

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**A163/02**

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

**Module B7 (Higher Tier)**

**MONDAY 16 JUNE 2014: Morning**

**DURATION: 1 hour  
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**

**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 Robert is worrying about his blood pressure. He decides to measure his blood pressure every day. Blood pressure consists of two readings. Systolic pressure is when the heart muscle is contracting. Diastolic pressure is when the heart muscle is relaxing. The graph opposite shows Robert's blood pressure taken over sixty days.

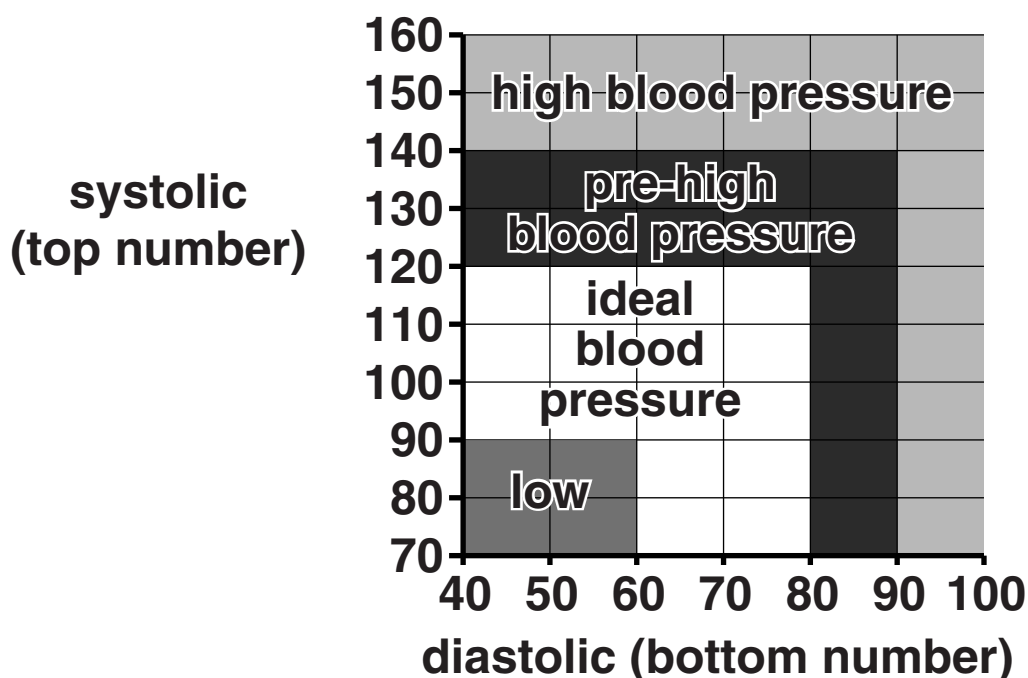
- (a) (i) Use the graph opposite to find Robert's blood pressure readings ON DAY 1.

systolic \_\_\_\_\_

diastolic \_\_\_\_\_

[1]

