

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

HUMAN BIOLOGY



Blood, Circulation and Gaseous Exchange

2856

Tuesday

10 JANUARY 2006

Morning

1 hour

Candidates answer on the question paper.

Additional materials:

Electronic calculator

Ruler (cm/mm)

Candidate
Name

Centre
Number

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Candidate
Number

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TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces provided on the question paper. Pencil may be used for graphs and diagrams **only**.
- Read each question carefully before starting your answer.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- 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	7	
2	11	
3	10	
4	11	
5	9	
6	12	
TOTAL	60	

This question paper consists of 14 printed pages and 2 blank pages.

Answer all the questions.

1 Fig. 1.1 shows drawings from electron micrographs of an animal cell and a plant cell.

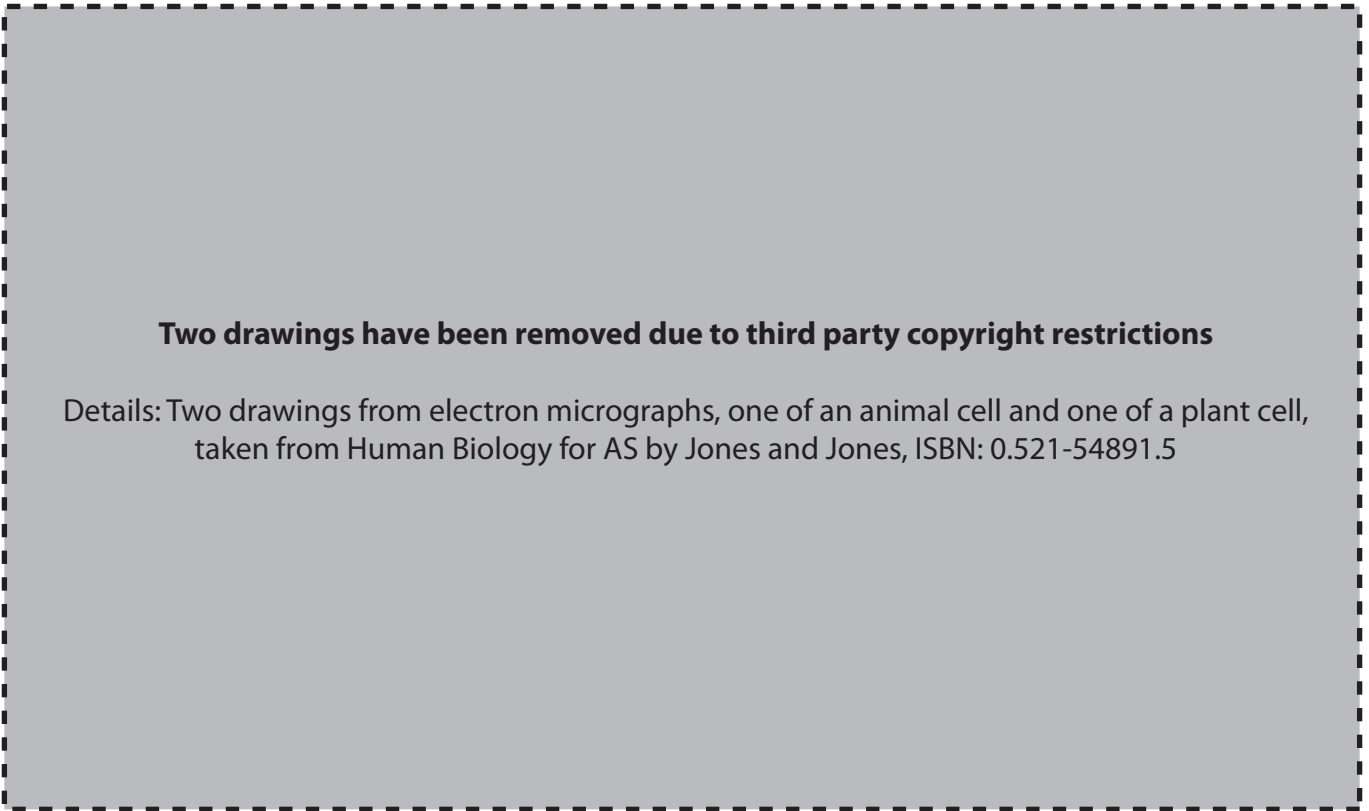


Fig. 1.1

(a) Name structures A to C.

