Microscopes

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Cell Structure
Sub Topic	Microscopes
Booklet	Theory
Paper Type	Question Paper 2

Time Allowed : **57 minutes**

Score : **/ 47**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 Fig. 1.1 is an electron micrograph of a cross section through a blood vessel.

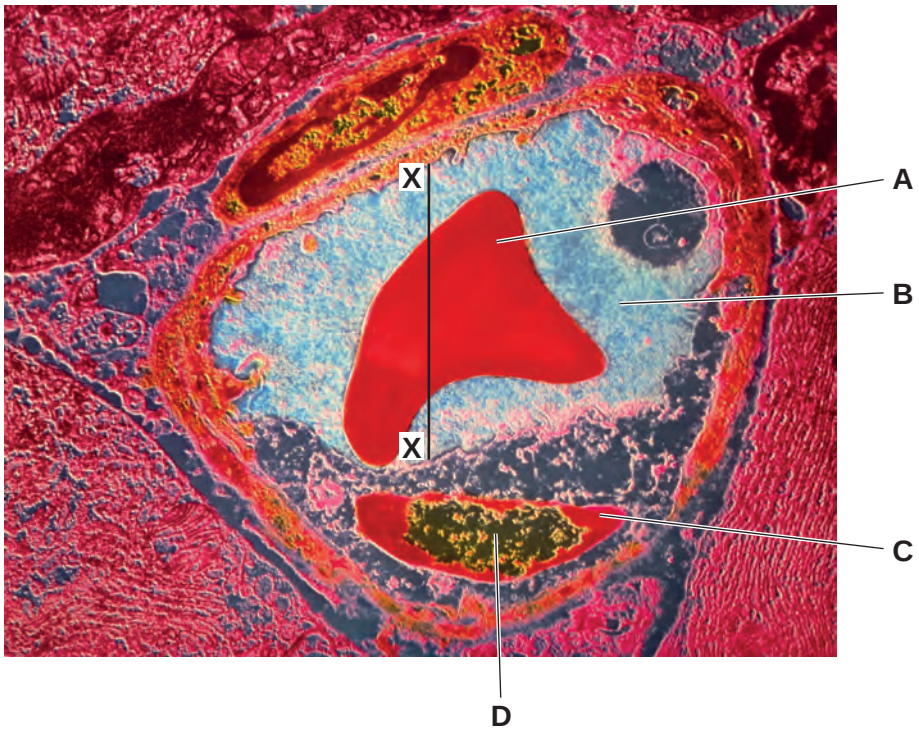


Fig. 1.1

(a) Name the type of blood vessel shown in Fig. 1.1 and describe one **visible** feature which is characteristic of this type of vessel.

type of vessel .....

characteristic feature .....

..... [2]

(b) Name:

(i) structure **A** .....

(ii) the main component of substance **B**. ..... [2]

(iii) Cell **C** in Fig. 1.1 is an endothelial cell.

Name structure **D**.

..... [1]

(c) The magnification of Fig. 1.1 is × 6000.

Calculate the diameter of the lumen along the line **X**–**X**.

Show your working and give your answer in micrometres (μm) to the nearest whole number.

answer ..... μm [2]

[Total: 7]

2 Tuberculosis (TB) is an infectious disease that kills about three million people worldwide each year.

(a) Name the pathogenic organism that causes tuberculosis.

.....[1]

Fig. 4.1 is a transmission electron micrograph of the organism that causes tuberculosis.

