OCR
RECOGNISING ACHIEVEMENT

SPECIMEN H

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE **A163/02**

BIOLOGY A

Unit 3: Module B7 (Higher Tier)

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)

Duration: 1 hour

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

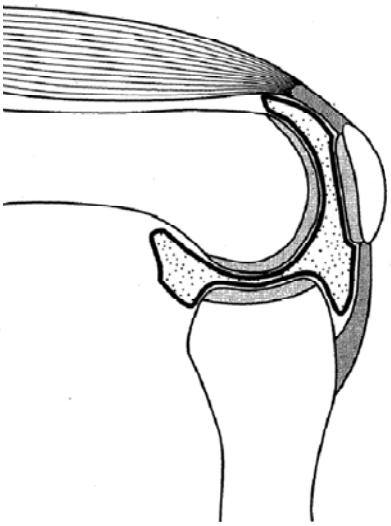
INFORMATION FOR CANDIDATES
- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks for each question is given in brackets **[ ]** at the end of the question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	**Mark**
1	**6**	
2	**12**	
3	**5**	
4	**11**	
5	**9**	
6	**3**	
7	**7**	
8	**7**	
TOTAL	**60**	

Answer **all** the questions.

1 The bones of the human skeleton are held together at joints, which allow movement.

The diagram shows the knee joint of the human skeleton.



Explain how the parts of the knee joint enable it to function.

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

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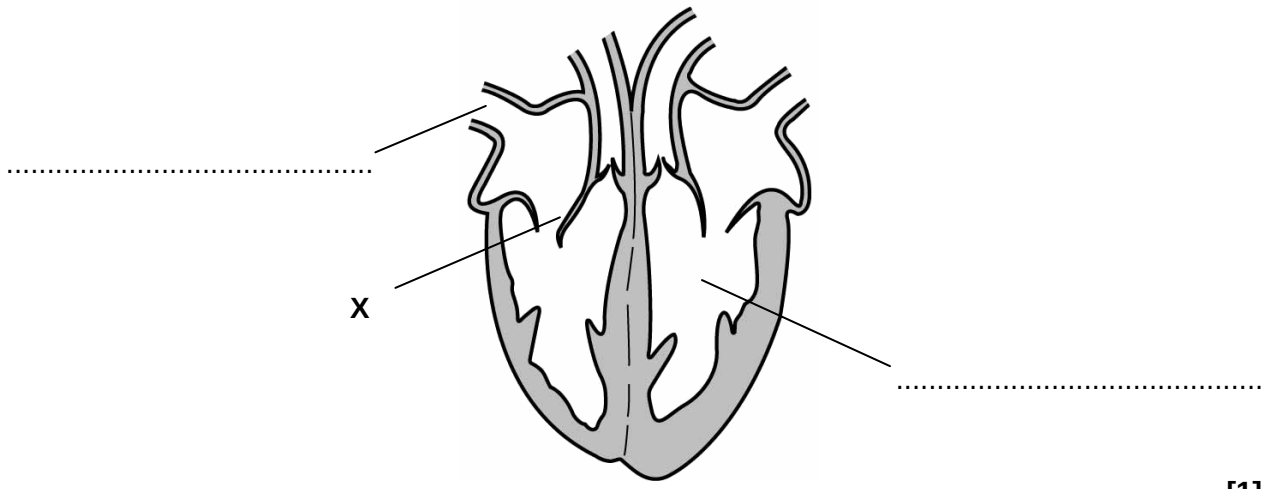
..... **[6]**

[Total: 6]

2 This question is about the heart and heart disease.

(a) Look at the diagram of the heart.

(i) Complete the two labels on the diagram below.



[1]

(ii) Suggest what would happen if structure **X** was faulty and the problems that this could cause.

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..... **[2]**

(iii) The thickness of the walls of the four chambers of the heart is different.

Explain why.

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..... **[3]**

(b) Eating too much fatty food can increase the risk of heart disease.

Read the article about heart disease.