A

B

C [3]

(b) State one function of the Golgi apparatus in either of the two cells.

.....

..... [1]

- (c) Large water-soluble molecules cannot pass through the phospholipid bilayer of the cell surface (plasma) membrane.

Outline how these molecules pass into a cell.

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..... [3]

[Total: 7]

2 Fig. 2.1 shows a drawing of some cells from a tissue lining the inside of the respiratory passages.

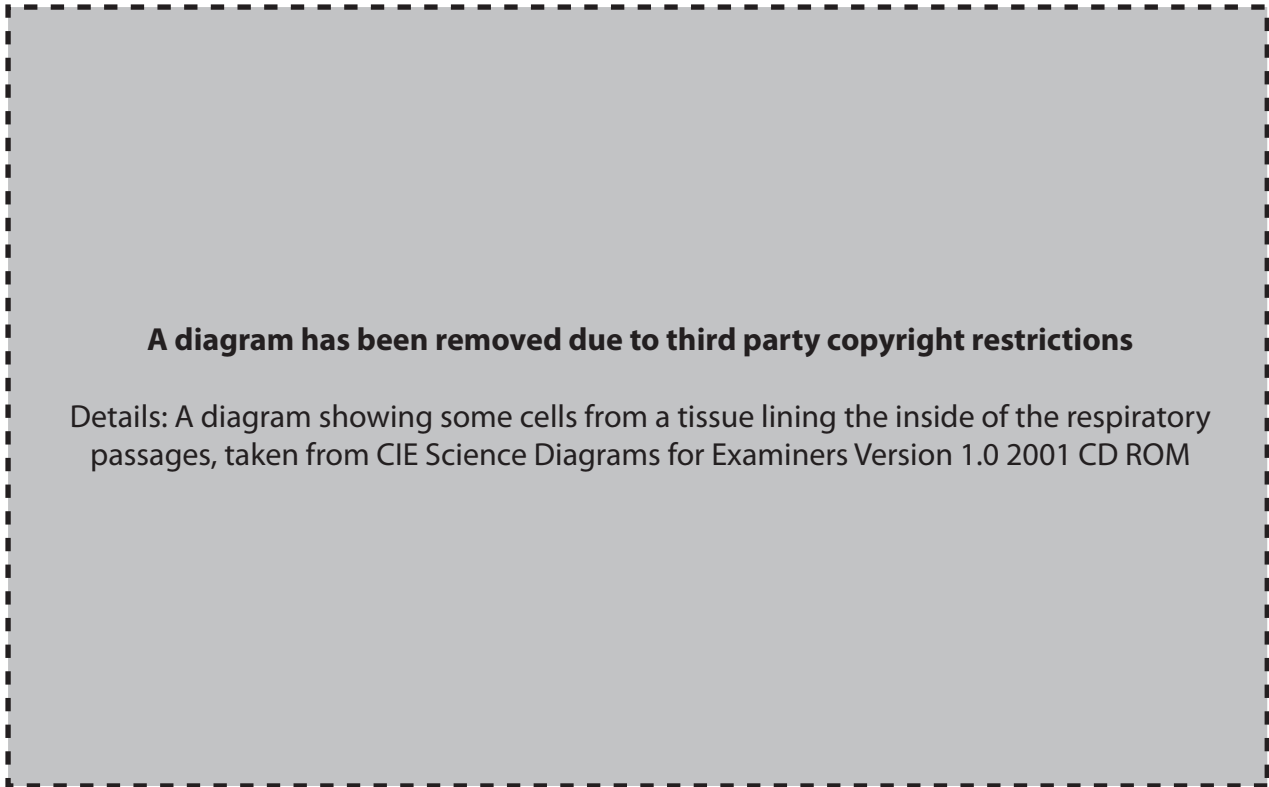


Fig. 2.1

(a) (i) Name the type of tissue shown in Fig. 2.1.