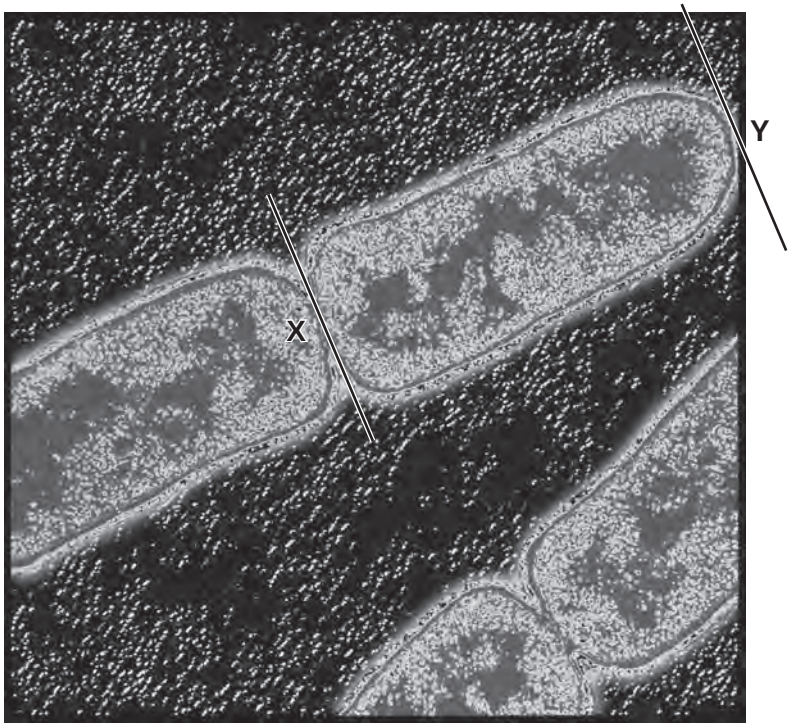


Fig. 4.1

(b) **(i)** The actual length of the cell between **X** and **Y** in Fig. 3.1 is 2 µm.

Calculate the magnification of the electron micrograph.

Show your working and give your answer to the nearest whole number.

magnification × .....[2]

(ii) The organism that causes tuberculosis is a prokaryote. State three features of prokaryotes.

1. .....

2. .....

3. .....[3]

In the 1940s, the use of antibiotics led to a steady decrease in the number of new cases of tuberculosis. However, in many developed countries, the number of new cases stopped decreasing in the mid-1980s and is now increasing.

(c) (i) State **one** factor, other than drug therapy, that contributed to the **steady decrease** in the number of new cases of tuberculosis.

.....[1]

(ii) Outline three reasons why, in many developed countries, the number of new cases of tuberculosis is now increasing.

1. .....

.....

2. .....

.....

3. .....

.....[3]

(d) Streptomycin was the first antibiotic to be discovered that was effective against the pathogen that causes tuberculosis. Streptomycin causes the death of the pathogen by binding to ribosomes and inhibiting protein synthesis.

(i) Suggest two ways in which streptomycin acts at ribosomes to inhibit protein synthesis.

1. .....

.....

.....

2. .....

.....

.....[2]

(ii) Streptomycin does not harm mammalian cells.

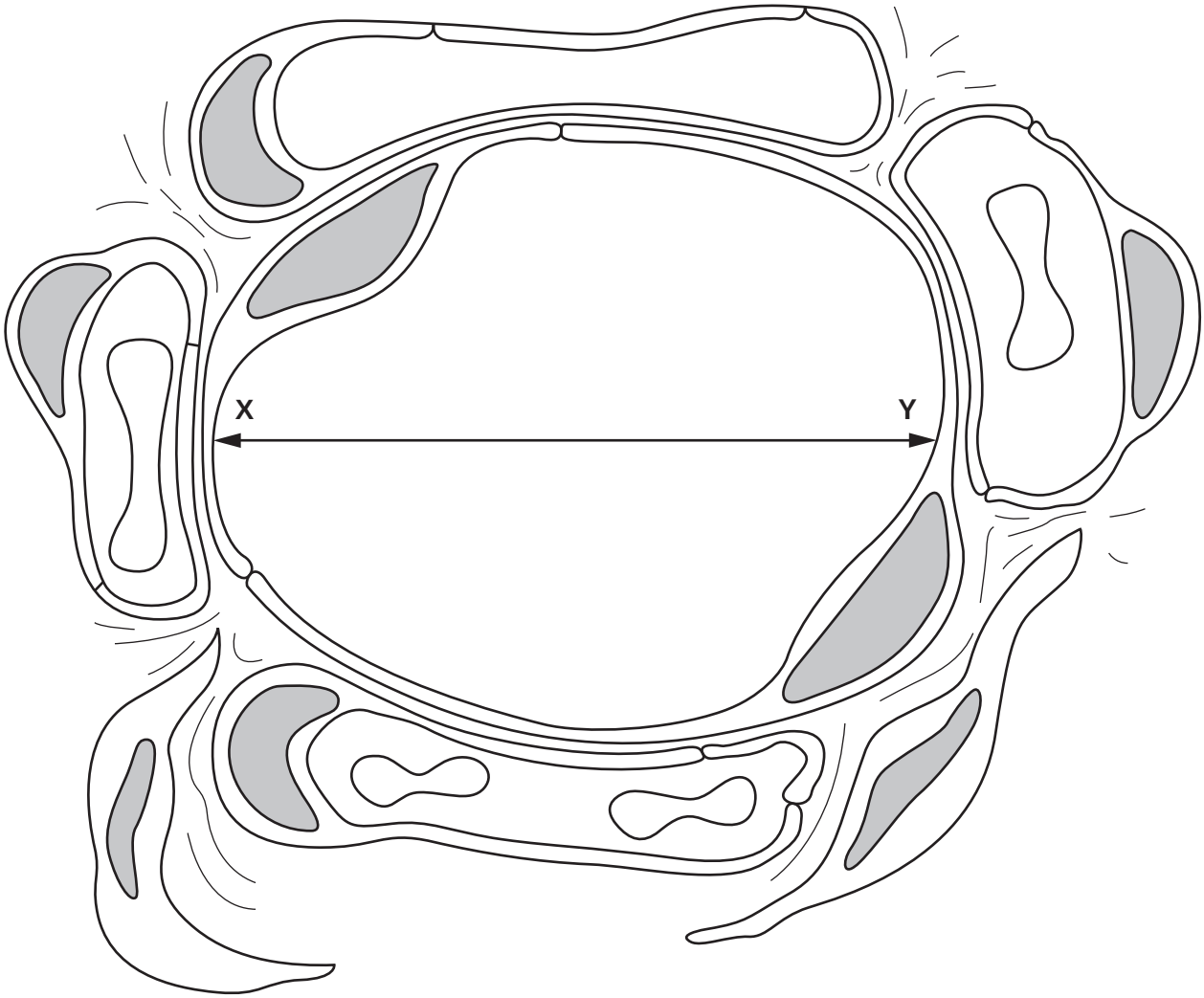
Suggest an explanation for this.

