

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE**

**B731/02**

**GATEWAY SCIENCE**  
**BIOLOGY B**

**Biology modules B1, B2, B3**  
**(Higher Tier)**

**WEDNESDAY 20 MAY 2015: Afternoon**

**DURATION: 1 hour 15 minutes**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

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

**Your 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 75.**

**Any blank pages are indicated.**

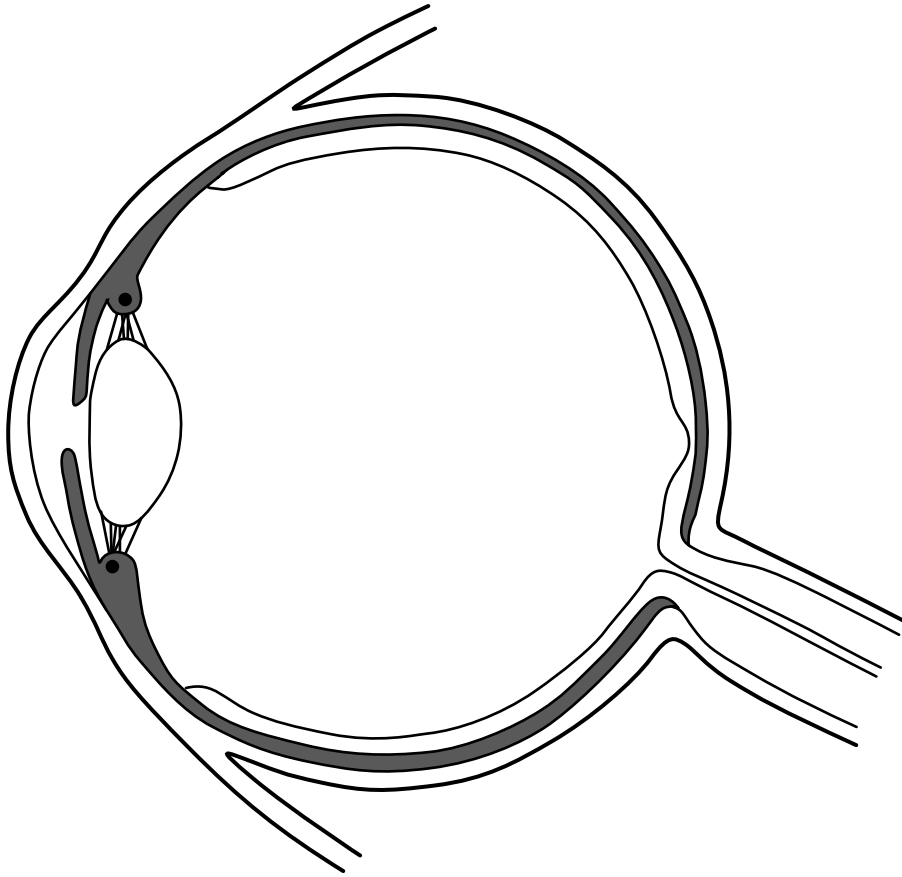
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**Answer ALL the questions.**