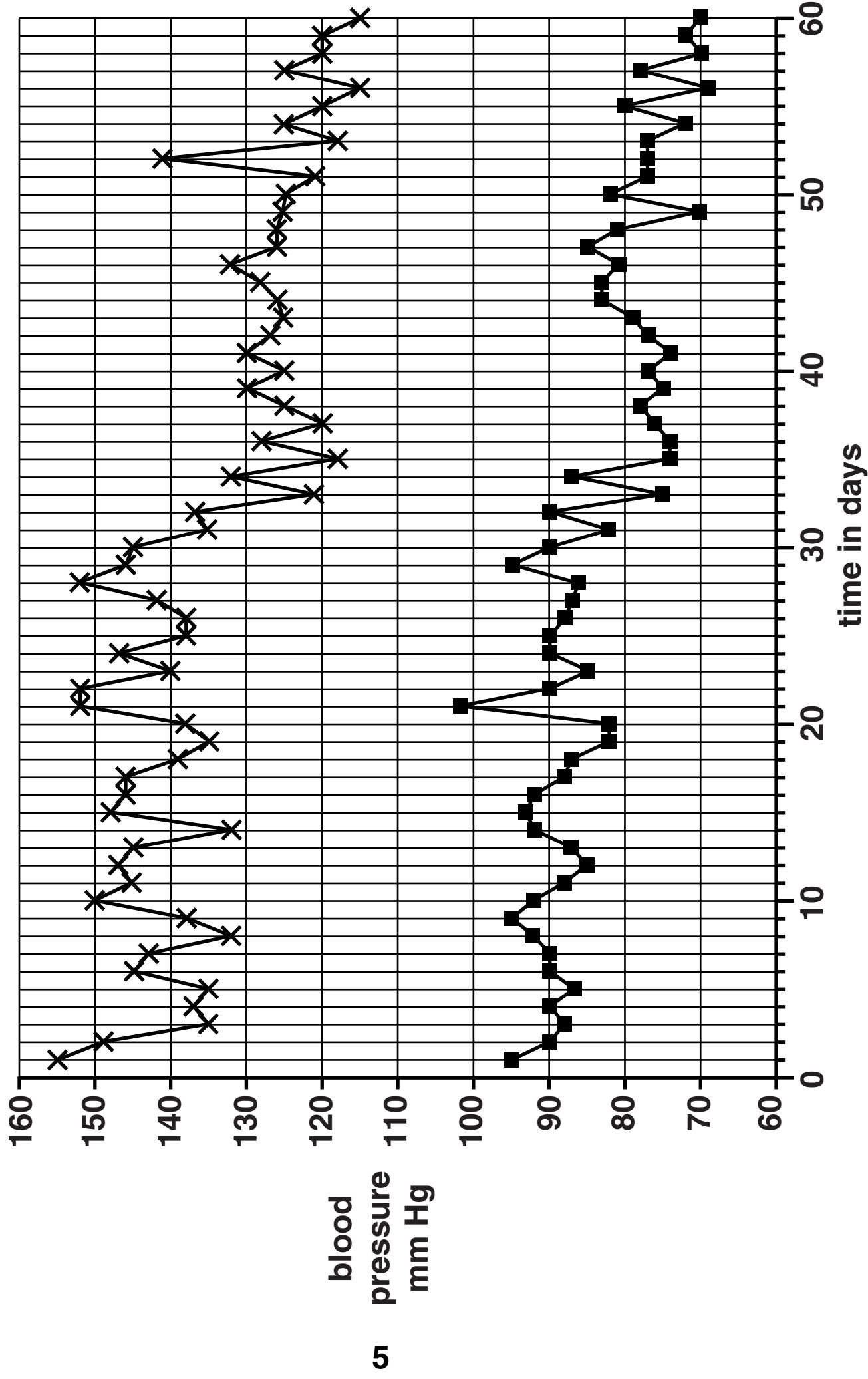
- (ii) Robert looks at a chart about blood pressure readings.



Key

—x— systolic

—■— diastolic



Use the chart on page 4 and your answer to part (i) to describe Robert's blood pressure ON DAY 1.

Put a tick (✓) in the correct box below.

	low	ideal	pre-high	high
Robert's blood pressure on day 1				

[1]

- (b) At some point during the sixty days, Robert's doctor gave him some medicine to reduce his blood pressure.

On which day do you think that Robert started to take his medicine?

day \_\_\_\_\_

[1]

- (c) Robert's blood pressure changes from day to day. Suggest one OTHER reason why.

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

**(d) Robert's average systolic blood pressure for the first seven days was 142.7 mm Hg.  
The table shows his systolic blood pressure for the last seven days.**

**(i) Complete the table by calculating Robert's average (mean) systolic blood pressure readings for the last seven days.**

<b>Day</b>	<b>Robert's systolic blood pressure in mm Hg</b>
<b>54</b>	<b>125</b>
<b>55</b>	<b>120</b>
<b>56</b>	<b>115</b>
<b>57</b>	<b>125</b>
<b>58</b>	<b>120</b>
<b>59</b>	<b>120</b>
<b>60</b>	<b>115</b>
<b>mean</b>	

**[2]**

**(ii) Suggest why scientists often calculate the mean of a set of data.**

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**[1]**

- (iii) Write down the range of systolic readings of Robert's blood pressure during the last seven days.**

from \_\_\_\_\_ to \_\_\_\_\_

**[1]**

- (iv) Use the data to provide evidence that the medicine reduced Robert's blood pressure.**

\_\_\_\_\_

\_\_\_\_\_

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

**[TOTAL: 10]**



**2 Humans live in parts of the world that experience high and low temperatures.**

**(a) To allow the human body to work properly, the internal temperature of the body must be kept constant.**

**Explain how the human body monitors and controls its temperature despite being exposed to both high and low temperatures.**



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

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**[6]**

**(b) A farmer has two glasshouses.**

**The first glasshouse has automatic heaters which switch off when the temperature goes above 22°C.**

**The second glasshouse has the same automatic heaters and also the windows open when the temperature goes above 22°C.**

**Both glasshouses use the same type of control system.**

**What name is given to this type of control system and why is the system better in the second glasshouse?**

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[2]

