OCR
Oxford Cambridge and RSA

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Monday 20 June 2016 – Morning

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

A163/02   Module B7 (Higher Tier)

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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
* 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.

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Turn over

Answer **all** the questions.

1 Sunita wants to get fit.
   She goes to her local gym and she works with a fitness instructor.

   (a) Before she starts her exercise programme, the fitness instructor needs to ask her questions about her lifestyle and medical history.

   (i) Write down **two** questions the fitness instructor might ask her about her **lifestyle**.

   Question 1 ....

   ....

   Question 2 ....

   ....
   [1]

   (ii) Write down **two** questions the fitness instructor might ask her about her **medical history**.

   Question 1 ....

   ....

   Question 2 ....

   ....
   [1]

 (b) Sunita starts her exercise programme.
 During exercise, the blood flow from Sunita's left ventricle to different parts of her body changes.

Part of Sunita's body	Blood flow through left ventricle (litres per minute)	
	Before exercise	**During exercise**
to the muscles	1.0	11.0
to the brain	0.7	0.8
to the digestive system	1.3	0.5
to the skin	0.5	2.0
to the heart muscle	0.2	0.7
to other body parts	....	13.0
Total blood flow	5.0	....

 (i) Calculate the two missing numbers in the table.
 Write your answers in the table. **[1]**

 (ii) Write down **three** conclusions that can be made about how Sunita's blood flow changes as a result of exercise.
 Explain each conclusion.

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 .... **[3]**

 (iii) The blood flow to Sunita's lungs is not included in the table.

 Explain why and write down how much blood goes to the lungs per minute before exercise.

 ....

 ....

 .... **[2]**

(c) The fitness instructor assesses Sunita's progress.

Which of the following needs to be taken into account in order to assess her progress correctly?
Put ticks (✓) in the boxes next to the **two** best answers.

the risk of doing the fitness programme ☐

the accuracy of the monitoring technique ☐

a peer review of other fitness trainers ☐

the fitness trainer's prediction of the outcome ☐

an understanding of cause and effect ☐

the repeatability of the data obtained ☐

[2]

[Total: 10]

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2 Neil is worried that he might have too much body fat and be overweight.

Here are some facts about Neil:
- his age is 43
- his body fat is 29%
- his mass is 90 kg
- his height is 1.7 m

Look at the formula, table and body fat chart below.

BMI	Category
<19	underweight
19 – 24	healthy weight
25 – 29	overweight
30 – 40	obese
>40	very obese

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

BODY FAT % MEASUREMENT CHART FOR MEN

AGE																	
18–20	2.0	3.9	6.2	8.5	10.5	12.5	14.3	16.0	17.5	18.9	20.2	21.3	22.3	23.1	23.8	24.3	24.9
21–25	2.5	4.9	7.3	9.5	11.6	13.6	15.4	17.0	18.6	20.0	21.3	22.3	23.3	24.2	24.9	25.4	25.8
26–30	3.5	6.0	8.4	10.6	12.7	14.6	16.4	18.1	19.6	21.0	22.3	23.4	24.4	25.2	25.9	26.5	26.9
31–35	4.5	7.1	9.4	11.7	13.7	15.7	17.5	19.2	20.7	22.1	23.4	24.5	25.5	26.3	27.0	27.5	28.0
36–40	5.6	8.1	10.5	12.7	14.8	16.8	18.6	20.2	21.8	23.2	24.4	25.6	26.5	27.4	28.1	28.6	29.0
41–45	6.7	9.2	11.5	13.8	15.9	17.8	19.6	21.3	22.8	24.7	25.5	26.6	27.6	28.4	29.1	29.7	30.1
46–50	7.7	10.2	12.6	14.8	16.9	18.9	20.7	22.4	23.9	25.3	26.6	27.7	28.7	29.5	30.2	30.7	31.2
51–55	8.8	11.3	13.7	15.9	18.0	20.0	21.8	23.4	25.0	26.4	27.6	28.7	29.7	30.6	31.2	31.8	32.2
>55	9.9	12.4	14.7	17.0	19.1	21.0	22.8	24.5	26.0	27.4	28.7	29.8	30.8	31.6	32.3	32.9	33.3
	Lean				Ideal				Average				Above average			

Should Neil be worried?
Use the information on the opposite page to **explain** your conclusion and suggest what action Neil should take.