..... [1]

(ii) Name D to F.

D

E

F [3]

(iii) Using the scale line given in Fig. 2.1, work out the magnification of the drawing.

Show your working.

Give your answer to the nearest whole number.

Answer = [2]

(iv) Explain how the tissue shown in Fig. 2.1 may protect against infections in organs such as the lungs.

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..... [3]

(b) Tuberculosis (TB) is a serious lung disease that is increasing throughout the world.

State **two** ways in which this increase could be prevented.

1

.....

2

..... [2]

[Total: 11]

- 3 • The National Blood Service is an integral part of the National Health Service.
 - Every year they process 2.5 million blood donations.
 - They also ensure that the blood they supply is properly screened.
- (a) Complete Table 3.1 to show the types of stored blood products and their uses.
- The first row has been completed for you.

Table 3.1

<p>A table has been removed due to third party copyright restrictions</p> <p>Details: A table showing the types of stored blood products and their uses, taken from the National Blood Transfusion website, http://www.blood.co.uk</p>
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[3]

- (b) Enzymes are an important part of donated blood. As donated blood contains enzymes, the conditions for storage must be carefully controlled.

State one storage condition and explain why it must be controlled.

condition

explanation

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[4]

(c) Many enzymes are only active in the presence of a non-protein component called a cofactor.

Name a cofactor involved in the blood clotting process.

..... [1]

(d) Suggest how the cofactor involved in the blood clotting process may work.

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..... [2]

[Total: 10]

- (b) During cardiac arrest, a 'shock sheet', such as the one shown in Fig. 4.1, can be administered to the patient. It is designed to be wrapped around the patient's legs and inflated, which raises the blood pressure in the upper part of the patient's body within 30 seconds.

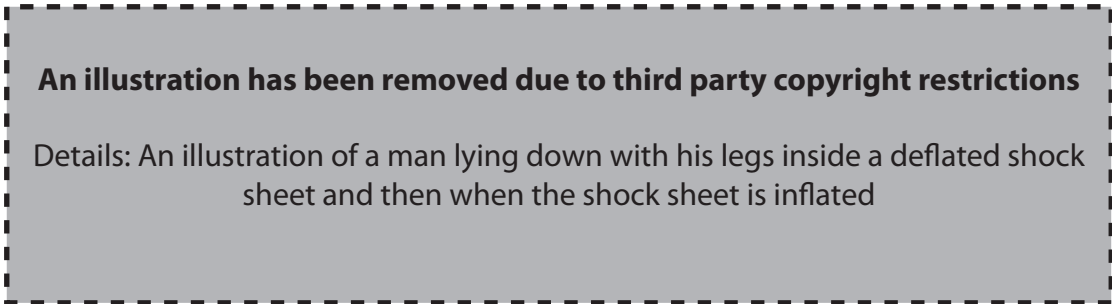


Fig. 4.1

- (i) Explain why the shock sheet raises the blood pressure in the upper part of the patient's body.

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..... [2]

- (ii) Why is it important that the blood pressure in the upper part of the body is maintained?

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..... [1]

[Total: 11]

- 5 Lipids are large molecules with few oxygen atoms and many carbon and hydrogen atoms. Triglycerides are one major group of lipids. Fig.5.1 shows the generalised structure of a triglyceride.