**SECTION A – Module B1**

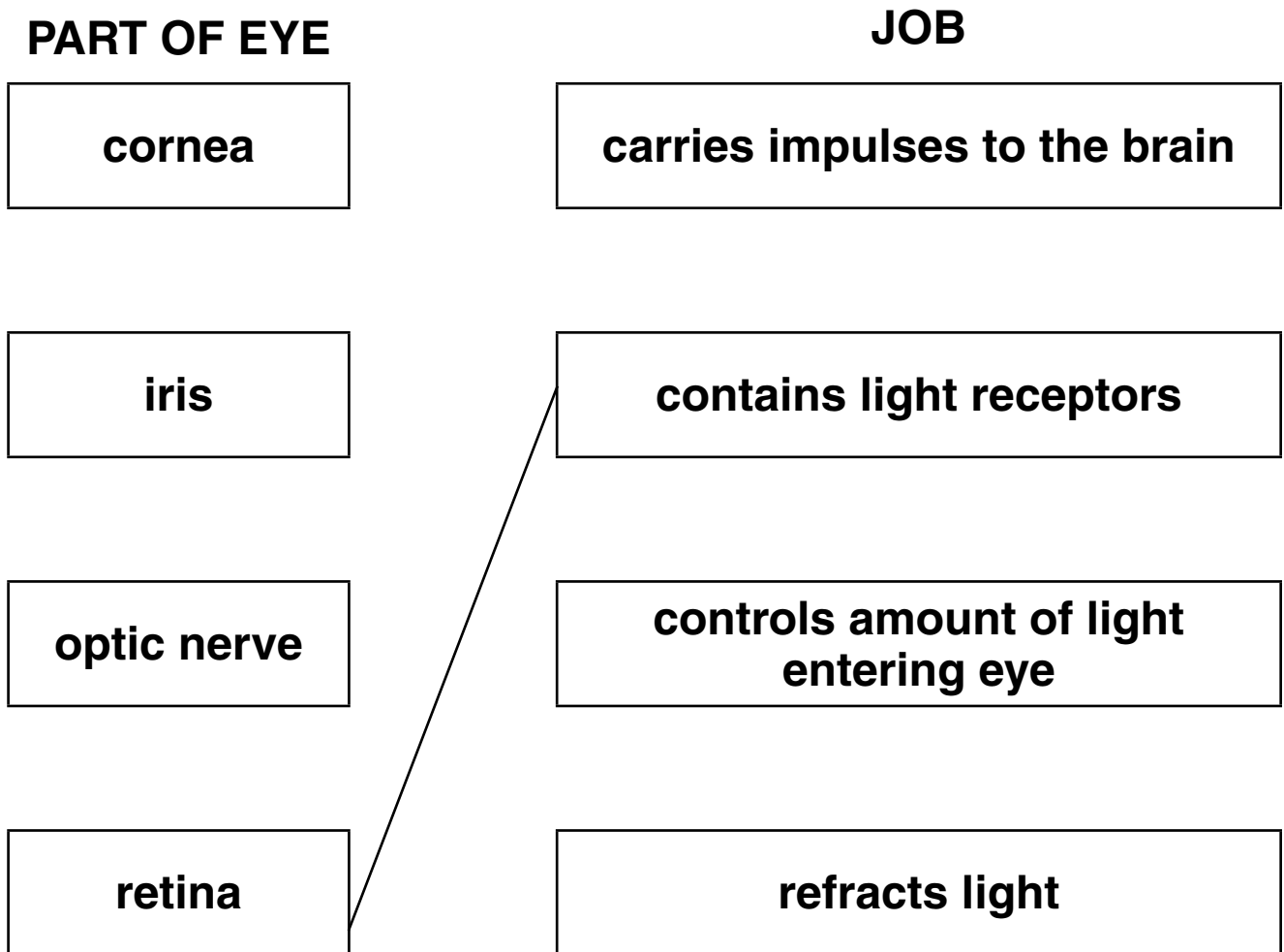
**1 This question is about vision.**

**Look at the diagram of an eye.**



**(a) Draw straight lines to join each PART OF THE EYE on the left to its JOB on the right.**

**One has been done for you.**



**[2]**

**(b) As people get older, the lens in the eye becomes less flexible and cannot change shape easily.**

**This means they cannot focus clearly on near objects.**

**Explain why.**

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**[2]**

**2 (a) Bronchi are airways leading to the lungs.**

**(i) Smoking cigarettes damages cells lining the bronchi.**

**What is the name of these cells?**

**Choose your answer from the list below.**

**ciliated epithelial cells**

**gamete cells**

**red blood cells**

**white blood cells**

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

**(ii) Smoking can cause cancer in cells lining the bronchi.**

**Describe and explain ONE OTHER way the smoke affects cells lining the bronchi.**

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

**(iii) There are two main types of tumour.**

**People who smoke are more likely to get malignant tumours.**

**Name the OTHER type of tumour and describe how it differs from a malignant tumour.**

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**[2]**

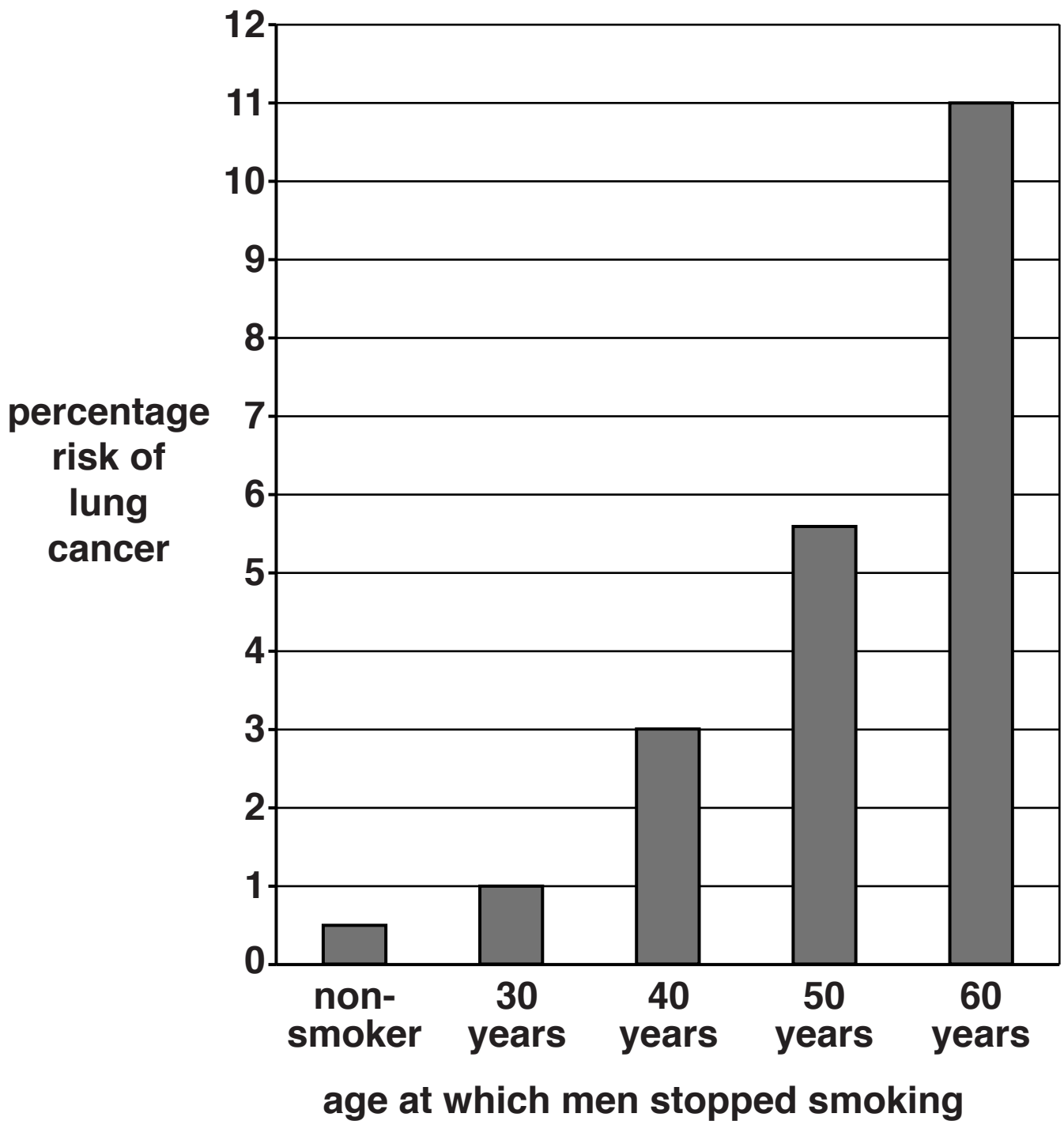


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**(b) Smoking cigarettes increases the risk of lung cancer.**

**Look at the graph.**

**It shows the risk of lung cancer in men who have stopped smoking.**



- (i) Estimate the risk of getting lung cancer for men who stop smoking at the age of 55 years.

\_\_\_\_\_ % [1]

- (ii) Stopping smoking reduces the risk of getting lung cancer.