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

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.... **[6]**

[Total: 6]

3 Swelling of the aorta is dangerous.
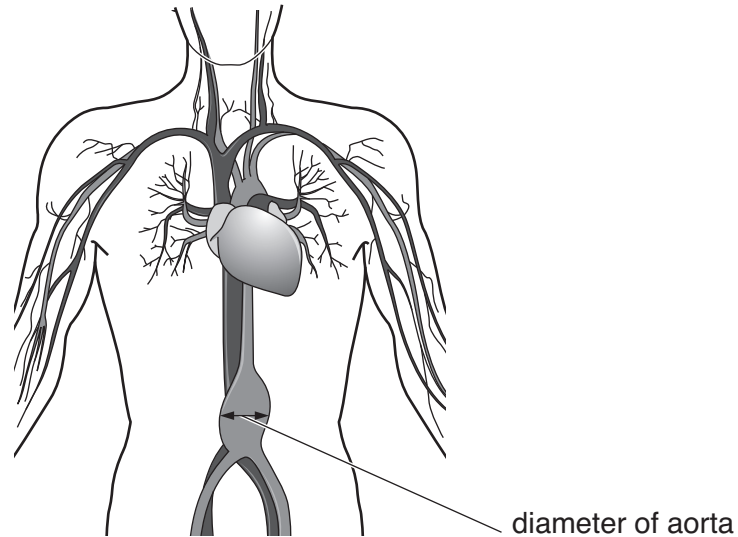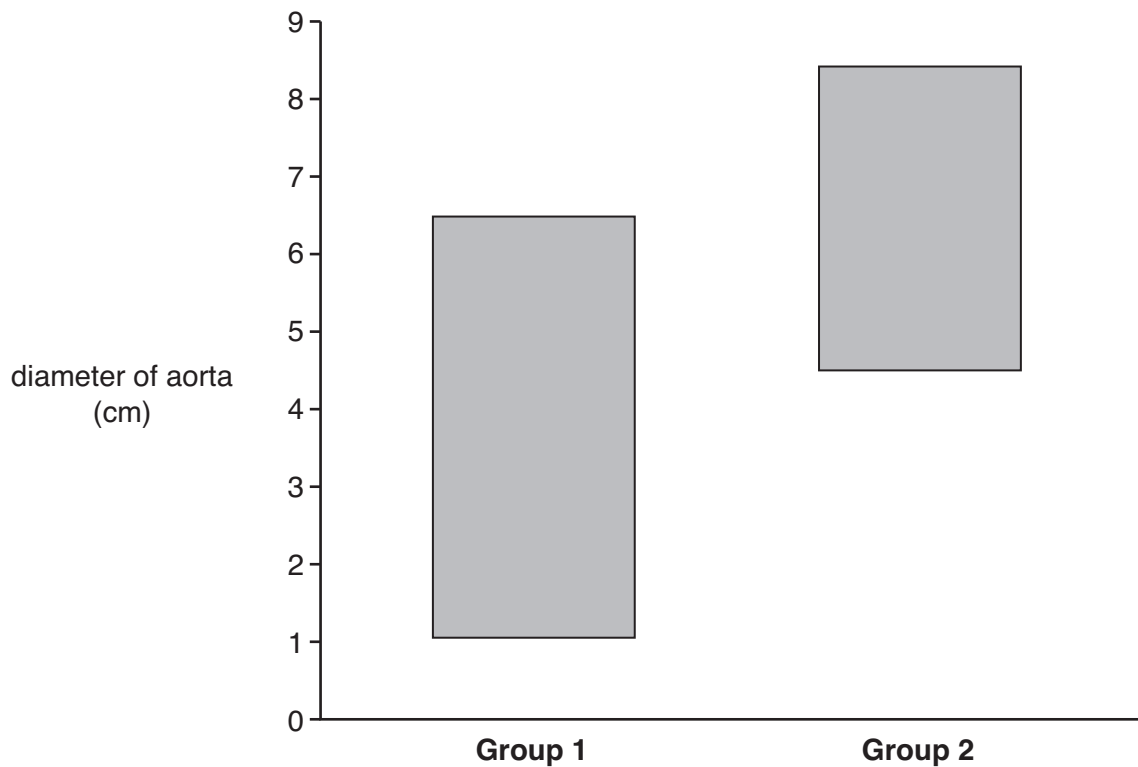
The swelling is called an aneurysm.
A swollen aorta can burst and usually results in death.

