

Monday 15 June 2015 – Morning

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

A163/01 Module B7 (Foundation 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, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

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**.
- This document consists of **16** pages. Any blank pages are indicated.

1 Nikita wants to improve her fitness level.

(a) She is interviewed by her fitness trainer before she starts her exercise programme.

Describe the questions her fitness trainer should ask and explain their importance.



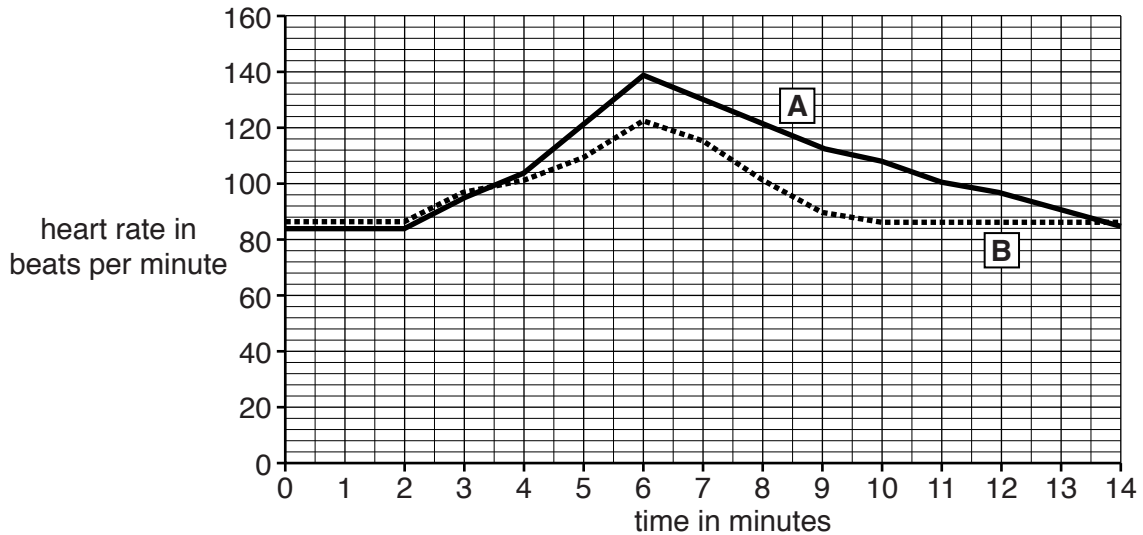
..... [6]

(b) The trainer sets a fitness test for Nikita.

Nikita takes a short test at the start of her fitness programme and repeats the test three months later.

The graph shows her heart rate during these two tests.

One test is labelled **A** and the other **B**.



(i) On the graph draw

- a short arrow labelled X to show when Nikita starts to exercise.
- a short arrow labelled Z to show when Nikita stops exercising.

[1]

(ii) How long did Nikita exercise during each test?

.....min

[1]

(iii) Which test, **A** or **B**, shows data for Nikita three months after she started her exercise programme?

Test

Explanation

.....

..... [2]

[Total: 10]

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2 Human blood contains different components.

(a) Write down the job of:

white blood cells

.....

platelets

.....

plasma

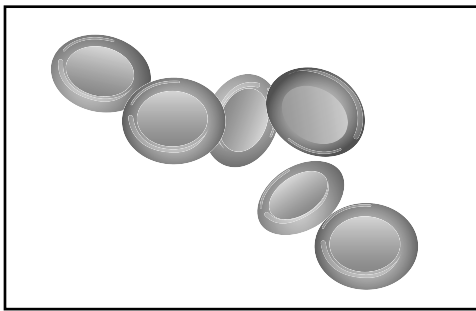
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[3]

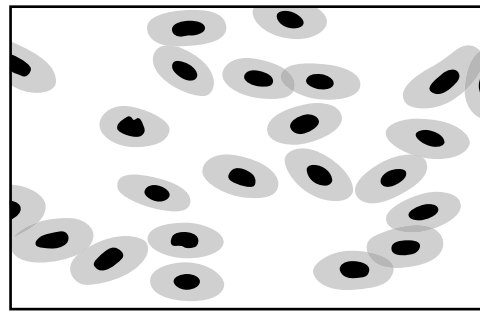
(b) Blood also contains red blood cells.

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.

.....