**Anti-smoking campaigns aimed at people under 30 will have the biggest effect on reducing lung cancer. Explain why.**

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

**3 When someone drinks alcohol, it is absorbed into the bloodstream.**

**The amount of alcohol in the blood is shown by the blood alcohol concentration (BAC).**

**This is measured as the number of grams (g) of alcohol in 100 millilitres (ml) of blood.**

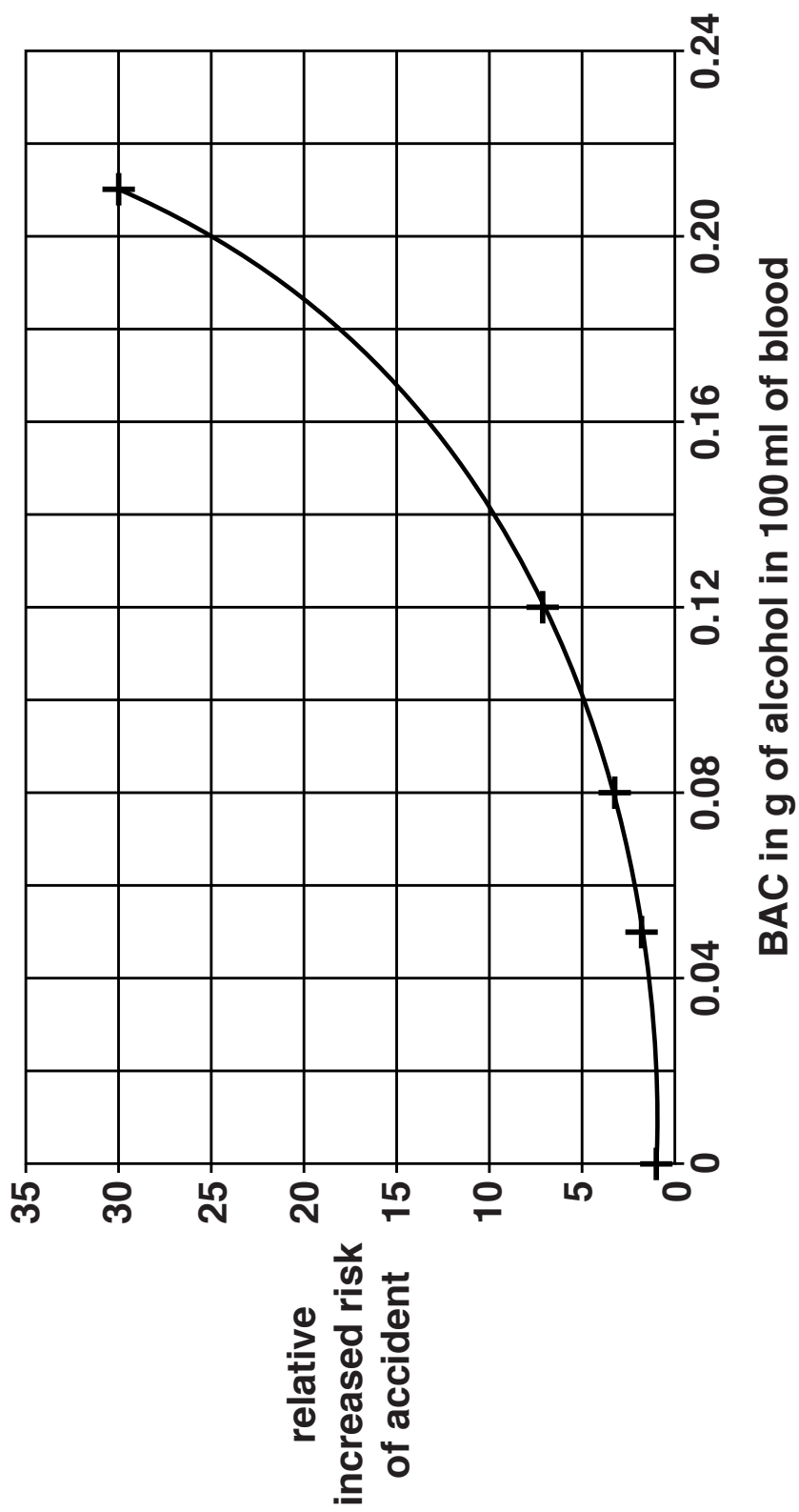
**Look at the graph opposite.**

**It shows the relative increased risk of an accident based on BAC levels.**

**Read the information below.**

**All the alcohol consumed is absorbed into the bloodstream.**

**There are 4000ml of blood in the body of an adult.**



**(a) John is a healthy adult.**

**A healthy adult's liver can break down 10g of alcohol per hour.**

**John has a drink that contains 28g of alcohol.**

**Calculate his BAC after TWO HOURS and use the graph on page 13 to identify John's relative increased risk of an accident.**



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

