

The gas exchange system and Smoking

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Gas exchange and smoking
Sub Topic	The gas exchange system and Smoking
Booklet	Theory
Paper Type	Question Paper 2

Time Allowed : 65 minutes

Score : / 54

Percentage : /100

Grade Boundaries:

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

- 1 (a) Spermatogenesis takes place in the seminiferous tubules, in the testis. Fig. 4.1 is a diagram showing some of the cells in a small sector of a seminiferous tubule.

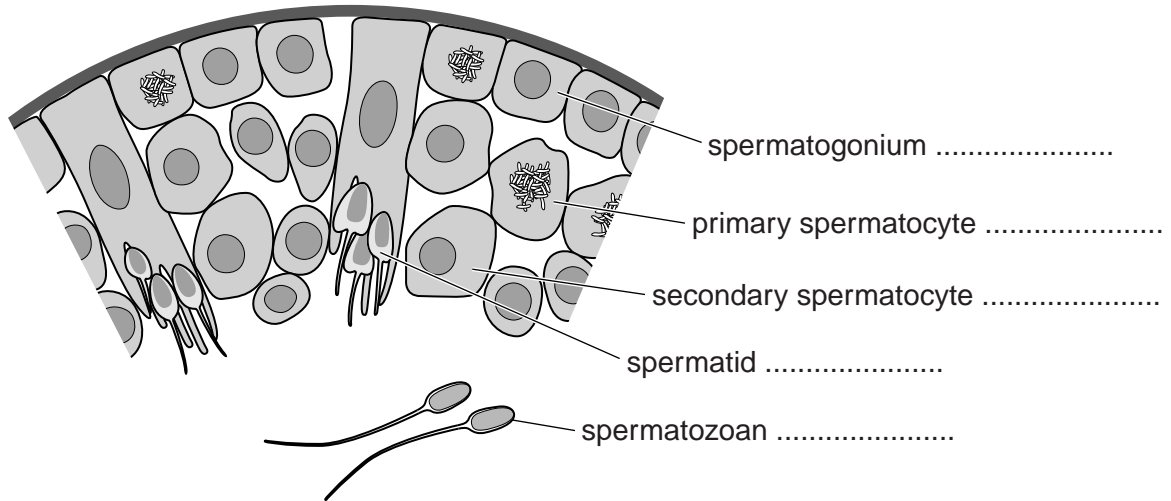


Fig. 4.1

- (i) On Fig. 4.1, state whether each of the labelled cells is haploid or diploid.

Write **n** if the cell is haploid and **2n** if the cell is diploid.

[2]

- (ii) Spermatogenesis involves meiosis, mitosis, growth and maturation. State which of these processes is involved in each of the following steps in spermatogenesis.

spermatogonium to primary spermatocyte

.....

spermatid to spermatozoan (sperm)

.....[2]

- (ii) Suggest a reason for the apparent reduction in the percentage of elongated cells between 24 hours and 48 hours in some of the samples.

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.....[1]

- (iii) Suggest why the culture medium was maintained at a temperature of 30°C, and not at core body temperature (37°C).

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.....[2]

[Total: 16]

- 2 (a) Transpiration is often described as an ‘inevitable consequence of gas exchange in plants’.

Explain what is meant by this statement.

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..... [3]

The buttonwood tree, *Conocarpus erectus*, grows in coastal areas of the Americas. A study was carried out on its ability to survive on Socorro Island off the Pacific coast of Mexico. The island is exposed to high winds, which can lead to high rates of transpiration.

The transpiration rates of trees at sheltered and exposed locations at the same altitude on Socorro Island were compared. The results are shown in Fig. 3.1.

