OCR
Oxford Cambridge and RSA

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Monday 15 June 2015 – Morning

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

A163/02 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

4823147631

A163/02

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

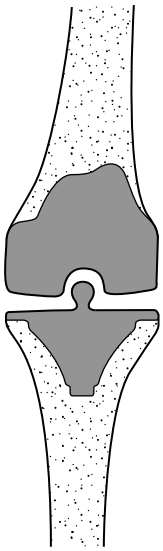
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting 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 **12** pages. Any blank pages are indicated.

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]

Turn over for the next question

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 .....

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2 .....

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3 .....

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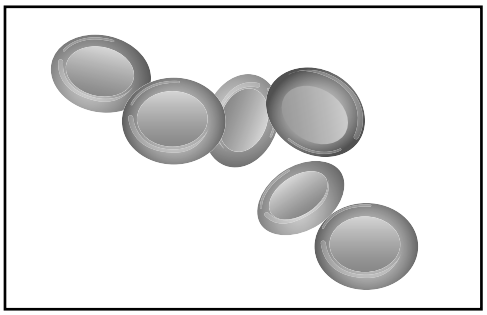
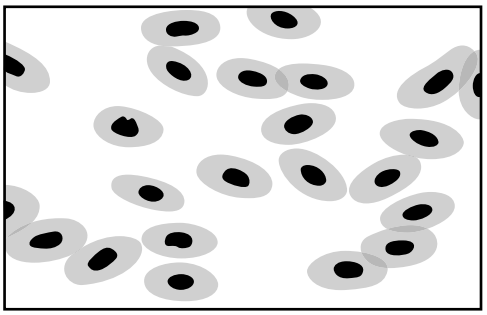
[3]

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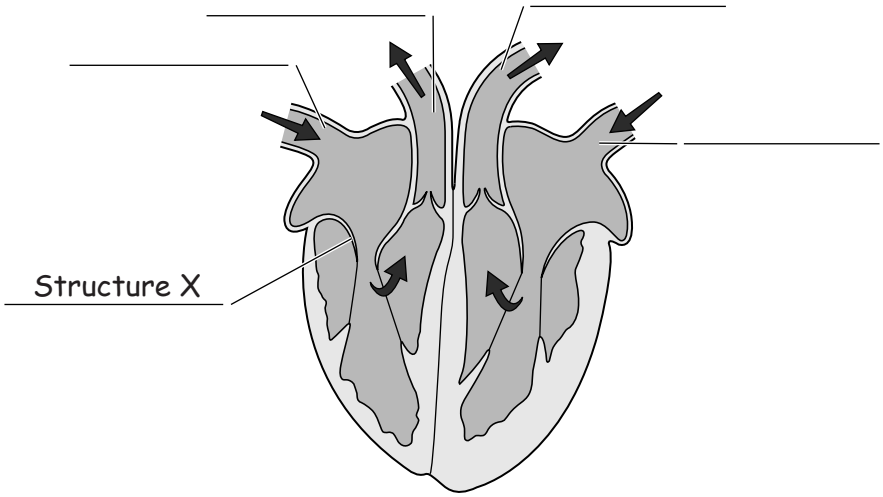
..... **[2]**

(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**.

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

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

Explain what double circulation means.

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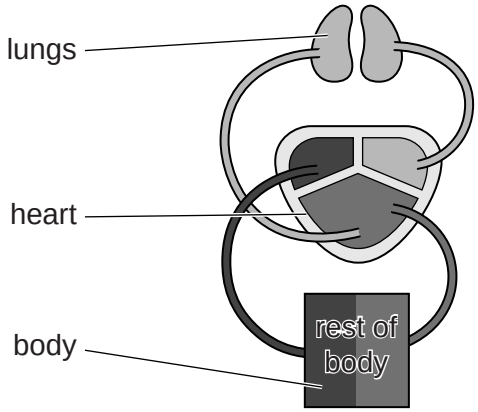
..... **[2]**

