

1)

(a) Each winter, the UK government recommends that vulnerable members of the public are vaccinated against the influenza (flu) virus.

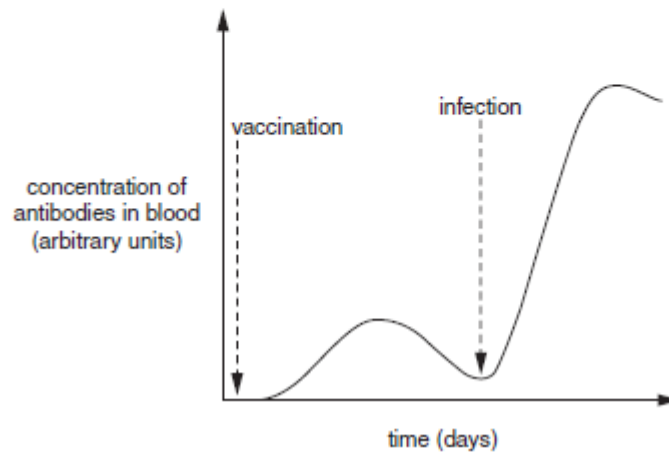
(i) State **two** groups of people that the government would consider as being vulnerable.

..... [2]

(ii) Suggest why the influenza vaccine has to be changed each year.

..... [2]

Fig. 4.1 shows the concentration of antibodies in a patient's bloodstream following an influenza vaccination and then infection with the influenza virus.



(iii) Using the information from Fig. 4.1, state **two differences** between the primary and secondary immune responses.

..... [2]

(iv) Memory cells are produced when a patient is vaccinated against influenza.

Describe the role of these memory cells when the influenza virus enters the body.

..... [3]

(b) Tamiflu[®] is an antiviral drug that can be used to treat influenza patients.

(i) State why a doctor would **not** prescribe antibiotics to treat influenza.

..... [1]

(ii) Neuraminidase is an enzyme which is present on the protein coat of the influenza virus.

This enzyme is used to break down the host cell membrane and allow the influenza viruses to leave the infected cell. Tamiflu[®] is a neuraminidase inhibitor.

Suggest how Tamiflu[®] could inhibit neuraminidase.

..... [2]

(iii) Suggest how Tamiflu[®] could help to reduce the spread of influenza.

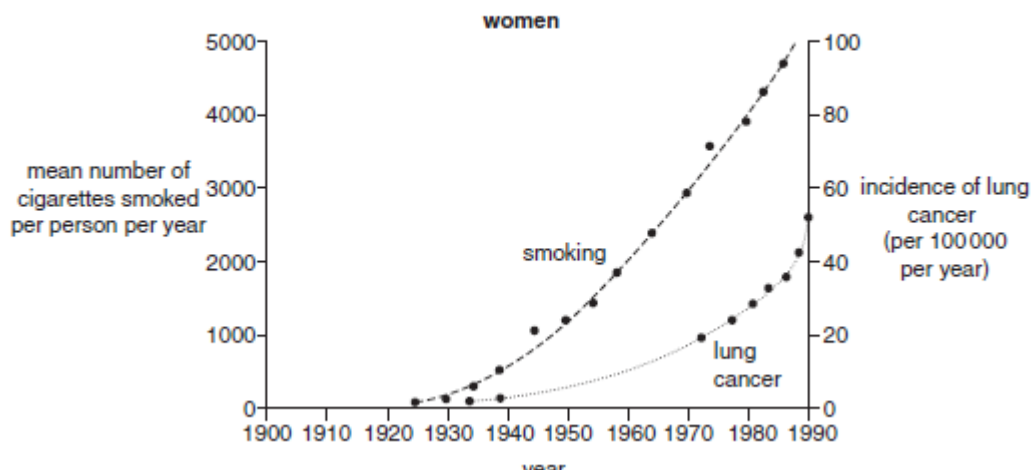
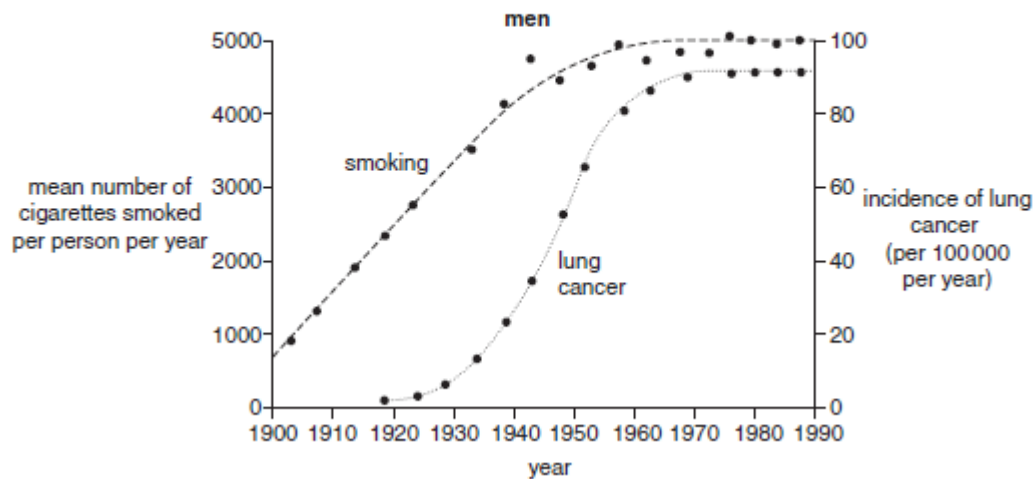
..... [2]

- (c) In an effort to find new drugs to combat a possible new influenza pandemic, researchers have investigated plants used in traditional medicine in Nepal. Two plants, an onion, *Allium oreoprasum*, and an asparagus, *Asparagus filicinus*, have been found to show antiviral properties.