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**[6]**

**(b) Drinking large amounts of alcohol daily can cause liver damage.**

**Describe how.**

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**[2]**

- 4 The marathon and the shot put are two different athletic events.  
The fitness training for the marathon and shot put are very different.**

**Look at the graph opposite.**

**It shows the fitness measure profile for the two events.**

- (a) (i) The fitness measure profiles for strength and for cardiovascular efficiency for the two events are different.**

**Describe ONE difference.**

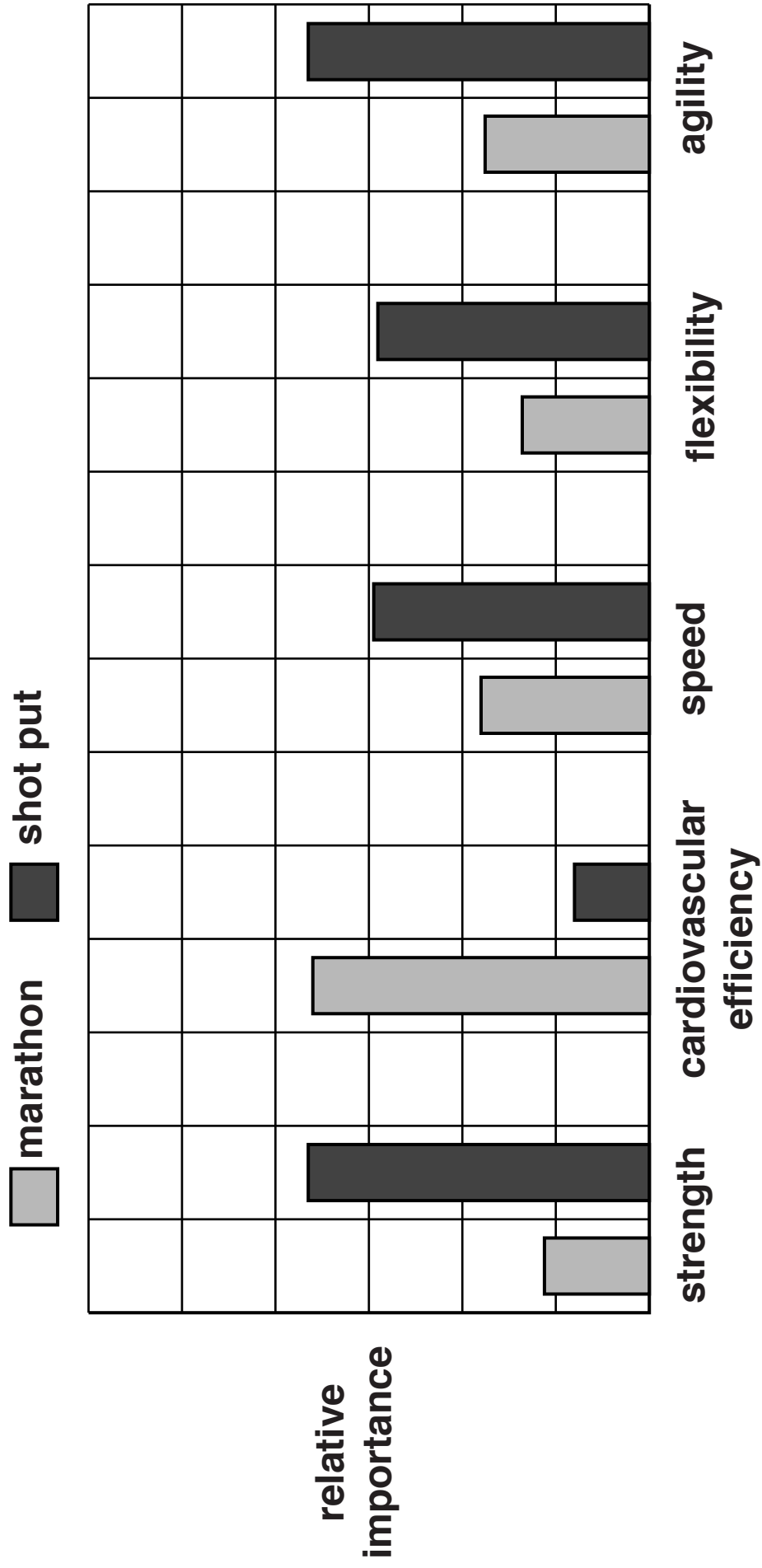
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**[1]**





fitness measure profile needed for  
marathon and shot put training

(ii) Paula wants to train for a marathon.