**[TOTAL: 8]**

**3 Tissue fluid is extremely important.**

**(a) Explain how tissue fluid is formed in capillary beds.**

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**[2]**

**(b) Describe the functions of tissue fluid.  
Include in your answer the name of the process involved.**

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**[3]**

**[TOTAL: 5]**

- Explain how insecticides can have harmful effects on other organisms in an ecosystem.**



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[6]

**[TOTAL: 6]**

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- 5 The Oral Glucose Tolerance Test (OGTT) is done to measure how quickly glucose is removed from our blood after we swallow a glucose drink. The levels of blood glucose are measured using blood samples taken over a period of time.**

**The stages in this test are:**

- 1. Do not eat or drink for eight hours.**
- 2. Give a blood sample.**
- 3. Drink a glucose drink.**
- 4. Give blood samples over the next few hours.**

**The graph opposite shows the results of this test on two different people.**

- (a) After how many minutes did person A and person B reach a maximum blood glucose level?**

**person A \_\_\_\_\_ minutes**

**person B \_\_\_\_\_ minutes**  
**[1]**

- (b) Use the graph to describe THREE other ways that the blood glucose level of person A differs from the blood glucose level of person B.**

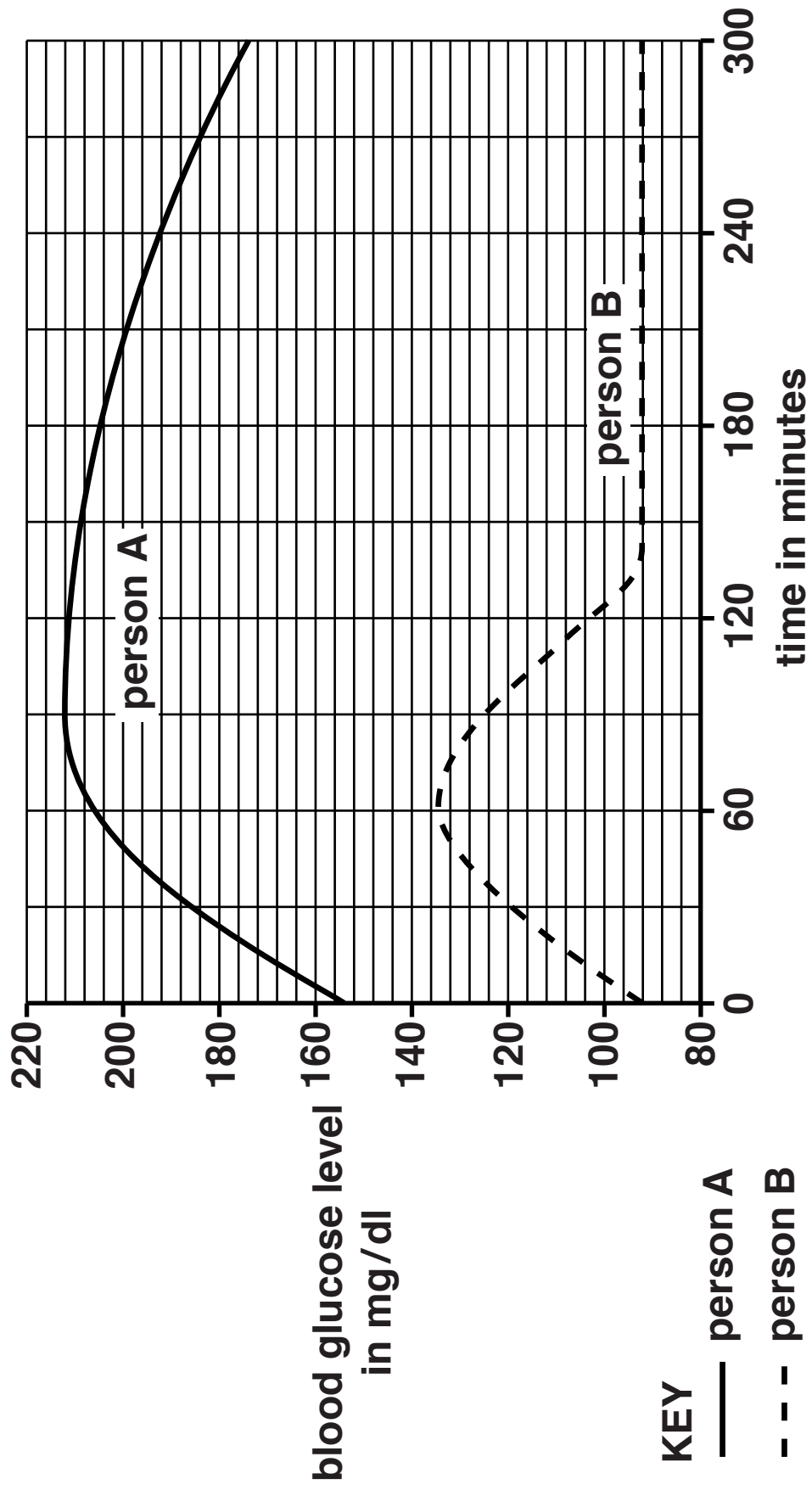
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**[3]**