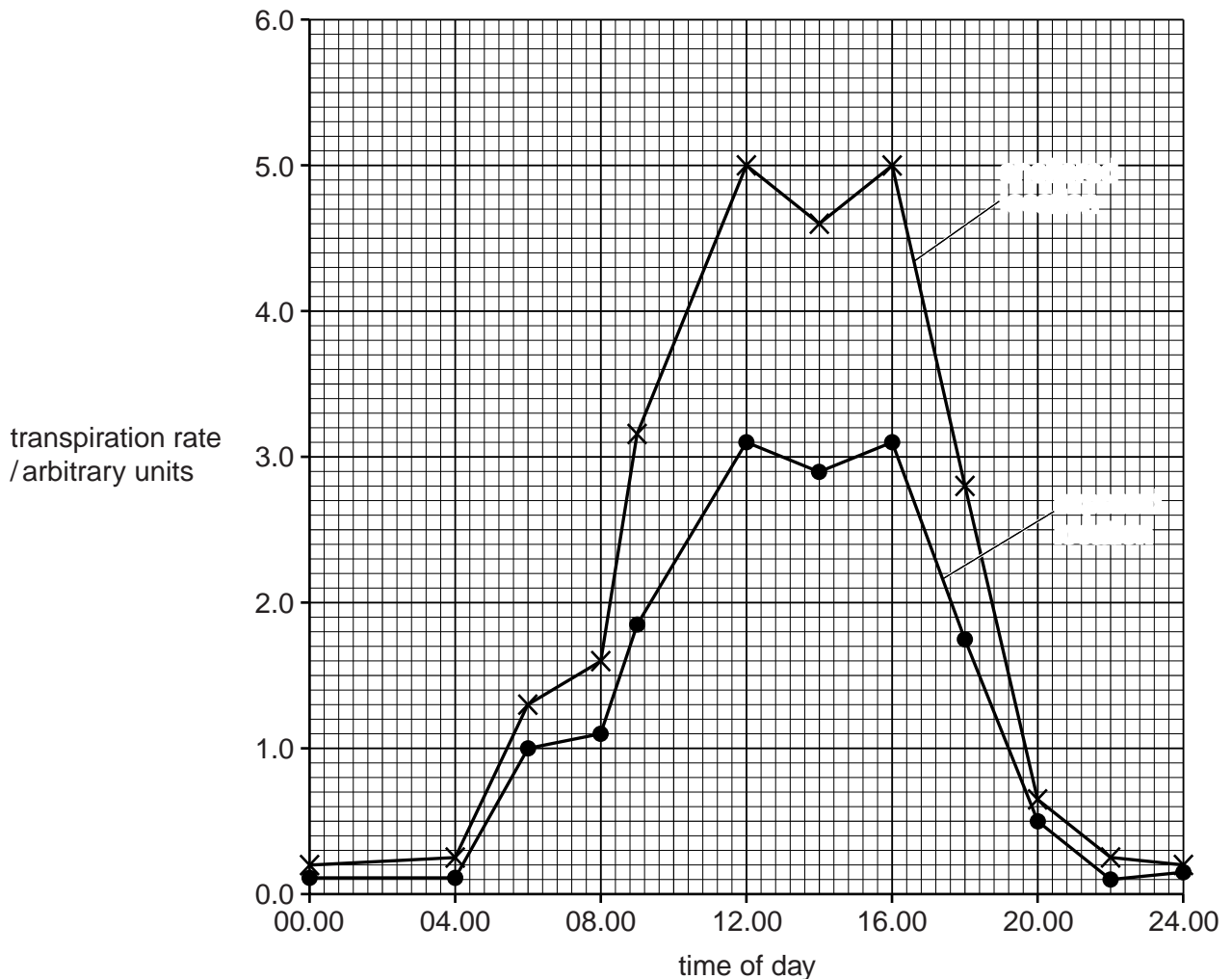


Fig. 3.1

3 (a) Explain how uncontrolled cell division can result in cancer.

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..... [3]

(b) Describe the experimental evidence that shows that smoking causes lung cancer.

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..... [3]

(c) Fig. 6.1 shows the changes in mortality rates for lung cancer in five countries between 1950 and 2006 for males.