She finds three different training programmes, A, B and C.

The table shows the levels of training for each fitness measure.

	TRAINING PROGRAMME		
FITNESS MEASURE	A	B	C
Strength	High	Low	Low
Cardiovascular efficiency	Medium	High	High
Speed	Low	Medium	Low
Flexibility	High	Medium	High
Agility	High	Medium	Low

Which training programme would be the best to use when training for a marathon?

Choose from A, B or C \_\_\_\_\_

Explain your choice.

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[2]

**(b) Paula's mother is a good marathon runner but her father competes in the shot put.**

**Could Paula be a good marathon runner?**

**Explain your answer.**

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**[2]**

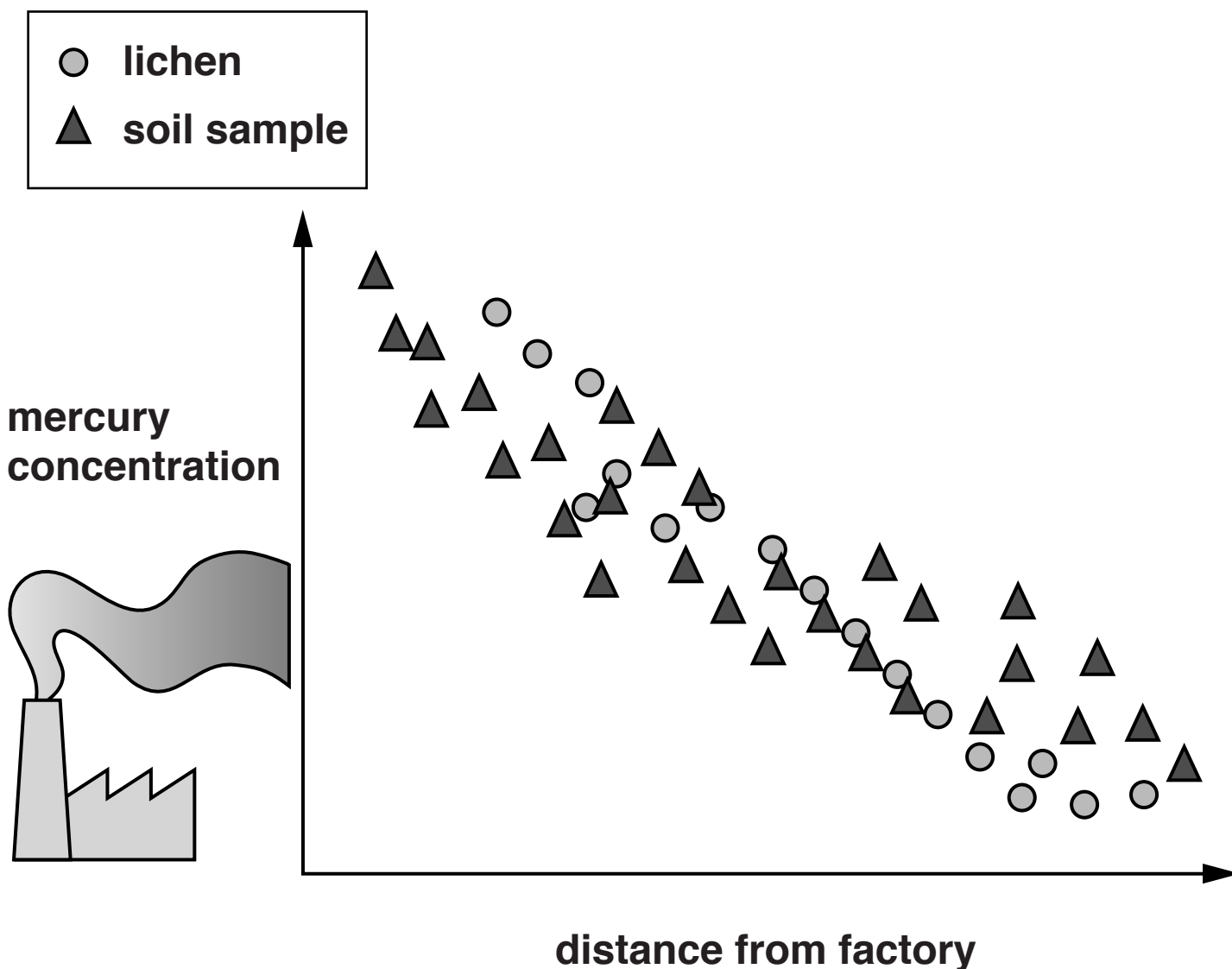
## SECTION B – Module B2

5 This question is about mercury pollution.

The normal method of detecting mercury pollution is to measure its concentration in soil.