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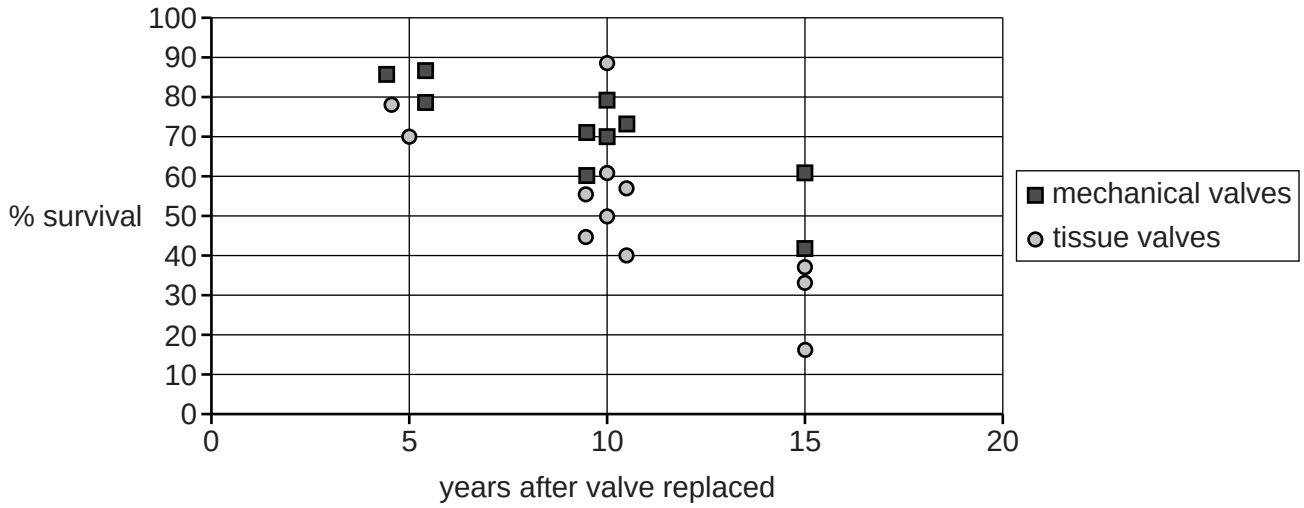
..... **[2]**

(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 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 .....

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Conclusion 2 .....

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[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 .....

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2 .....

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[2]

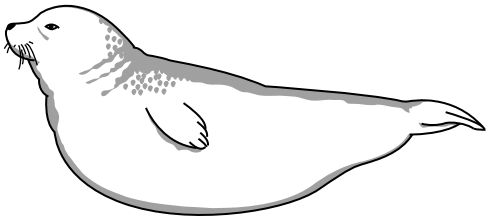
[Total: 17]

Turn over for the next question

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

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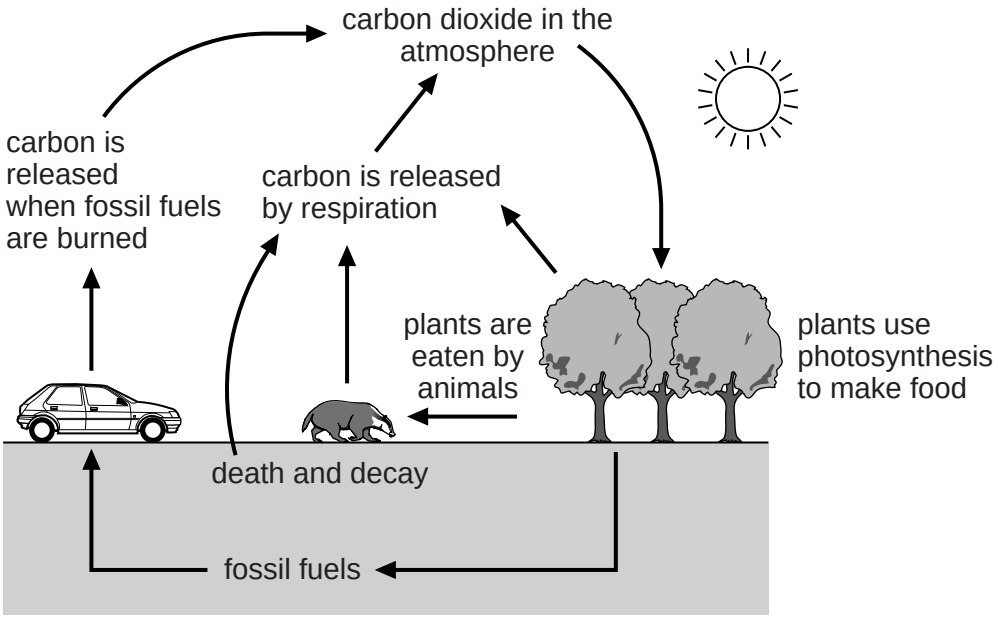
..... **[6]**

[Total: 6]

4 Look at the diagram 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?

..... **[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.

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..... **[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 .....

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2 .....

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[2]

[Total: 7]

END OF QUESTION PAPER