.....

.....[1]

[Total: 13]

3 Fig. 2.1 is a section of an alveolus and surrounding tissue.



magnification × 3 500

Fig. 2.1

(a) Calculate the actual diameter of the alveolus along the line **X**–**Y**.

Show your working and give your answer to the nearest micrometre.

Answer = ... µm [2]

(b) **(i)** Describe the role of elastic fibres in the wall of the alveolus.

.....

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.....[2]

(ii) With reference to Fig. 2.1, explain how alveoli are adapted for gas exchange.

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.....[4]

(c) Chronic obstructive pulmonary disease (COPD) is a progressive disease that develops in many smokers. COPD refers to two conditions:

- chronic bronchitis
- emp ysema.

(i) State two ways in which the lung tissue of someone with emphysema differs from the lung tissue of someone with healthy lungs.

1. .....

2. .....[2]

(ii) State two symptoms of emphysema.

1. .....

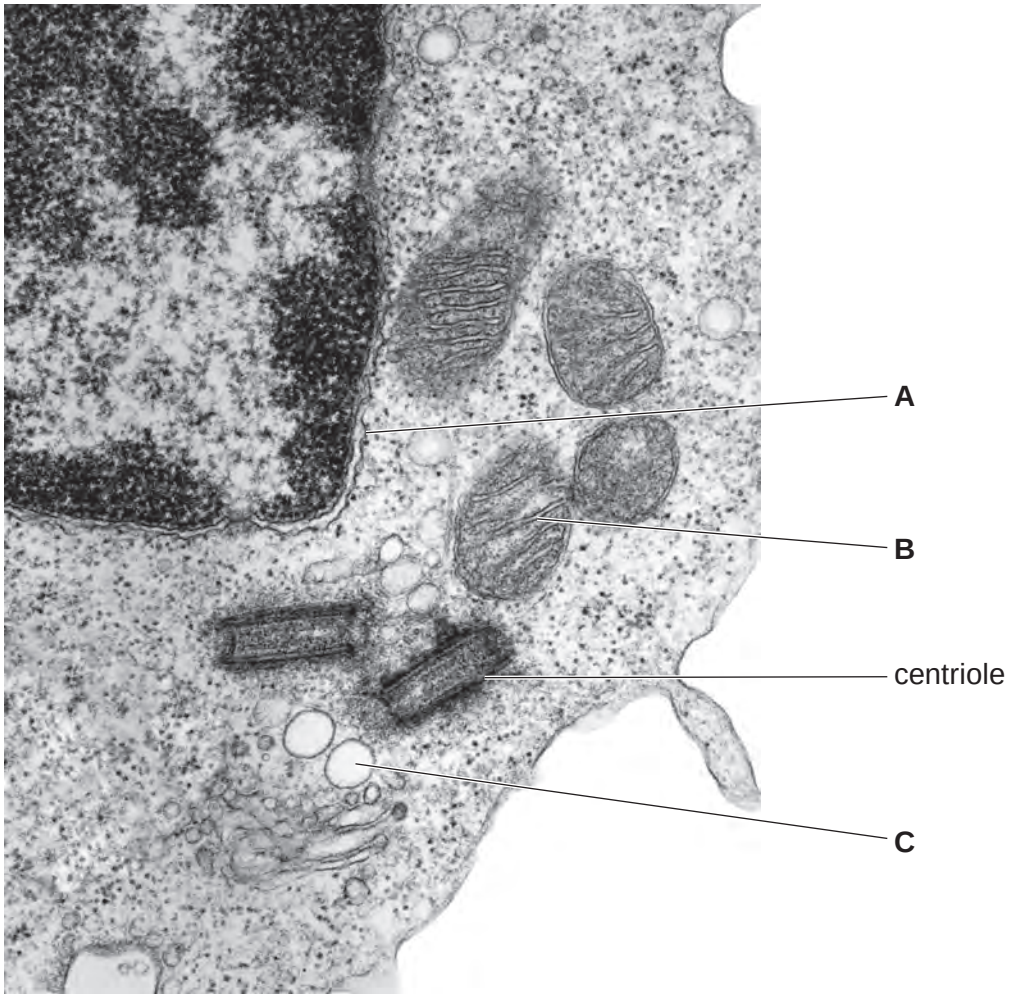
.....