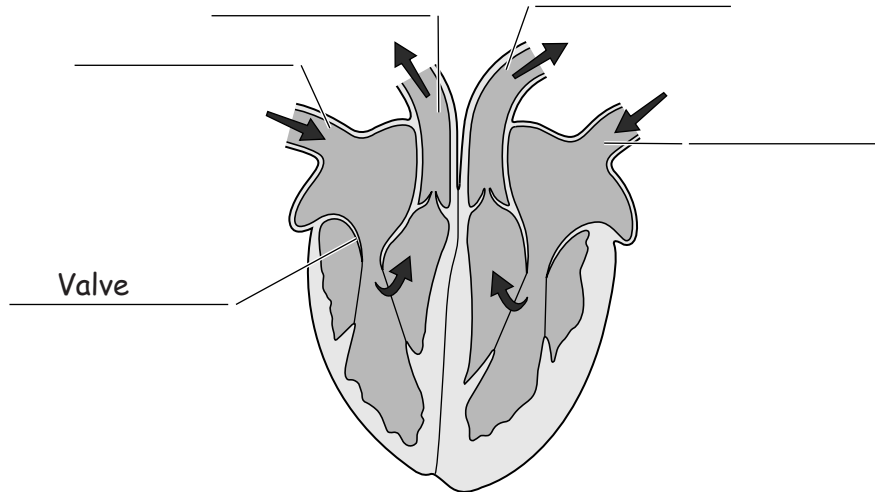
.....

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

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

Look at the diagram of a human heart.

- (i) Complete the labels. One has been done for you.



[3]

- (ii) A valve is labelled on the diagram of the heart.

What is the job of a valve?

.....
 [1]

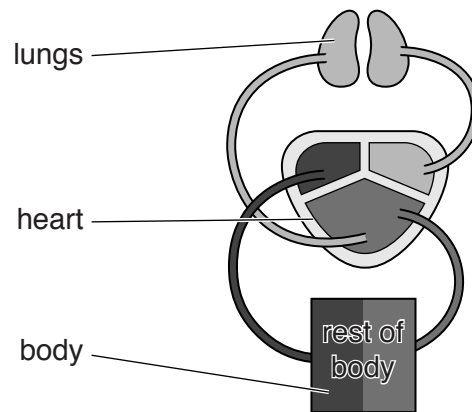
- (iii) The arrows on the diagram of the heart show a double circulation.

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.

.....

.....

..... [2]

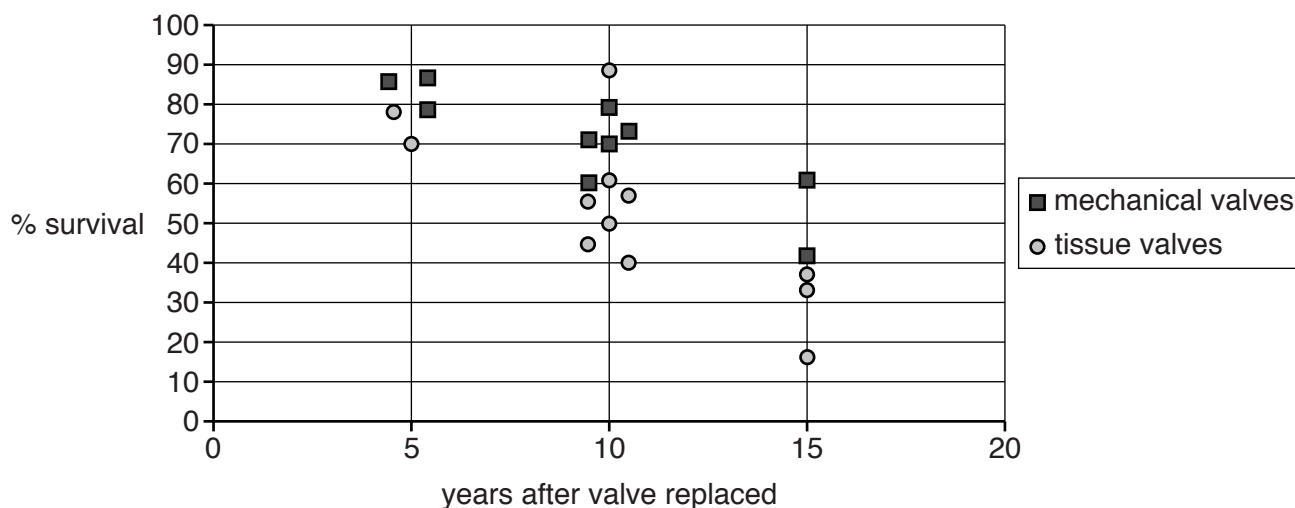
- (v) Sometimes valves in the human heart do not work properly.

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 shows data collected at approximately five-year intervals.



Write down **two** conclusions that can be made from the data shown in the graph.

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** 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.



Seal

Suggest how seals manage to maintain a constant body temperature even though they live in cold water.

Use ideas about body temperature control, insulation, respiration and blood flow in your answer.



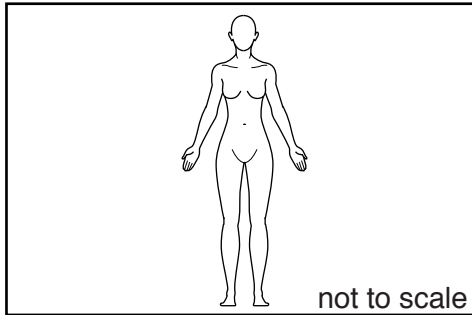
The quality of written communication will be assessed in your answer.