- (c) What conclusions can you make about the health of person A and person B?**

**Explain your answer.**

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**[3]**

- (d) A doctor observed an OGTT graph of another patient and predicted that the patient was healthy. Further tests showed this patient was indeed healthy.**

**Explain what it means to a scientist when an observation agrees with a prediction.**

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**[2]**

**[TOTAL: 9]**



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**6 Helene is a deep sea diver.**

**She reads these two articles in a magazine.**



**The deeper you dive, the greater the pressure of the water.**

**The longer you stay under water, the more air dissolves in your blood.**

**Air bubbles in the blood can block blood flow to organs causing pain and damage.**



**Fizzy drinks get their fizz from a gas that is dissolved in the drink under great pressure.**

**When the bottle is opened the pressure is released and bubbles of gas appear in the drink.**

**If the bottle is opened slowly fewer bubbles appear in the drink.**

**Helene plans to dive with a supply of air.**

**Predict what might happen in Helene's body as she returns to the surface.**

**Explain any possible problems and how she might avoid them.**

**Use information from the articles in your answer.**



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

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**[6]**

**[TOTAL: 6]**

- 7 Neil investigates whether using fertiliser increases seed production in plants.**

**He grows five plants without fertiliser and five plants with fertiliser.**

**He counts the number of seeds each plant produces.**

**These are his results.**

**Each star (★) in the table represents one plant.**

<b>Number of seeds produced</b>	<b>Without fertiliser</b>	<b>With fertiliser</b>
<b>100</b>	<b>★</b>	
<b>110</b>	<b>★</b>	
<b>120</b>		
<b>130</b>	<b>★</b>	<b>★</b>
<b>140</b>		<b>★</b>
<b>150</b>	<b>★</b>	<b>★</b>
<b>160</b>		<b>★</b>
<b>170</b>		<b>★</b>
<b>180</b>	<b>★</b>	
<b>mean</b>	<b>134 seeds</b>	<b>150 seeds</b>

**Three students comment on Neil's results.**

**Wendy says, 'You cannot say that plants with fertiliser produce more seeds because the ranges of the two groups of plants (those without and those with fertiliser) overlap.'**

**Alistair says, 'Adding fertiliser is a waste of time because one plant without fertiliser produced the most seeds.'**

**Ann says, 'Adding fertiliser must make a difference because the plants with fertiliser have a higher mean.'**

**(a) For each student, state whether they are right or wrong and comment on their statement.**

**Ann**

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**Alistair**

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**Wendy**

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**[4]**

- (b) Neil does his experiment in a glasshouse.  
Suggest whether the experiment involved an open  
loop system or a closed loop system.  
Give TWO reasons for your answer.**

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**[2]**

**[TOTAL: 6]**

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- 8 Genetic testing uses DNA technology.**  
**Genetic testing can be used to find out if a person is a carrier for a genetic condition.**

