

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**A163/02**

**TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A/FURTHER ADDITIONAL  
SCIENCE A**

**Module B7 (Higher Tier)**

**MONDAY 15 JUNE 2015: Morning**

**DURATION: 1 hour**

**plus your additional time allowance**

**MODIFIED ENLARGED 24pt**

<b>Candidate forename</b>						<b>Candidate surname</b>				
<b>Centre number</b>						<b>Candidate number</b>				

**Candidates answer on the Question Paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:  
None**

**OTHER MATERIALS REQUIRED:  
Pencil  
Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**

**Use black ink. HB pencil may be used for graphs and diagrams only.**

**Answer ALL the questions.**

**Read each question carefully. Make sure you know what you have to do before starting your answer.**

**Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

## **INFORMATION FOR CANDIDATES**

**The quality of written communication is assessed in questions marked with a pencil (  ).**

**The number of marks is given in brackets [ ] at the end of each question or part question.**

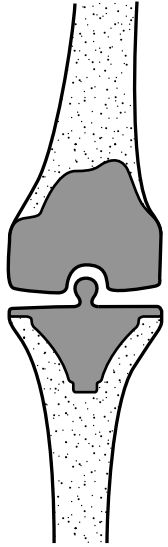
**The total number of marks for this paper is 60.**

**Any blank pages are indicated.**

**BLANK PAGE**

**Answer ALL the questions.**

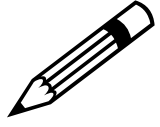
**1 The drawing shows an artificial knee joint.**



**The joint will not contain cartilage but all other structures and tissues will remain.**

**(a) Complete and label the drawing to show structures and tissues associated with the artificial joint.**

**Describe the properties of these structures and tissues and explain how these properties enable the joint to function effectively.**



**The quality of written communication will be assessed in your answer.**

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**[6]**

**(b) One type of injury that can happen to a joint is a sprain.**

**Write down TWO other types of injury that can happen to a joint.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ **[2]**