2. .....

.....[2]

[Total: 12]

4 Fig. 2.1 is an electron micrograph of part of an animal cell. A centriole is labelled.



X 10,000

Fig. 2.1

(a) Name the structures labelled **A** to **C**.

A .....

B .....

C ..... [3]

(b) Describe the roles of centrioles in animal cells.

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..... [3]

(c) Explain why it is possible to see the internal membranes of a cell in electron micrographs, such as Fig. 2.1, but it is not possible to see them when using the light microscope.

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..... [3]

(d) A student investigated the effect of temperature on beetroot tissue. Beetroot cells contain a dark red pigment known as betalain, which is stored inside their vacuoles.

The student

- cut the beetroot tissue into cubes of the same size
- washed the cubes thoroughly in distilled water
- placed the same number of cubes into distilled water at seven different temperatures.

After 30 minutes, samples of the water were removed and placed in a colorimeter to measure the transmission of light. The lower the percentage transmission the more betalain is present in the water.

The results are shown in Fig. 2.2.

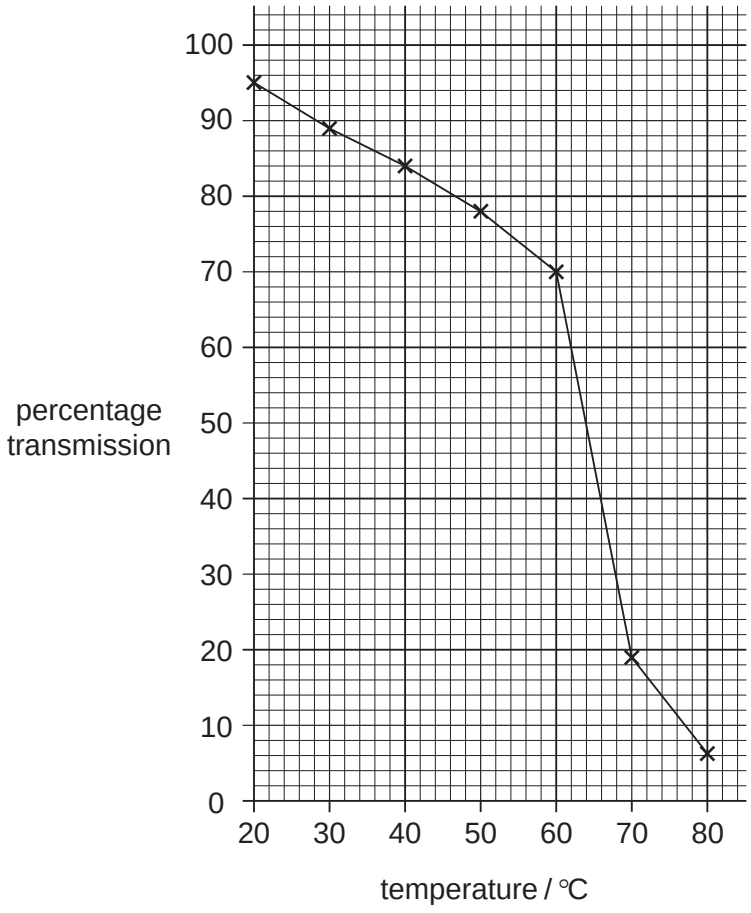

Fig. 2.2

Using the information in Fig. 2.2,

(i) describe the student's results;

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..... [3]

(ii) explain the effect of increasing temperature on the beetroot tissue.

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..... [3]

[Total: 15]