Men are screened to detect a dangerous swelling of the aorta.

The diameter of a healthy aorta is approximately 2 cm.

diameter of aorta

The diameter of the aorta was measured in two groups of men aged over 65.
The range of diameters of the aorta is shown in the graph for both groups.

It was decided to give the men in **Group 2** surgery to repair the aneurysm.
Men in **Group 1** were not given surgery.

(a) Look at the graph.

(i) Doctors have to decide whether or not to operate to repair an aneurysm.

Write down the minimum diameter of the aorta at which doctors decided to operate.

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

(ii) Some men who had an aneurysm of 6 cm were operated on, while others were not.

Suggest **two** reasons why.

....

....

.... **[2]**

(b) Surgery always carries some risk.

Suggest why most patients are prepared to accept this risk when agreeing to have the surgery.

....

.... **[1]**

(c) An aneurysm is repaired by inserting a plastic tube called a stent into the aorta.
In 1990, the risk of death from this operation was 5.7%.

Explain the difference between **perceived** and **calculated** risk when patients decide whether or not to have the operation.

....

....

.... **[2]**

[Total: 6]

Turn over

4 Smoking cigarettes increases the risk of developing lung cancer.
This risk can be reduced by stopping smoking.

The graph shows the risk of developing lung cancer in people who have never smoked and people who have stopped smoking.

age when stopped smoking
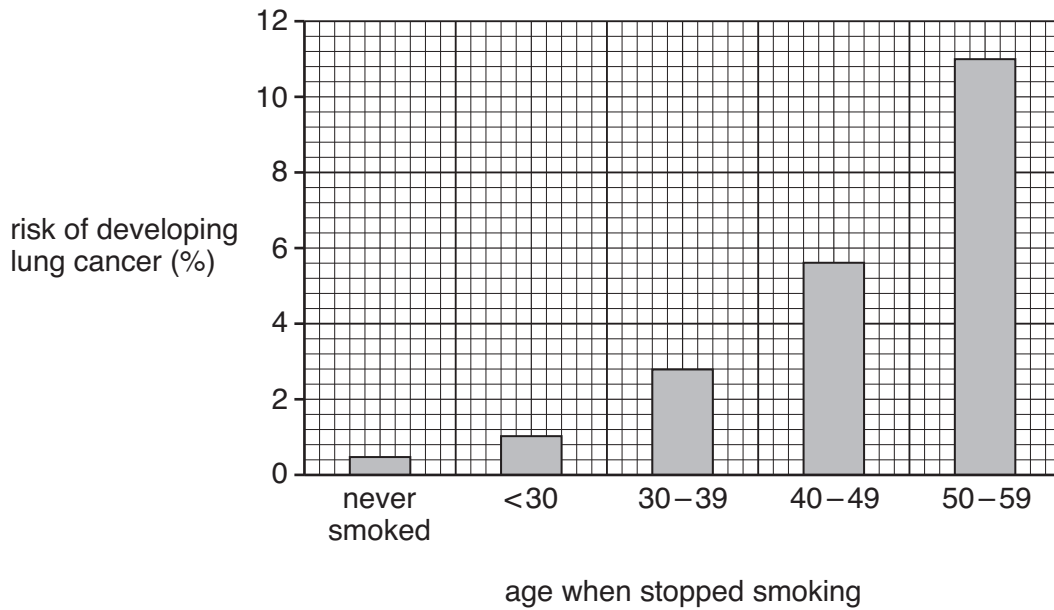
(a) Look at the graph.