**(c) Describe the treatments for a sprain.**

\_\_\_\_\_  
\_\_\_\_\_ **[2]**

**(d) Describe the role of a physiotherapist in the treatment of a joint injury.**

\_\_\_\_\_  
\_\_\_\_\_ **[1]**

**[TOTAL: 11]**

**2 Human blood contains four main components.**

**One of these is red blood cells.**

**(a) Name and explain the functions of the other THREE main components.**

**1** \_\_\_\_\_  
\_\_\_\_\_

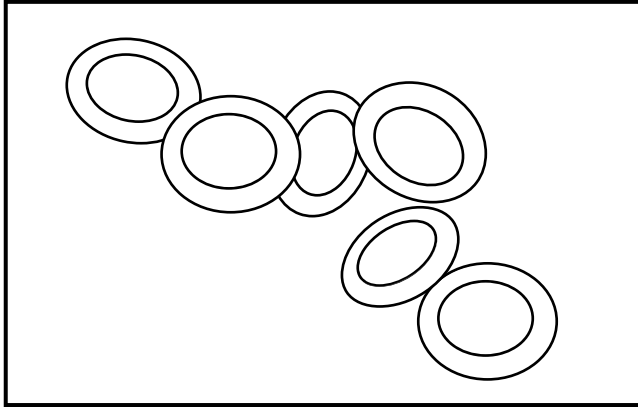
**2** \_\_\_\_\_  
\_\_\_\_\_