Heart disease is related to blood cholesterol levels

Doctors say that the number of cases of heart disease in the population is directly related to the level of cholesterol in the blood.

People with high cholesterol are almost twice as likely to experience heart disease during their lifetime.

Men are almost twice as likely as women of having heart disease even if they have the same level of cholesterol in their blood.

Cholesterol is found in high fat foods.

This is why some people are cutting the amount of fat in their diet.

Other people think that because our body can make cholesterol, cutting down on fat in our diet is a waste of time.

(i) Describe the correlations suggested by the article.

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..... **[2]**

(ii) A student concludes that the article proves that cholesterol causes heart disease?

Is this conclusion valid? Explain your answer.

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..... **[1]**

(iii) A patient has their blood cholesterol measured.

Levels of blood cholesterol can be determined by doing a simple blood test.

Several measurements of the same quantity may give different results.

Suggest why repeating measurements gives a more reliable estimate of the quantity.

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..... **[3]**

[Total: 12]

3 Our bodies maintain a constant body temperature of 37 °C.

(a) These steps explain one way in which the body controls its own temperature.

They are in the wrong order.

A information sent to the hypothalamus

B blood flow to the skin's surface increases or decreases

C receptors in the skin detect the external temperature

D effectors in the skin increase or decrease vasodilation

E the temperature of the body returns to the correct level

F instructions are sent from the brain

Put the steps in the correct order by writing the letters in the empty boxes. One has been done for you.

					E

[2]

(b) When the human body is in danger of cooling down, it responds in order to maintain its core temperature.

Draw a straight line from each **structure** to the **action** it takes to maintain core temperature.

Then draw a straight line from each correct **action** to the **role** it plays in maintaining core temperature.

structure	action	role
	stop working	restricts blood flow
capillaries in skin		
	stand on end	reduces evaporation
sweat glands		
	twitch	increases insulation
muscles		
	become narrower	increases respiration

[3]

[Total: 5]

4 Natural ecosystems can be unbalanced by human activity.

(a) A gardener notices that the pond in her garden has turned green and all of the fish have died. She suspects that this may be because she used inorganic fertiliser in her garden.

Explain to the gardener how using inorganic fertiliser may have caused the effects in her pond.

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

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..... **[6]**

(b) Many years ago in America, intensive wheat farming turned a grassland into a desert.

Which of these statements are possible explanations of why this intensive wheat farming was not sustainable?

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

A desert is a stable ecosystem.	☐
A closed loop system became an open loop system.	☐
In open loop systems waste is always reused.	☐
The output from the ecosystem became greater than the input.	☐
Over-production of reproductive structures only occurs in closed loop systems.	☐
Ploughing soil prevents soil erosion.	☐
Intensive farming always results in an open loop system.	☐

[3]

(c) Energy can be generated in many ways.

Which of the following ways to generate electricity could meet the requirements of a closed loop system?

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

burning coal in a power station	☐
generating electricity from the wind	☐
using petrol in cars	☐
using waves to produce electrical power	☐
using North Sea gas for cooking	☐

[2]

[Total: 11]

5 This question is about genetic modification.

(a) Explain how bacteria can be genetically modified to produce human insulin.

Suggest benefits of using human insulin rather than insulin extracted from animals.

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

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..... **[6]**

(b) Wheat can be genetically modified to be resistant to weed killer.

This helps farmers to keep their wheat crop free of weeds, maximise the yield and earn more profit. It also helps consumers by providing a larger supply of food.

However, some people are opposed to the genetic modification of wheat in this way for a variety of reasons. Some think it is morally wrong to alter the DNA of living things, as if human beings are "playing God". Others have different concerns.

(i) Describe two other arguments **against** the genetic modification of wheat to be resistant to weed killer.

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..... **[2]**

(ii) Look at the balance of arguments for and against the genetic modification of wheat to be resistant to weed killer.

State whether you agree or disagree with this. Explain your answer.