(i) What does the number <30 on the horizontal axis mean?

....

.... **[2]**

(ii) Steve was 45 years old when he stopped smoking.

Write down his increase of percentage risk of developing lung cancer if he had waited until he was 55 years old.

increase of percentage risk = ... % **[2]**

(iii) Write down **two** different conclusions that can be made from looking at the graph.

....

....

....

.... **[2]**

(iv) The graph does not show the age at which people started smoking.

Suggest why this information is important when making conclusions from the graph.

....

....

.... **[2]**

(b) Smoking is an example of an unhealthy lifestyle choice.

Write down **two** other examples of an unhealthy lifestyle choice.
Explain why each lifestyle choice may cause health problems.

Lifestyle choice 1 ....

....

Lifestyle choice 2 ....

....
[2]

[Total: 10]

5 The rainforests are a valuable resource for everyone.

Timber is harvested from rainforests by local people.

Describe the impact of removing timber from the rainforests and explain why many people feel that this should be done in a sustainable way.
You should consider the needs of different groups of people in your answer.

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

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.... **[6]**

[Total: 6]

6 Scientists do a Life Cycle Assessment on a new type of plastic bag.

(a) Explain what a Life Cycle Assessment means.

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.... **[3]**

(b) Some questions concerning the new plastic bag can be answered using a scientific approach. Other questions cannot.
Put ticks (✓) in the boxes next to the **two** questions that **cannot** be answered using a scientific approach.

Does adding coloured dye to the plastic make the plastic weaker? ☐

How much will it cost to manufacture the new plastic for the bags? ☐

Is it a good idea to fine people for dropping the plastic in the street? ☐

Should plastic bags have holes to prevent children from suffocating themselves? ☐

How thick does the plastic need to be to stop the bags from tearing too easily? ☐

When the plastic is thrown away, will it biodegrade and how long will it take? ☐

[2]

(c) Supermarkets charge customers for disposable plastic bags.

Different groups of people have different views about this.

Summarise the different views that may be held by customers and environmental scientists.

....

....

....

.... **[2]**

[Total: 7]

Turn over

7 Vegetation in stable ecosystems such as rainforests has several important jobs.

(a) Put ticks (✓) in the boxes next to the **three** jobs done by the vegetation.

prevents soil erosion ☐

causes water to run off the land ☐

prevents light from reaching the ground ☐

stops nutrients from soaking into the soil ☐

stops fires from spreading ☐

prevents extremes of temperature ☐

causes cloud formation ☐

[3]

(b) Humans depend on rainforests for ecosystem services.

Apart from wood for timber, write down **three** other examples of ecosystem services.

1 ....

2 ....

3 ....

[3]

(c) All ecosystems such as rainforests produce waste.

Write down **two** examples of waste produced by a natural ecosystem.

1 ....

2 ....

[2]

[Total: 8]

8   (a) Scientists can genetically modify bacteria to make human insulin.

Describe procedures that scientists could use to genetically modify bacteria to make insulin and to identify the bacteria that have been successfully modified.

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

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.... **[6]**

(b) There are lots of reasons that make bacteria ideal organisms for genetic modification. One of the statements below is **not** a good reason.

Put a ⬭ring around the statement that is **not** a good reason.

rapid reproduction

presence of plasmids

may cause disease

ability to make complex molecules

simple biochemistry

[1]

[Total: 7]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

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