**3** \_\_\_\_\_  
\_\_\_\_\_

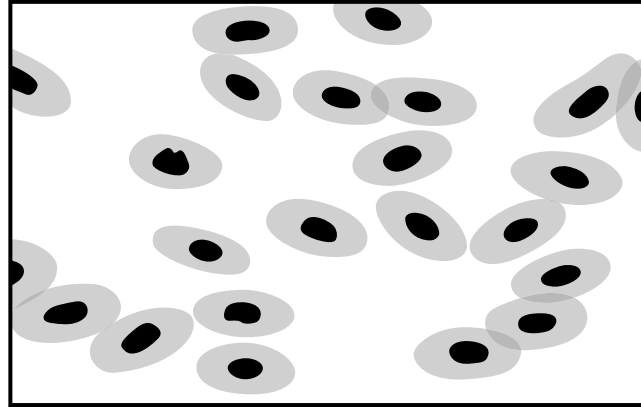
**[3]**

**(b) Look at the diagrams.**  
**They show human red blood cells and frog red blood cells.**

**Human red blood cells**



**Frog red blood cells**



**Human red blood cells are better adapted to the job that they do than frog red blood cells.**

**Use the diagrams to suggest how.**

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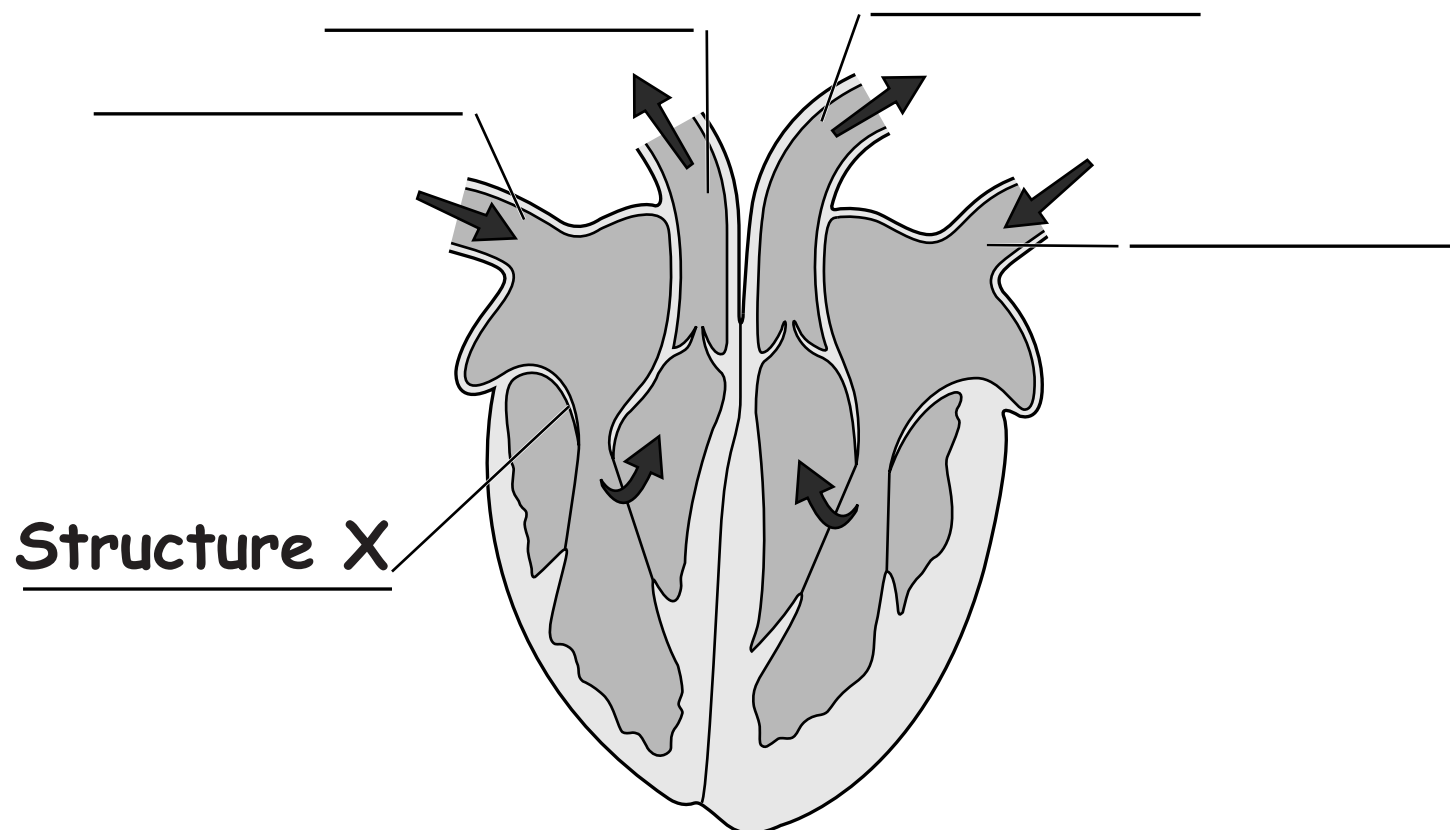
**[2]**