Scientists want to know if lichens can be used to measure mercury pollution.

The graph shows the concentration of mercury in lichens and in soil at different distances from a factory.



**(a) Describe the trends shown in the graph.**

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[2]

**(b) What conclusions can the scientists make about using lichens to measure mercury pollution?**

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[2]

**6 (a) Snowy owls feed on lemmings.**

**The graph opposite shows the number of snowy owl nests and the number of lemmings found on Bylot Island, Canada.**

**The data in the graph suggests there is a pattern shown between the breeding of snowy owls and the numbers of lemmings.**

**Describe this pattern and explain how it affects the POPULATIONS of snowy owls and lemmings.**

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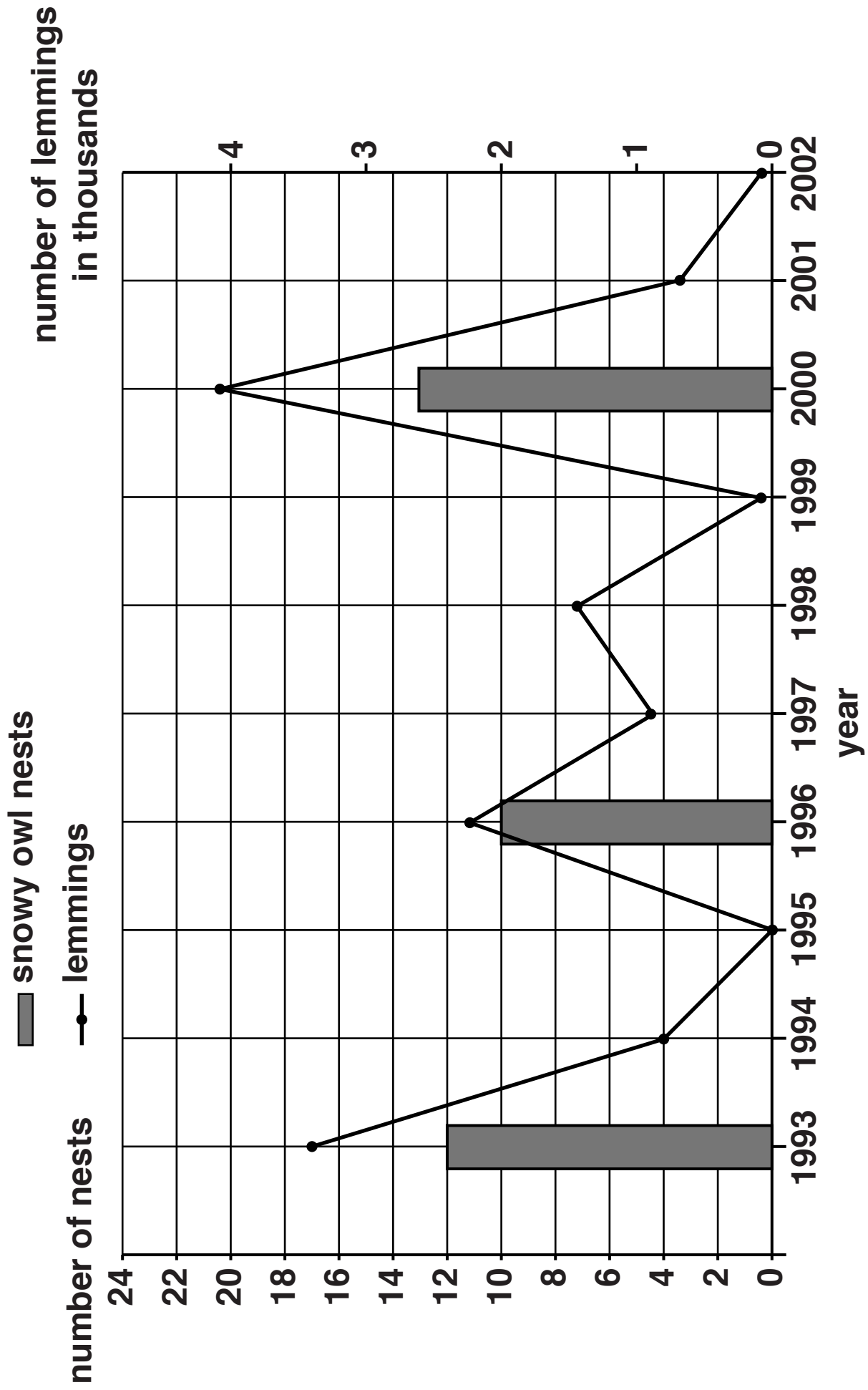
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[2]