[6]

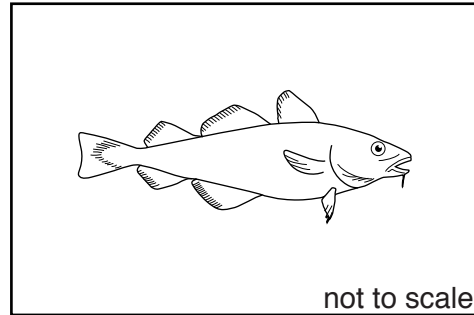
[Total: 6]

- 4 A human female usually only produces one egg at a time.

A female codfish can release over 1 million eggs at one time.



Human female



Female codfish

- (a) Suggest why there is such a large difference in the number of eggs produced by humans and by codfish.

.....

 [2]

- (b) Suggest why the number of eggs produced by the codfish is not wasteful for the ecosystem.

.....
 [1]

- (c) Codfish live in a natural ecosystem.
 Humans depend on natural ecosystems for 'ecosystem services'.

Write down **one** service provided by the ecosystem in which the codfish lives.

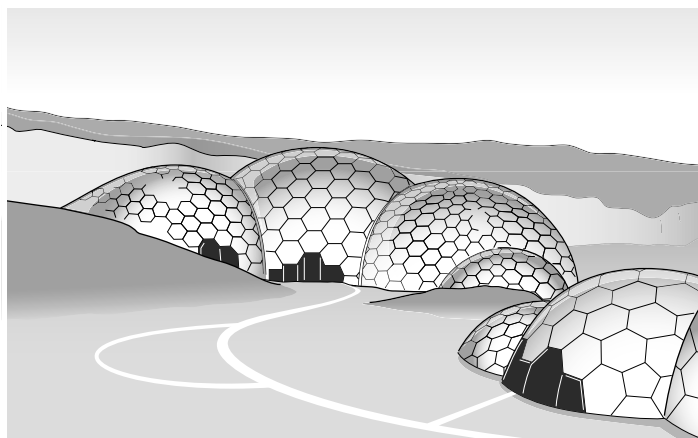
..... [1]

[Total: 4]

5 The drawing shows the Eden Project in Cornwall.

Each dome contains a different environment such as 'Mediterranean' and 'rainforest'.

Visitors can enter each dome to see the different animals and plants in each environment.



- (a)** Jason visits the Eden Project on a school trip. He thinks that each dome is a closed-loop system.

Explain what Jason means by a closed-loop system.

Discuss reasons why Jason may be right and why he may be wrong.



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

..... [6

- (b) The Eden Project does not use pesticides to kill unwanted pests.
Use ideas about closed-loop systems to suggest why.

.....

.....

..... [2]

[Total: 8]

- 6** During the last 100 years, the area of England's natural woodland has been getting smaller. The trees are being used as timber and the land converted to farmland.

(a) Suggest what this is doing to biodiversity.

..... [1]

(b) Suggest how English woodland could be made sustainable.

.....

.....

..... [2]

(c) Sometimes it is difficult to conserve woodland and also meet the needs of the local community. Use ideas of risk and benefit to explain why.

.....

.....

..... [2]

[Total: 5]

7 Bacteria can be grown on a large scale in fermenters to produce medicines.

(a) A single bacterium can reproduce in the fermenter by dividing into two every twenty minutes.

(i) Starting with **ten** bacteria, how long will it take for the fermenter to contain **640** bacteria?
Show your working.

.....min [1]

(ii) Suggest **one** reason why it is not possible to calculate accurately the number of bacteria in the fermenter after 48 hours.

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

(iii) Some medicines can be made by growing plants and then extracting the medicine. Scientists often prefer to use bacteria to make medicines.

Use your answer from (i) to suggest why bacteria are used instead of plants.

..... [1]

(b) Bacteria can be genetically modified to produce different medicines.

(i) Explain what is meant by genetic modification.

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

(ii) Some crop plants can grow only in hot conditions. Scientists want to genetically modify some crops so that they can also grow in colder conditions.

Suggest why this might be a useful application of genetic modification.

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

[Total: 6]

- 8 Nanotechnology involves structures that are about the same size as some molecules.

(a) Write down these structures in order of size.

Start with the smallest structure.

molecule human hair atom cell

..... [1]

(b) Which of these are possible consequences of using nanotechnology in the food industry?

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

It reduces demand for food.

☐

More shops can sell the food.

☐

Farmers need less equipment to produce food.

☐

It increases the shelf life of food.

☐

It makes food taste worse.

☐

It detects contaminants in food.

☐

[2]

(c) Some people are worried about the risks involved with nanotechnology.

Which two of the following should be considered when calculating the risk?

Put ticks (✓) in the boxes next to the **two** best answers.

The method of developing the nanotechnology.

☐

The chance of something harmful happening.

☐

The seriousness of the consequences of the risk.

☐

What other substances have the same risk.

☐

[1]

[Total: 4]

END OF QUESTION PAPER

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