**(a) These are the stages in the process of genetic testing.**

**They are listed in the correct order.**

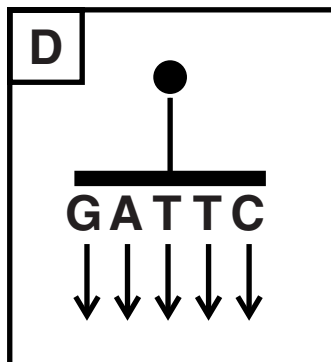
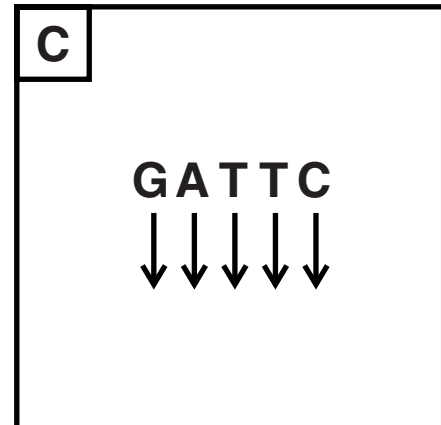
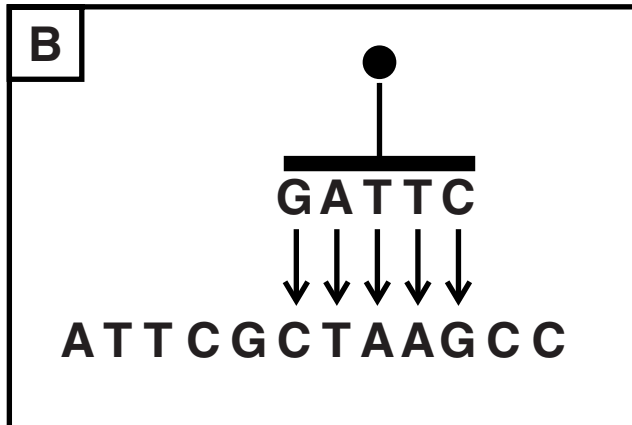
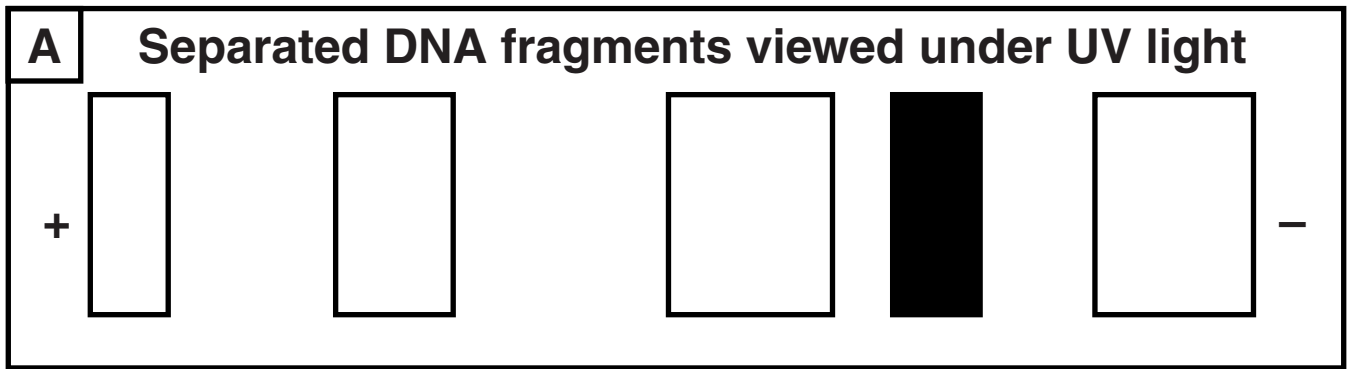
<b>1</b>	<b>Isolation of DNA sample from white blood cells.</b>
<b>2</b>	<b>Production of gene probe.</b>
<b>3</b>	<b>Gene probe labelled with UV fluorescent dye.</b>
<b>4</b>	<b>Addition of gene probe to DNA sample.</b>
<b>5</b>	<b>Use UV light to detect gene probe on DNA sample.</b>

**The diagrams opposite, A, B, C, D and E, show these stages but they are not in the correct order.**

**Put the diagrams, A, B, C, D and E, in the correct order.**

\_\_\_\_\_ [4]





- (b) Suggest whether the DNA sample carried the allele for the genetic condition that was being looked for.  
Explain your answer.

\_\_\_\_\_

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

[TOTAL: 5]

**9 This question is about using microorganisms for industrial processes.**

**(a) Which of these features of bacteria make them ideal for using in industrial processes?**

**Put ticks (✓) in the boxes next to the THREE correct answers.**

**They need carefully controlled conditions for growth.**

☐

**They have a rapid rate of reproduction.**

☐

**They can make complex molecules.**

☐

**There are few ethical concerns over their culture.**

☐

**They cannot be seen with the naked eye.**

☐

**Some of them can cause disease in other living organisms.**

☐

**They can cross-contaminate other industrial processes.**

☐

**[3]**

**(b) Bacteria and fungi can be grown in large scale fermenters to make different products.  
Put ticks (✓) in the boxes next to THREE of these products.**

**red blood cells**

☐

**single cell protein**

☐

**a replacement heart**

☐

**antibiotics**

☐

**a genetically modified wheat plant**

☐

**enzymes**

☐

**nerve cells**

☐

**[2]**

**[TOTAL: 5]**

**END OF QUESTION PAPER**



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