**(c) The heart pumps blood around the body.**

**Look at the diagram of a human heart.**

**(i) Complete the labels.**



**[3]**

**(ii) Describe the function of Structure X.**

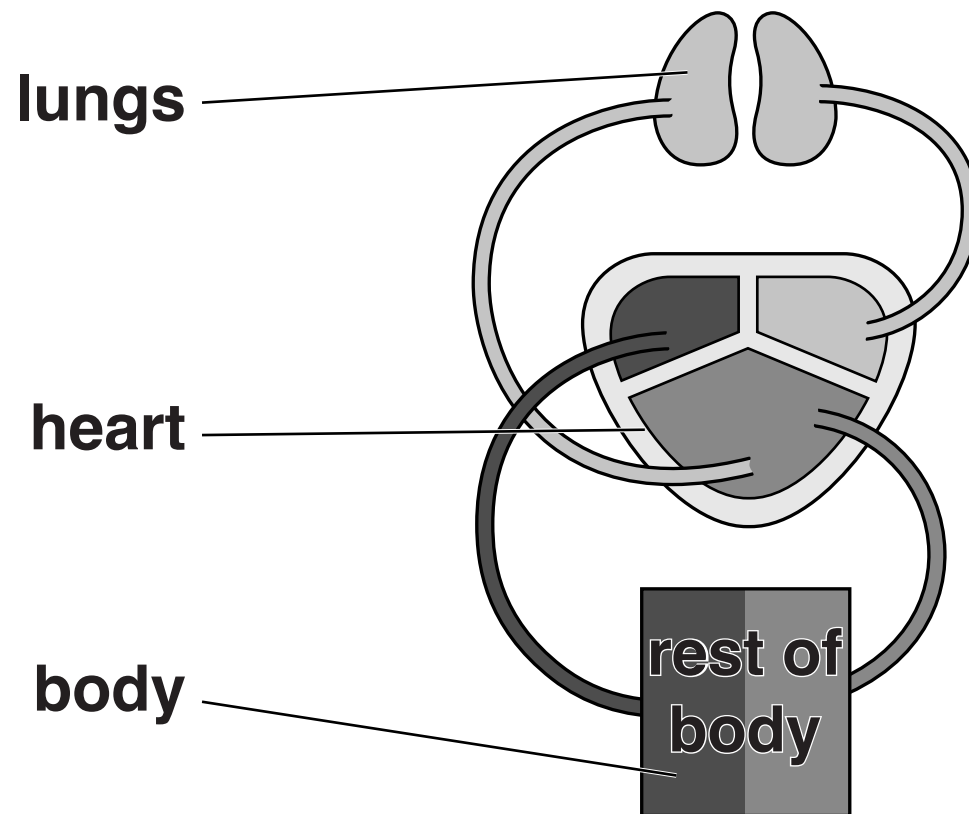
\_\_\_\_\_  
\_\_\_\_\_ **[1]**

**(iii) The arrows on the diagram of the heart show a double circulation.**

**Explain what double circulation means.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

- (iv) A frog's heart is different to a human heart.  
Look at the diagram of a frog's heart and circulation.



