OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE **2802**

BIOLOGY

Human Health and Disease

TUESDAY 15 JANUARY 2008 Afternoon

Time: 1 hour

Candidates answer on the question paper
Additional materials: Electronic calculator
Ruler (cm/mm)

CUP/T28055

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 60.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**10**	
2	**12**	
3	**8**	
4	**11**	
5	**11**	
6	**8**	
TOTAL	**60**	

This document consists of **12** printed pages and an Insert.

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[Turn over

Answer **all** the questions.

1 **(a)** Table 1.1 shows some information about four infectious diseases.

Complete the table.

Table 1.1

disease	name of pathogen	means of transmission	**one** means of prevention or control
cholera		water borne	sewage treatment
malaria	*Plasmodium sp.*		
AIDS		through transmission of body fluids	practising safe sex using condoms
tuberculosis			long course of multiple antibiotics

[6]

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(b) The list below describes a number of reasons why antibiotics are not always successful in treating certain diseases.

A The infectious organism has developed resistance to the antibiotic.
B The antibiotic is digested in the gut.
C Antibiotics cannot harm viruses.
D Antibiotics do not affect pathogens that are eukaryotic.
E Antibiotics taken orally are expelled from the gut before they can be absorbed.

Select from the list the best explanation of why antibiotics are **not** always a successful treatment for each of the diseases below.

Write the correct letter **A**, **B**, **C**, **D** or **E** next to the name of the disease.

You should not use any letter more than once.

malaria ……

tuberculosis ……

AIDS ……

cholera …… [4]

[Total: 10]

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2 An exercise stress test was carried out on a 13-year-old boy.

- He walked on a treadmill set at different speeds and gradients.
- His heart rate in beats per minute was recorded at the end of each activity period.
- Each activity followed on from the previous one without a break.

The results are shown in Table 2.1.

Table 2.1

activity	duration of activity / s	walking speed / km h^{-1}	heart rate / beats per minute
standing	180	–	121
walking up a 10% gradient	180	2.7	131
walking up a 12% gradient	180	4.0	157
walking up a 14% gradient	180	5.5	186
walking up a 16% gradient	180	6.8	195
walking up an 18% gradient	86	8.0	208
sitting	180	–	173
sitting	180	–	175
sitting	180	–	137

(a) Using the information in Table 2.1, describe **and** explain the **immediate** effect of exercise on the boy's heart rate.

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.....[3]

(b) Other than the effect on heart rate, state **two** other changes that may occur in the boy's **cardiovascular system** during the exercise stress test.

1 .....

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2 .....

.....[2]

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(c) The maximum safe heart rate can be calculated by subtracting a person's age from 220.

Suggest why the exercise stress test was stopped after 86 seconds when the boy was walking at 8.0 km h^{-1}.

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.....[1]

(d) A resting heart rate of 121 beats per minute could indicate that this boy is not physically fit.

Suggest how the boy could improve his level of physical fitness with exercise.

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.....[3]

(e) State **three** long-term benefits to the boy of improving and maintaining his physical fitness.

1 .....

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2 .....

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3 .....

.....[3]

[Total: 12]

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3 A health survey was conducted on two women in their mid-twenties by an insurance company.

Here is some of the information they provided:

woman **A**	woman **B**
• in full employment	• not in employment
• often eats takeaway 'fast food' such as burgers	• usually eats oven-ready meals
• is slightly overweight (BMI of 26)	• is very overweight (BMI of 29)
• exercises regularly as a member of a ladies squash club	• rarely exercises more than walking to the local shop
• is a non-smoker	• is a non-smoker
• visits a local pub or club once or twice a week with friends	• rarely goes out other than for essential shopping trips
• drinks moderately – two or three alcopops when out with friends	• drinks up to a bottle of wine at home each day
• has no children	• has three children under five years old

(a) The insurance company conducting the survey concluded that woman **A** was probably more healthy than woman **B**.

Use the information above to explain their conclusion.

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.....[3]

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(b) Woman **B** asserted that she was in good health because she never felt unwell. The insurance company disagreed with her.

Use the information provided by woman **B** to discuss the statement 'health is more than simply the absence of disease'.

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(c) The results of this survey were added to a long-term epidemiological study.

Suggest why long-term epidemiological studies are carried out.

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[Total: 8]

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4 Fig. 4.1 and Fig. 4.2 are provided for you on an insert.

Fig. 4.1 and Fig. 4.2 are photomicrographs of lung tissue taken at similar magnification.

- Fig. 4.1 shows healthy lung tissue.
- Fig. 4.2 shows damaged lung tissue in a condition known as emphysema.

(a) Describe **two** ways in which the lung tissue shown in Fig. 4.2 differs from that in Fig. 4.1.

1 .....

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2 .....

.....[2]

(b) Suggest how the damage shown in Fig. 4.2 will affect a person with emphysema.

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.....[2]

(c) Tar is one of the harmful components of cigarette smoke.

Describe how tar, deposited in the lungs from cigarette smoke, can lead to emphysema.

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.....[4]

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(d) Tar from cigarette smoke is known to cause lung cancer.

State **two** pieces of epidemiological evidence and **one** piece of experimental evidence linking smoking with lung cancer.

epidemiological evidence

1 .....

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2 .....

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experimental evidence

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.....[3]

[Total: 11]

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5 A farm worker was taken to hospital with a severe gash on his arm. Nurses decided to give him a tetanus injection despite his records showing that his tetanus vaccinations were up to date. This injection provided the farm worker with passive immunity to tetanus.

(a) Explain how passive immunity gives protection against tetanus.

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.....[2]

(b) In this question, one mark is available for the quality of the use and organisation of scientific terms.

Describe how vaccination can provide immunity to a disease such as tetanus **and** explain why vaccinations are not always effective.

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Quality of Written Communication [1]

[Total: 11]

TURN OVER FOR QUESTION 6

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6 People following a vegan diet do not eat any animal products.

An introductory guide to vegan diets includes the following statements.

Comment on the significance of each statement for the health of the person following a vegan diet.

- Vegans should eat a wide variety of plant foods.

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..... [2]

- The majority of grain eaten by a vegan should be wholemeal and unrefined.

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- A vegan diet includes considerably more of the essential fatty acids than an omnivore diet.

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..... [2]

- A good vegan diet will contain plenty of nuts and pulses (peas, beans, etc.).

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..... [2]

[Total: 8]

END OF QUESTION PAPER

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