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..... **[1]**

[Total: 9]

6 DNA technology is used in genetic testing.

Genetic testing can be used to find out whether a person is a carrier of a genetic condition such as cystic fibrosis.

Complete these statements to show how genetic testing is carried out.

Choose from the following words.

antibody allele antigen chromosome DNA gene probe nucleus

A sample of ..... is isolated from white blood cells.

A..... with a UV fluorescing marker is added to the sample.

UV light is then used to identify if the..... is present.

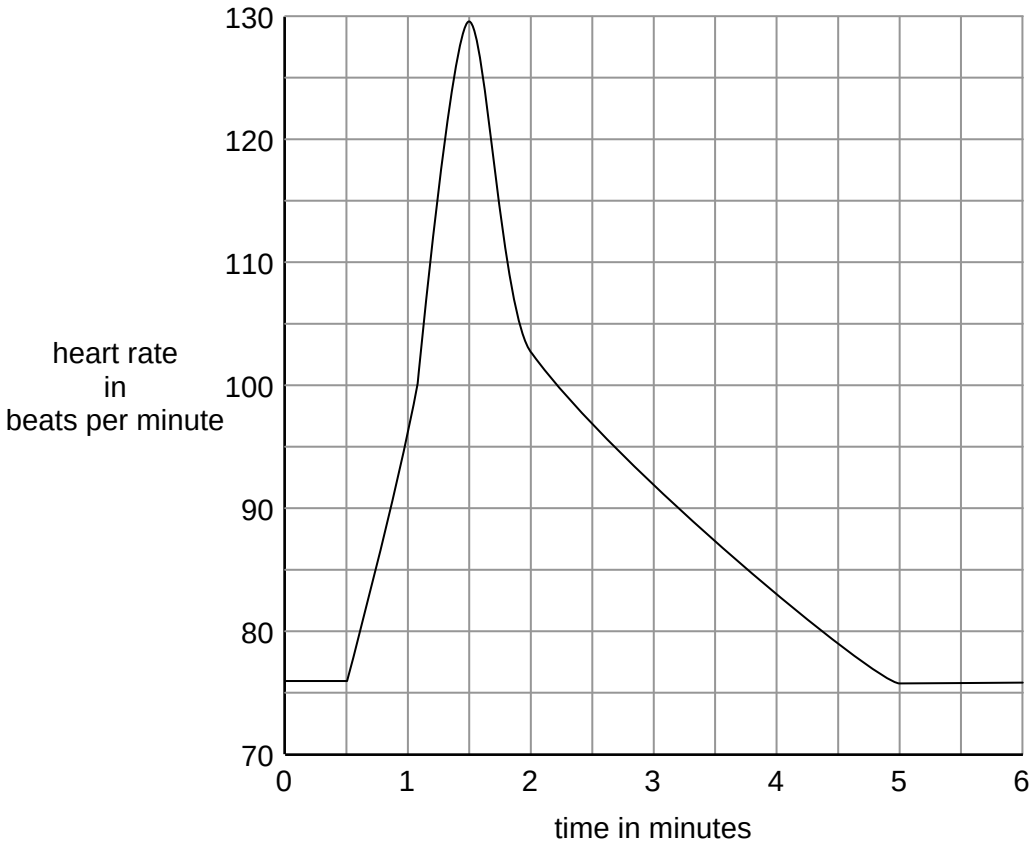
[3]

[Total: 3]

7 Steve and Mark are athletes.

Steve's heart rate is measured continuously during a standard exercise routine using a heart rate monitor.

The graph shows Steve's heart rate in beats per minute over a period of time.



(a) Use the graph to describe when Steve is resting and exercising during the six minute period.