**(b) Look at the picture of a lemming.**



**Lemmings live in Arctic conditions.**

**They do NOT hibernate.**

**Suggest and explain how lemmings are adapted to cold environments.**

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**[2]**



**(c) Penguins also live in cold climates.**

**Penguins use a counter-current heat exchange system.**

**Explain how this adaptation reduces heat loss.**

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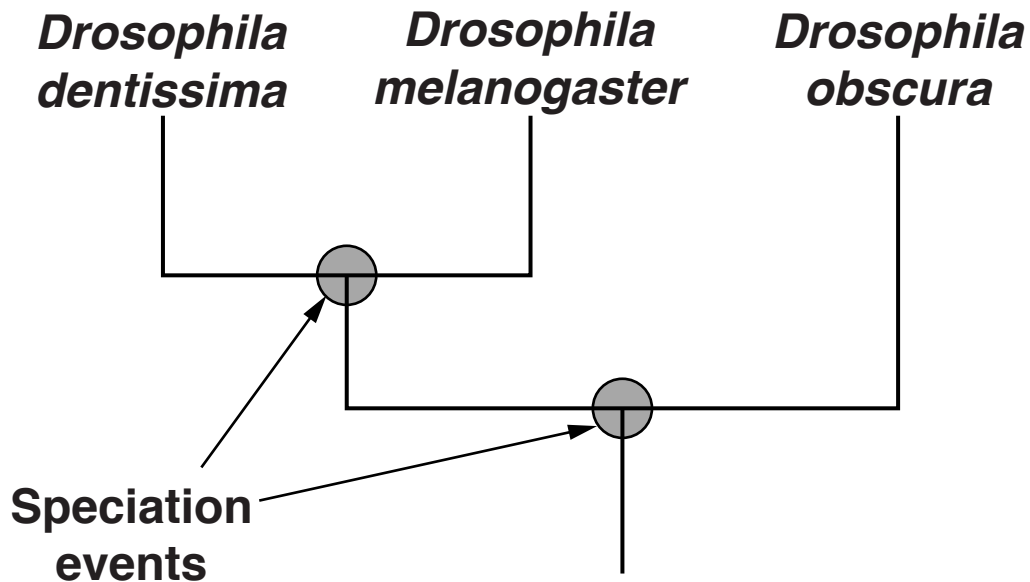
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**[2]**

7 This question is about classification.

(a) Look at the diagram.

It shows part of an evolutionary tree for three different *Drosophila* fruit flies.



What is the genus of all three fruit flies?

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

- (b) Catalina macaws are produced when a ‘Scarlet’ macaw species breeds with a ‘Blue and Gold’ macaw species.**

**Most Catalina macaws are infertile.**

**However, there are now some Catalina macaws that can breed together and produce new Catalina macaws.**

**Explain why this has caused problems in classifying the Catalina macaw.**

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[2]

- (c) (i) Natural selection can help explain how species evolve.**

**When Charles Darwin suggested his ideas about evolution by natural selection, some people were against his theory.**

**Explain why.**

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[2]

- (ii) Natural selection is now widely accepted as a theory about evolution.**

**Explain why.**

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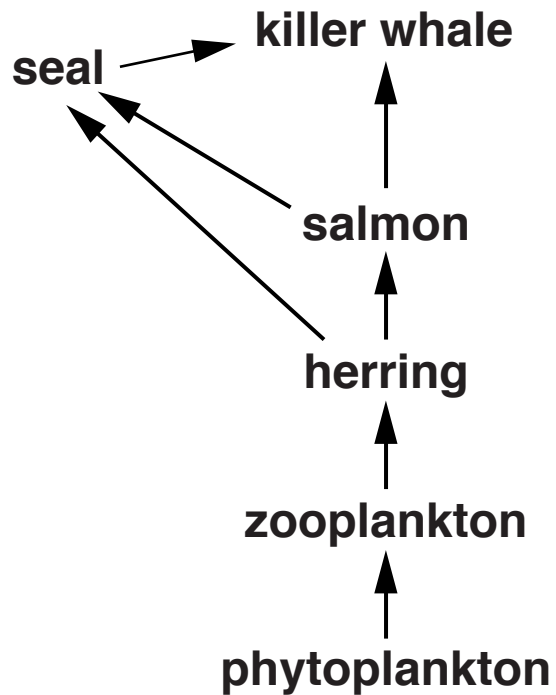
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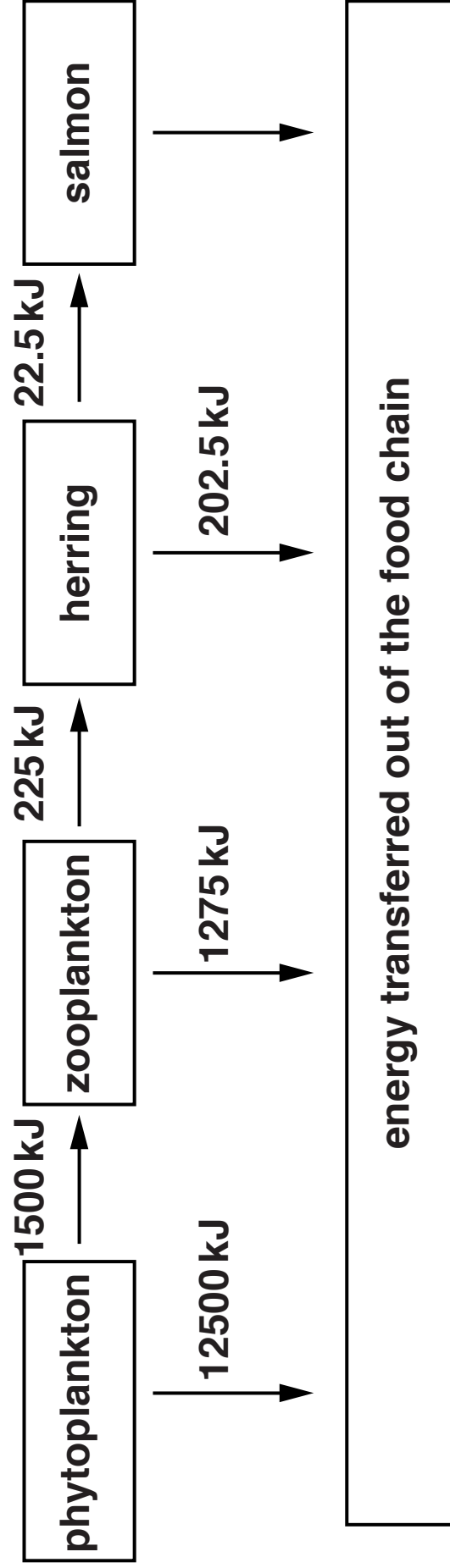
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**8 Look at the food web.**