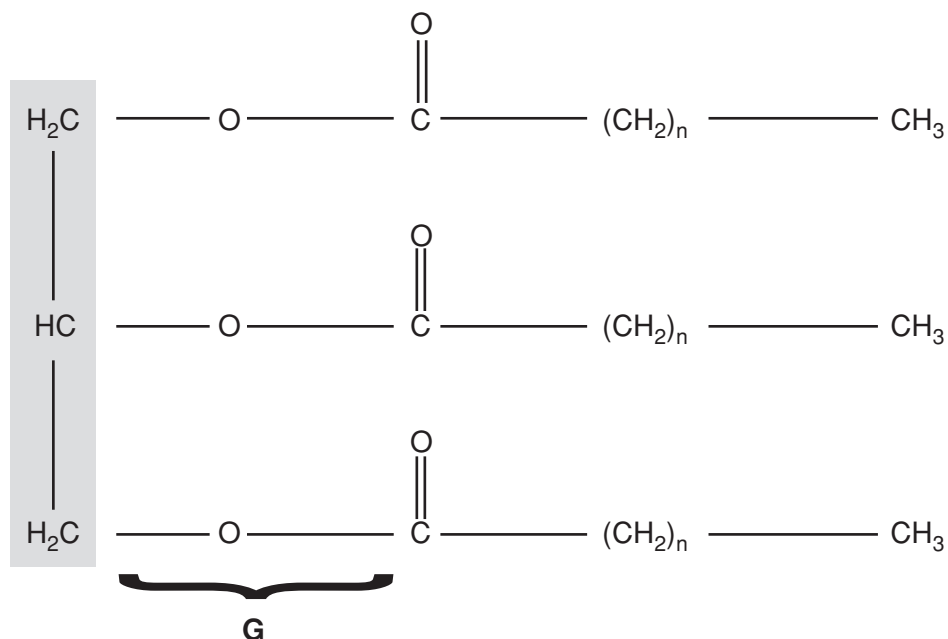


Fig.5.1

- (a) (i) Name the bond labelled **G**.

..... [1]

- (ii) Name the type of reaction which formed bond **G**.

..... [1]

- (iii) Name the part of the triglyceride molecule in the shaded box.

..... [1]

- (b) Fatty acids are described as saturated or unsaturated.

State a difference between saturated and unsaturated fatty acids.

.....

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..... [1]

- (c) Cholesterol is another type of lipid. It has many functions in the body including forming part of membranes. When cholesterol is carried in the blood it is bound to small complexes called lipoproteins.

Suggest why cholesterol is carried as lipoprotein.

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..... [1]

- (d) Name the **two** main types of lipoprotein and describe their roles in cardiovascular disease.

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..... [4]

[Total: 9]

- 6 (a) In order to **breathe out** (exhale) forcefully, the following events happen:

J	the volume of the thorax decreases
K	air pressure in the thorax is higher than atmospheric pressure
L	the diaphragm relaxes and the internal intercostal muscles contract
M	air flows out of the lungs.

Place the events in the correct order using letters **J** to **M**.

..... [3]

- (b) Doctors may use pulmonary (lung) function tests to diagnose various diseases associated with the respiratory system. During tests, measurements such as **FVC** and **FEV₁** may be taken. These are defined below.

- **Forced vital capacity (FVC)** measures the volume of air exhaled when a subject takes a deep breath and then exhales as forcefully and as rapidly as possible.
- **FEV₁** is the volume of air exhaled in the first second of a forced expiration (exhalation) from a position of full inspiration (inhalation).

Individuals with healthy lungs can exhale 80% of the FVC within one second.

Table 6.1 shows the results of lung function tests for three patients, **Q**, **R** and **S**.

Table 6.1

patient	FEV ₁ /dm ³	FVC/dm ³	FEV ₁ : FVC/%
Q	4.4	5.2	84.6
R	3.6	4.5	80.0
S	1.2	3.4	

- (i) Calculate the proportion of air exhaled forcibly in one second as a percentage of FVC for patient **S**.

Show your working.

Give your answer correct to one decimal place.

Answer = [2]

- (ii) Doctors use the scale shown in Table 6.2, to assess the severity of chronic obstructive pulmonary disease (COPD) in a patient.

Table 6.2

FEV ₁ : FVC / %	category of COPD
60-80	mild
40-59	moderate
less than 39	severe

Using your results from (b)(i) state the category into which patient S falls.

..... [1]

- (c) Describe the sequence of changes that occur in the lungs, when a patient is developing emphysema.

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..... [5]

- (d) Name a disease **other than emphysema** that contributes to COPD.

..... [1]

[Total: 12]

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