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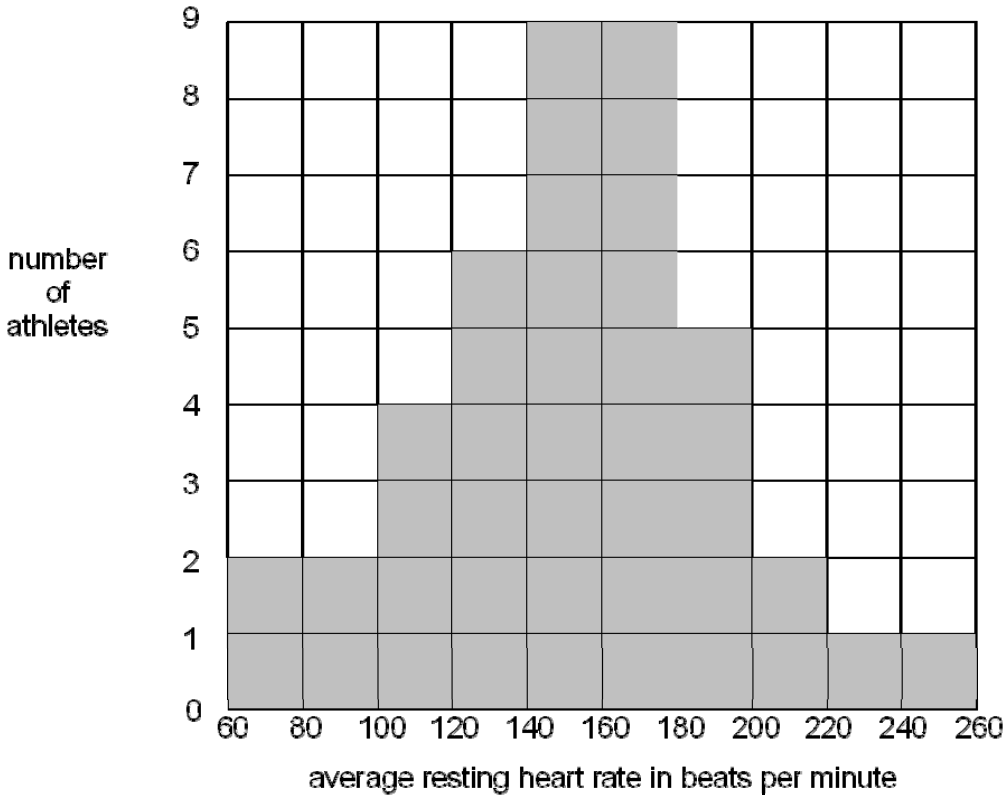
..... **[2]**

(b) The length of recovery period following a standard exercise routine is one indicator of fitness.

What is Steve's recovery period in seconds?

answer ..... s **[1]**

(c) The histogram shows the recovery period for a group of 40 athletes following this standard exercise routine.



Mark's recovery period is 205 seconds.

This is in the 90th percentile of the group.

Explain what this means and what it suggests about his level of fitness.

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..... **[2]**

(d) Mark's coach wants to find out how Mark is progressing in his training.

He uses measurements of recovery period following the standard exercise routine to monitor Mark's progress over several months of training.

These are the results that Mark's coach collects during the first 8 weeks.

	week							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
recovery period in seconds	210	183	207	194	199	180	197	178

Mark's coach concludes that Mark's fitness has improved over the 8 weeks.

Why do these data reduce confidence in the validity of this conclusion?

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..... **[2]**

[Total: 7]

8 Jake is concerned about his weight.

(a) He is 200 cm tall and has a body mass of 76 kg.

Use this formula to calculate Jakes body mass index (BMI).

Show your working.

$$\text{BMI} = \frac{\text{mass (kg)}}{[\text{height (m)}]^2}$$

BMI = ... **[2]**

(b) Look at the body mass index (BMI) table.

BMI	**condition**
less than 19	underweight
19 – 24	normal weight
25 – 29	overweight
30 – 40	obese
over 40	severely obese

Discuss whether Jake should be concerned about his body mass.

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..... **[2]**

(c) Suggest reasons why the BMI table may not be an accurate way of evaluating whether a person is overweight or underweight.

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.....**[3]**

[Total: 7]

[Paper Total: 60]

END OF QUESTION PAPER