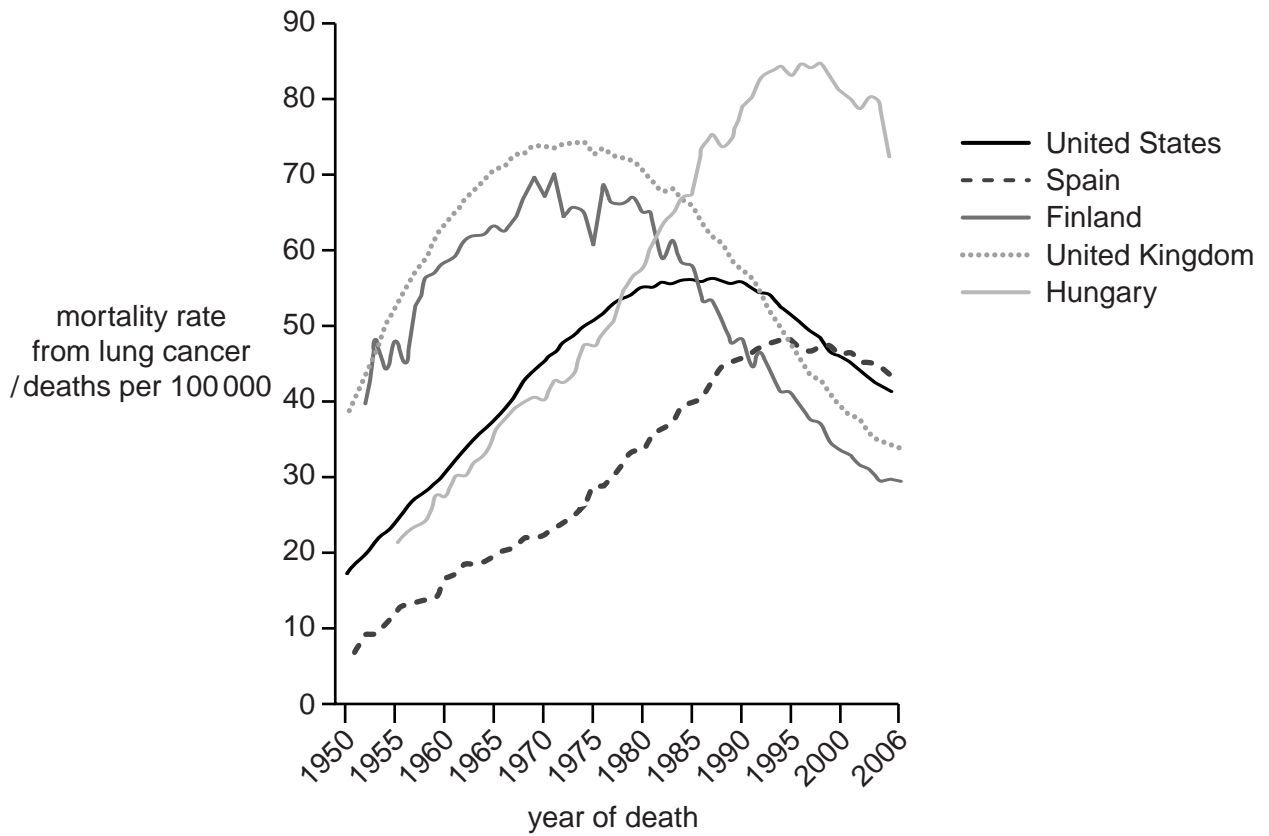


Fig. 6.1

With reference to Fig. 6.1, describe the similarities **and** differences in the trends in mortality rates in the countries shown.

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[3]
[Total: 9]

4 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 \times [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.

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2.

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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.

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2.

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.....[2]

(ii) Streptomycin does not harm mammalian cells.

Suggest an explanation for this.

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.....[1]

[Total: 13]

5 Leaves of tobacco plants, *Nicotiana spp*, have a high concentration of nicotine, the addictive component of tobacco smoke. Scientists are continually seeking ways to produce tobacco plants that have reduced nicotine content.

(a) Describe **and** explain the effects of nicotine on the cardiovascular system that can contribute to a person developing **coronary heart disease**.

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..... [4]

(b) The production of low-nicotine cigarettes and cigars is considered a strategy that may reduce the harmful effects of smoking.

Explain whether or not you agree with this statement.

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..... [1]

[Total: 5]