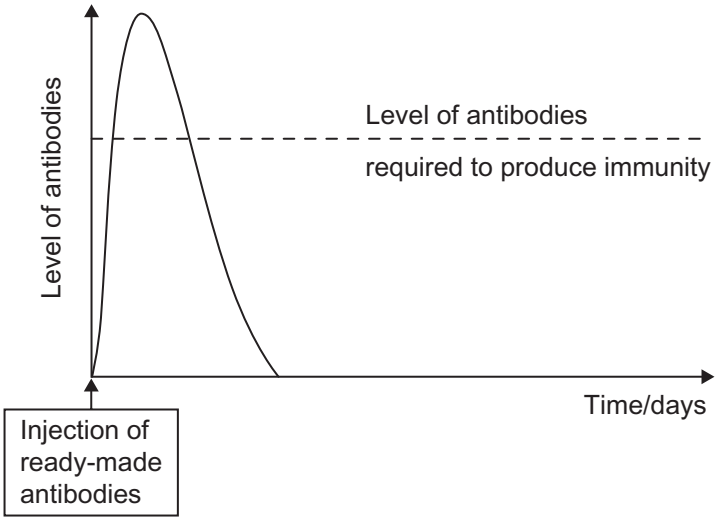
(iii) Suggest why we have different antibodies for each type of disease.

_____ [1]

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.)

_____

_____

_____

_____

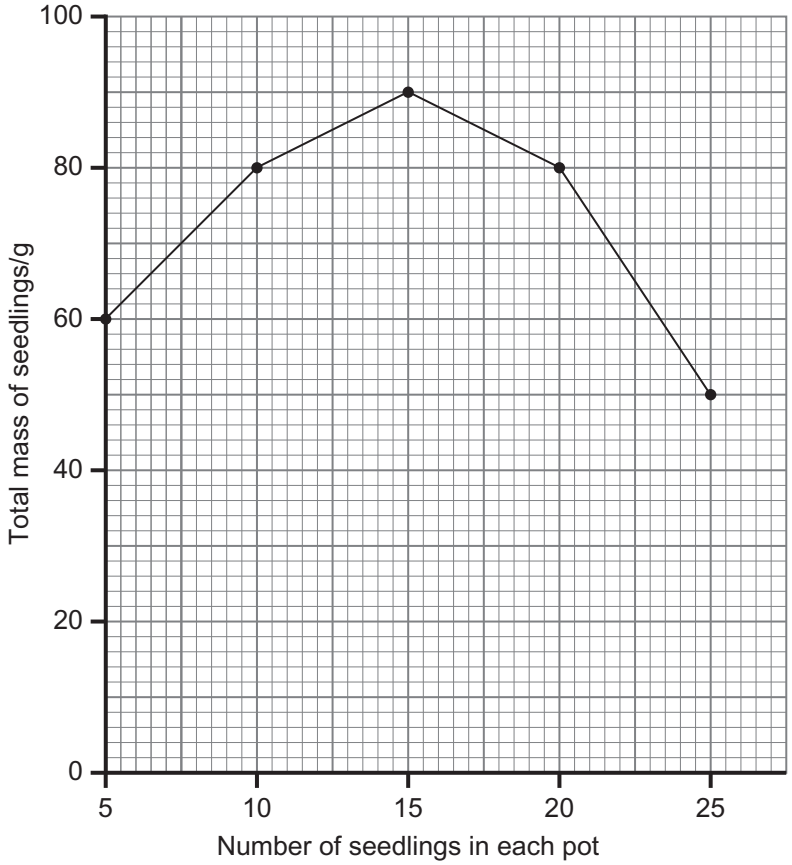
_____

_____ [4]

Examiner Only	
Marks	Remark

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.

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]

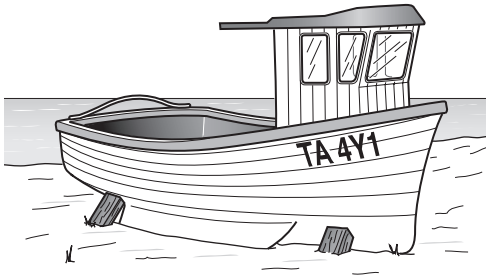
(ii) Suggest how pleasure boating could increase the spread of the zebra mussel across the waterways of Northern Ireland.

_____

_____ [2]

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]

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]

Examiner Only	
Marks	Remark

(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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