**Describe how the frog's heart is different to a human heart and suggest what effect this will have.**

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**[2]**

**BLANK PAGE**

**(v) Sometimes valves in the heart do not work properly.**

**They can be replaced with either mechanical valves or valves made from animal tissue.**

**In ten studies, patients had received MECHANICAL valves.**

**In twelve studies, patients had received animal TISSUE valves.**

**The graph opposite shows data collected at approximately five-year intervals.**

**Write down TWO conclusions that can be made from the data shown in the graph on the opposite page.**

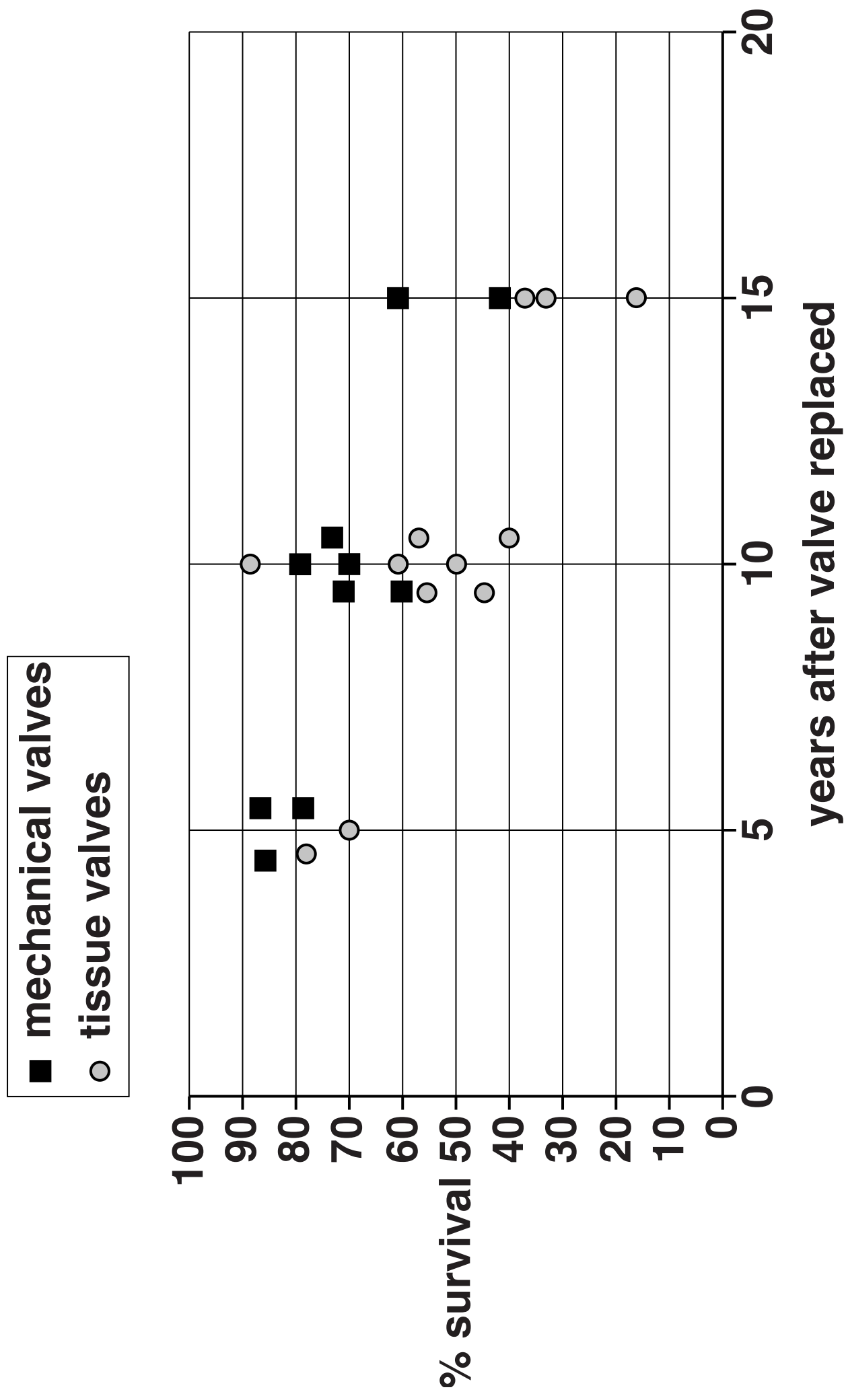
**Conclusion 1** \_\_\_\_\_

\_\_\_\_\_

**Conclusion 2** \_\_\_\_\_

\_\_\_\_\_

**[2]**



**(vi) To make a valid comparison between the two different studies, other pieces of information about the patients are needed.**

**Write down TWO other pieces of information needed.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_ **[2]**

**[TOTAL: 17]**

**3 Mammals such as seals maintain a constant body temperature.**

# Seals live in cold water.

**They have a thick layer of body fat and spend several hours each day lying in the sunshine.**

**Use your knowledge of temperature regulation and the information provided to suggest how a seal maintains a constant body temperature.**



**The quality of written communication will be assessed in your answer.**

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[6]

**[6]**

**[TOTAL: 6]**

**4 Look at the diagram opposite of the carbon cycle.**

**(a) Some students think that the carbon cycle is a closed-loop system.**

**Use ideas about carbon atoms and energy to suggest reasons for and against this conclusion.**

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[3]