**Look at the diagram opposite.**

**It shows the energy flow in PART of one food chain from the food web.**



- (a) The energy efficiency between zooplankton and herring in this chain is 15%.

Calculate the energy efficiency between the HERRING and SALMON in the food chain and use this value to explain why there are no more trophic levels after killer whales.



The quality of written communication will be assessed in your answer to this question.

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[6]



**(b) Captivity can be used as a way to conserve endangered species.**

**Some killer whales are kept in captivity.**

**Some people are concerned about keeping killer whales in captivity. Describe reasons why.**

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**[2]**

## **SECTION C – Module B3**

- 9 Weever fish are small fish that live in sand in shallow waters on some of Britain's beaches.**

**They have poisonous spines on their back.**

**Anyone touching the spines can get a painful sting.**

**The spines inject a nerve poison made of protein.**

**The first aid treatment is to put the affected area in hot water, as hot as the victim can bear.**

**The pain will start to ease after a few minutes.**

**Although the sting is very painful, it does not usually cause any lasting harm.**

- (a) The weever fish poison is made of protein.**

**What are proteins made of?**

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

- (b) The treatment involves hot water, the hotter the better.**

**Suggest why.**

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

- (c) The information for making the poison is coded in the fish's DNA and is in every cell.**

**However, the poison is only produced in the spines.**

**Explain why the poison is NOT produced in every cell.**

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**[1]**

- (d) On Britain's beaches in 2011, over 1000 holiday-makers were stung by weever fish.**

**Some people want to close the beaches where people have been stung.**

**Should the beaches be closed?**

**Explain your answer.**

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**[2]**

**10 During exercise, the rate of blood flow to different parts of the body changes.**

**Look at the table.**

	<b>RATE OF BLOOD FLOW IN ml PER MINUTE</b>	
<b>PART OF BODY</b>	<b>AT REST</b>	<b>DURING EXERCISE</b>
<b>digestive system</b>	<b>1350</b>	<b>600</b>
<b>kidneys</b>	<b>1100</b>	<b>600</b>
<b>muscles</b>	<b>1000</b>	<b>12500</b>
<b>brain</b>	<b>700</b>	<b>750</b>
<b>skin</b>	<b>300</b>	<b>1900</b>
<b>heart muscle</b>	<b>200</b>	<b>750</b>
<b>other</b>	<b>350</b>	<b>400</b>
<b>Total blood flow to the body</b>	<b>5000</b>	<b>17500</b>

- (a) Explain how the rate of blood flow changes during exercise.**

**Use data from the table in your answer.**



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

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**[6]**

- (b) The rate of blood flow to the lungs is always the same as the total rate of blood flow shown in the table. Suggest why.**

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**[1]**

## 11 Read the newspaper article.

### **Scientists make eggs from skin cells**

**In 2012, Japanese scientists reported that they had used normal skin cells from mice to make mouse stem cells.**

**They then used these stem cells to make eggs.**

**The eggs were fertilised with sperm from a male mouse and implanted into a female mouse.**

**When the baby mice were born they were perfectly healthy and grew up to breed normally and have babies of their own.**

**The scientists have also produced sperm cells in a similar way.**

**If these techniques could be used with humans they could help infertile couples have children.**

**(a) What are stem cells?**

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**[2]**

- (b) The stem cells used by the Japanese scientists were different from normal mouse stem cells.**

**How were these stem cells different from normal mouse stem cells?**

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[2]

- (c) The stem cells are all clones of the skin cell they were made from.**

**Would the egg cells be clones of each other?**

**Explain your answer.**

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[2]

- (d) In the future, scientists could try to use similar techniques to produce human children.  
This will be controversial.**

**Some people think that it is unethical and goes against religious beliefs.**

**Suggest OTHER reasons why it is controversial.**

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[2]

- (e) Sperm cells contain many mitochondria.**

**Mitochondria produce ATP.**

**What is ATP used for?**

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[1]



**(f) Egg cells contain many ribosomes.**

**The ribosomes use the genetic code from the nucleus.**

**(i) What do ribosomes do?**

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

**(ii) What substance carries the genetic code from the nucleus to the ribosomes?**

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

**(iii) In the nucleus, the genetic code is contained in the base sequence of DNA.**

**Write down all the different bases.**

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

**END OF QUESTION PAPER**

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