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

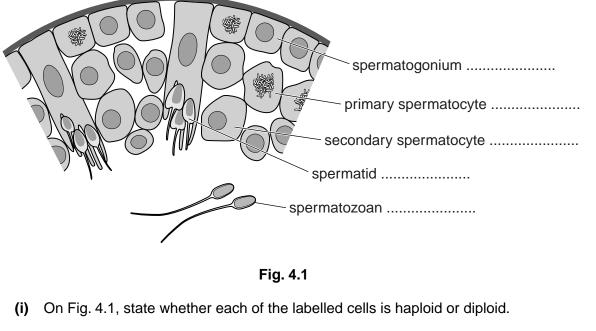
Percentage: /100

Grade Boundaries:

A*	А	В	С	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

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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.



	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 spermatogenesis.	in
	spermatogonium to primary spermatocyte	
	spermatid to spermatozoan (sperm)	
		.[2]

	(iii)	State	one role	of a Sert	toli cell.							
				•••••						•••••		
												[1]
(b)	prod	luced a	are unab	ermatoger ble to fertil them to fa	lise an eg	gg. A forn	n of IVF	called in				
	In IC	SI, a s	sperm ce	ell is inser	rted into	a second	dary ooc	yte usinç	a very ti	ny needl	e.	
	Outli	ine the	treatme	ent require	ed in ord	er to obta	ain matu	ire oocyt	es as par	t of an IV	F proced	lure.
		•••••										
												[4]

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(c) One approach to helping an infertile man to father children is to extract immature spermatids from his testes and culture them in the laboratory, in conditions that may increase the number of them that develop into functioning sperm. These can then be used for IVF.

An investigation was carried out to see if adding reproductive hormones to a culture of immature spermatids affects their development.

Samples of spermatids were collected from men in whom the spermatids did not normally develop into functioning sperm. The spermatids were cultured in a suitable liquid medium, kept at 30 °C.

The samples were divided into four groups. No hormones were added to one group. FSH, testosterone or both were added to the other groups. The percentage of spermatids that developed into elongated cells in each group after 24 hours and 48 hours was calculated. The results are shown in Table 4.1.

Table 4.1

hormones added	percentage of spermatids that developed into elongated cells				
	after 24 hours	after 48 hours			
none	20	21			
FSH	32	31			
testosterone	21	19			
FSH and testosterone	39	44			

(i)

With reference to Table 4.1, describe the effects of adding reproductive hormones on the development of the spermatids after 48 hours .
[4]

(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.
	[1]
(iii)	Suggest why the culture medium was maintained at a temperature of 30 $^{\circ}$ C, and not at core body temperature (37 $^{\circ}$ C).
	[2]
	[Total: 16]

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

Explain what is meant by this statement.	

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.

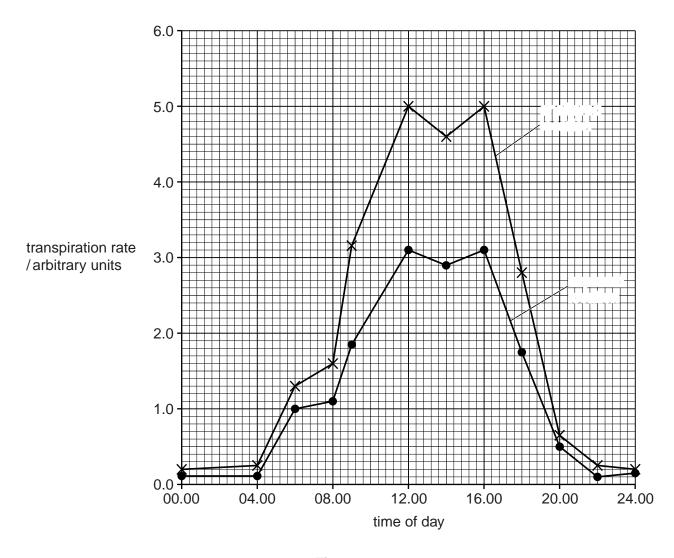


Fig. 3.1

(b)	Describe the results shown in Fig. 3.1.
	[5]
(c)	The leaves of the buttonwood trees at the exposed site were significantly smaller than those at the sheltered site.
	Describe three ways, other than small size , in which leaves are adapted to reduce the rate of transpiration.
	1
	2
	3

3	(a)	Explain how uncontrolled cell division can result in cancer.	
			[3]
	(b)	Describe the experimental evidence that shows that smoking causes lung cancer.	
			3

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

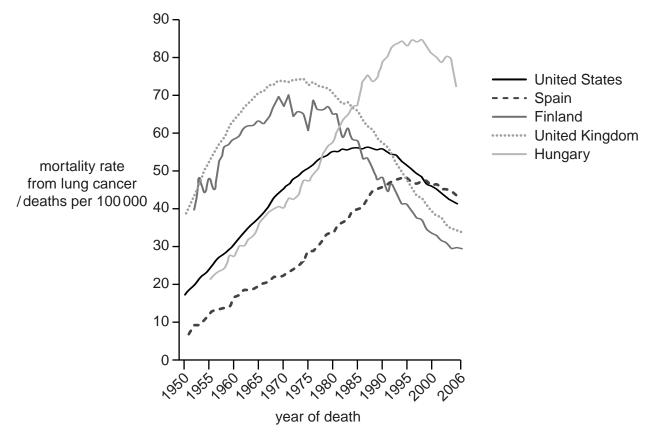


Fig. 6.1

mortality rates in the countries shown.	
	[3]
	- 1 Iotal: 91

With reference to Fig. 6.1, describe the similarities and differences in the trends in

(a) Nar	ne the pathogenic organism that causes tuberculosis[1
Fig. 4.1 i	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 prokaryotes.

3.[3]

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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)	path	eptomycin was the first antibiotic to be discovered that was effective against the nogen that causes tuberculosis. Streptomycin causes the death of the pathogen by ding to ribosomes and inhibiting protein synthesis. 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]

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 .	
	[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.	
	[1]	
	[Total: 5]	