**(b) Rainforests are sometimes called stable ecosystems.**

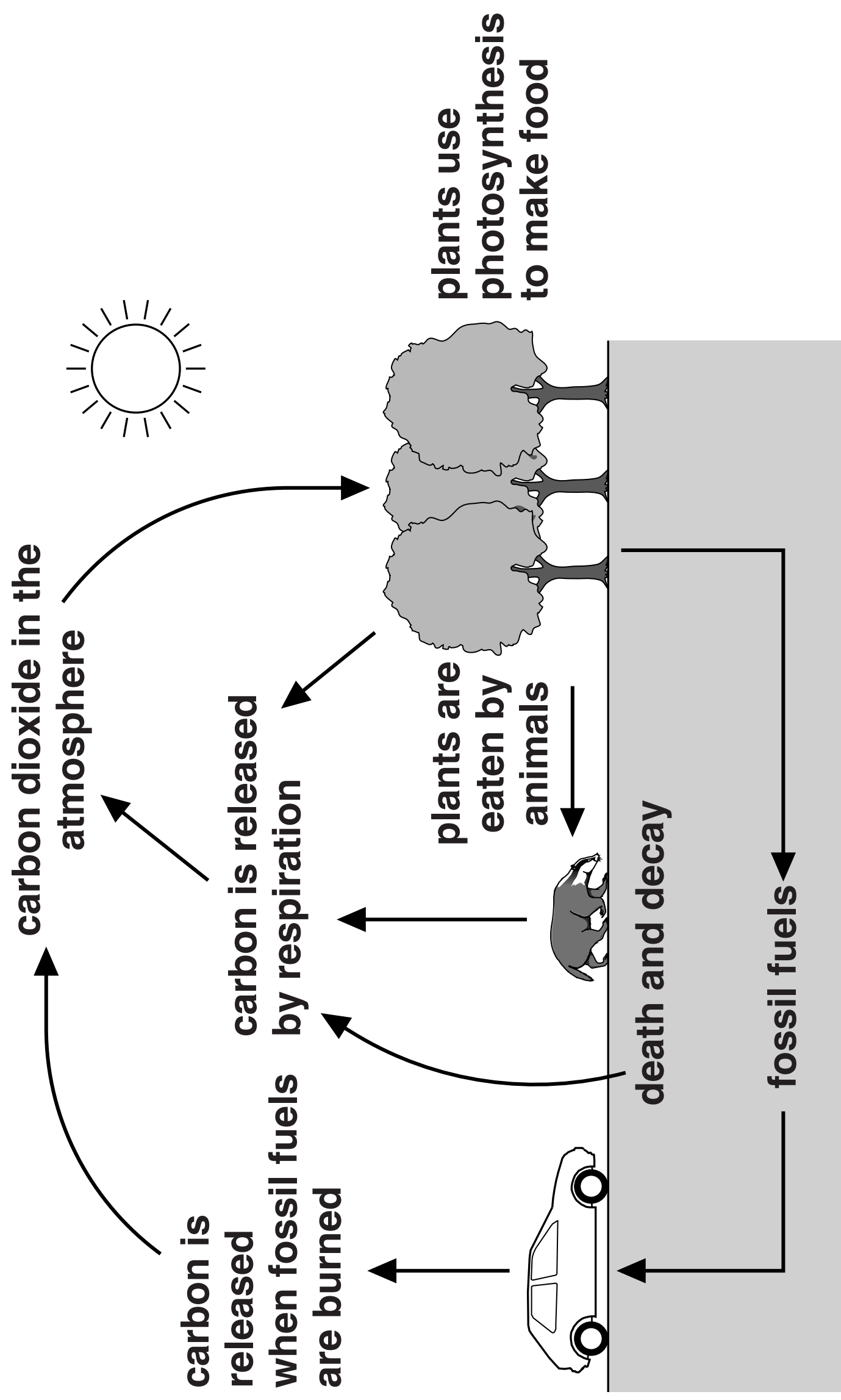
**Why are they described as stable?**

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[1]

**[TOTAL: 4]**





**5 Farmers use fertilisers. Some fertilisers contain nitrates.**

**Fertilisers can cause eutrophication in ponds and rivers.**

**The table shows dissolved oxygen and nitrate levels in two different ponds A and B.**

	Pond A	Pond B
dissolved oxygen mg/l	2	13
dissolved nitrates mg/l	61	8

**(a) Explain what ‘eutrophication’ is and how it is caused.**

**You must refer to data in the table to help you answer the question.**



**The quality of written communication will be assessed in your answer.**

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**[6]**

**(b) Farmers also use pesticides.**

**Read the newspaper article.**

**SCIENTISTS DEVELOP NEW  
PESTICIDE**

**Scientists have developed a new  
and safer pesticide.**

**Farmers must make sure that the  
level of the pesticide in their crops  
does not exceed a certain amount.**

**Protestors say that pesticides  
should never be used on food  
crops because it is a risk.**

**(i) Suggest a risk that the protestors are worried about.**

\_\_\_\_\_ **[1]**

**(ii) What TWO factors need to be considered when  
assessing just how big the risk is?**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**[2]**

**(iii) Suggest TWO reasons why people are willing to  
accept this risk.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**[2]**

**(c) Some pesticides can increase the risk of developing Parkinson's disease.**

**Two people in 1000 have Parkinson's disease.**

**Research suggests that exposure to pesticides may increase this risk by 50%.**

**(i) Calculate the risk of developing Parkinson's disease after exposure to pesticides.**

**Show your working.**

\_\_\_\_\_ **[2]**

**(ii) Use information from your answer in (i) to help to explain the difference between perceived risk and calculated risk when using pesticides.**

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ **[2]**

**[TOTAL: 15]**

**6 Stem cell technology and biomedical engineering are examples of new technologies.**

**(a) Parkinson's disease occurs when some nerve cells in the brain die.**

**These nerve cells make dopamine.**

**Stem cell technology is being used to treat some people with Parkinson's disease.**

**(i) Suggest what a stem cell is.**

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**[2]**

**(ii) Suggest how stem cell technology could be used to treat people with Parkinson's disease.**

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**[3]**

**(b) Our heartbeat is controlled by a natural pacemaker in the heart.**

**Biomedical engineering has been used to make an electrical pacemaker powered by a battery.  
This can save lives by replacing a faulty natural pacemaker.**

**Suggest TWO problems that may occur when using an artificial pacemaker.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

**[2]**

**[TOTAL: 7]**

**END OF QUESTION PAPER**

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