Suggest why researchers in Nepal concentrated their research on plants that had been used in traditional medicine.

..... [2]

- (a) Fig. 5.1 shows the relationship between the mean number of cigarettes smoked per person per year and the incidence of lung cancer for both men and women between 1900 and 1990.



- (i) Compare the changes in the patterns of **smoking** in men and women from 1900 to 1990.

..... [2]

- (ii) What evidence from Fig. 5.1 suggests that smoking causes lung cancer?

..... [2]

- (b) Describe how smoking contributes to the development of lung cancer.



In your answer, you should make clear the links between smoking and the development of lung cancer.

..... [6]

(c) Name **three other** diseases associated with smoking.

- 1
- 2
- 3 [3]

3)

(a) Fig. 6.1 shows two species of trilobites, a group of arthropods that became extinct about 240 million years ago. Species **A** is 20 million years older than species **B**.

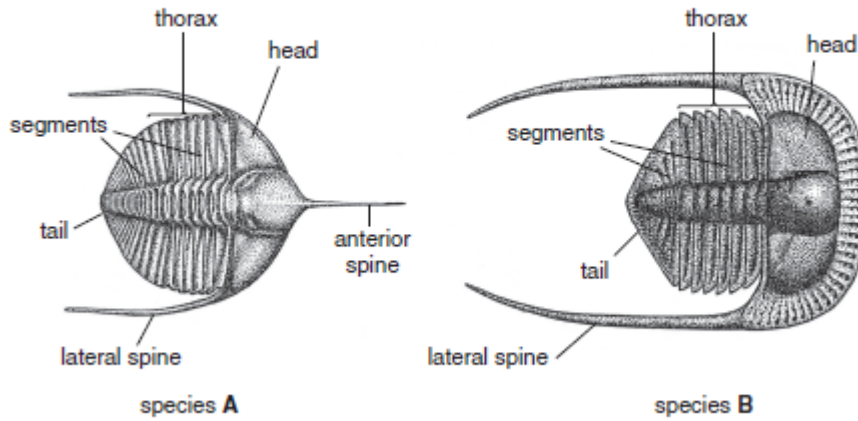


Fig. 6.1

(i) List **three** observable features from Fig. 6.1 that suggest the two species are related.

- 1
- 2
- 3 [3]

(ii) List **two** observable features from Fig. 6.1, **other than size**, that could suggest they are **different** species.

- 1
- 2 [2]

(b) Explain how fossils provide evidence for the theory of evolution.

..... [2]

4)

On Christmas Eve 1987, the last female Spix's Macaw, *Cyanopsitta spixii*, was removed from the wild in Brazil. The last remaining male bird continued to live in the wild for a further six years. This male bird, having lost its partner, mated with a Blue-winged Macaw, *Procyrrhura maracana*.

(a) Explain why eggs produced by this mating did not hatch.

..... [2]

(b) Spix's Macaws became endangered because the birds were illegally trafficked to collectors in other parts of the world. This is against the CITES agreement.

(i) State what the abbreviation CITES stands for.

.....
..... [1]

(ii) State **two** of the aims of the CITES agreement.

1

.....

2

..... [2]

(c) Once it was realised that the Spix's Macaws were in danger of becoming extinct, the collectors were "invited" to allow their macaws to take part in a breeding programme.

Suggest **two** factors to be taken into consideration when selecting individuals for this breeding programme.

..... [2]

(d) Finally, a captive bred female Spix's Macaw was released into the original male's territory.

What could be done to try to ensure the success of this release programme?

..... [3]

5)

Three examples of fluids in the mammalian body are blood, tissue fluid and lymph.

- (a) Complete Table 3.1 below comparing different features of arterial blood, tissue fluid and lymph.

Table 3.1

feature	arterial blood	tissue fluid	lymph
hydrostatic pressure		low	
presence of large proteins	yes		
presence of neutrophils	yes		
presence of erythrocytes			no

[4]

- (b) In a closed circulatory system, blood is kept inside blood vessels.

(i) Suggest **two** advantages of keeping the blood inside vessels. [2]

- (ii) Describe **and** explain how the wall of an artery is adapted both to withstand and maintain high hydrostatic pressure.



In your answer you should use appropriate technical terms, spelt correctly.

to withstand pressure

to maintain pressure

..... [5]

6)

- (a) A student used a potometer to investigate the effect of light intensity on the rate of transpiration in a healthy leafy shoot.

The results obtained are shown in Table 5.1.

Table 5.1

light intensity in arbitrary units (a.u.)	rate of transpiration (mm min^{-1})			
	trial 1	trial 2	trial 3	mean
10	5.0	7.0	5.0	5.7
20	5.0	7.0	5.0	5.7
30	12.0	12.0	11.0	11.7
40	24.0	23.0	26.0	24.3
50	32.0	33.0	32.0	32.3

- (i) Describe the trend shown in the mean rate of transpiration as light intensity increases from 20 to 50 a.u.

..... [2]

- (ii) Suggest why the rate of transpiration did not change between light intensities 10 a.u. and 20 a.u.

.....

..... [1]

- (b) (i) Explain why transpiration is unavoidable during the day.

..... [3]

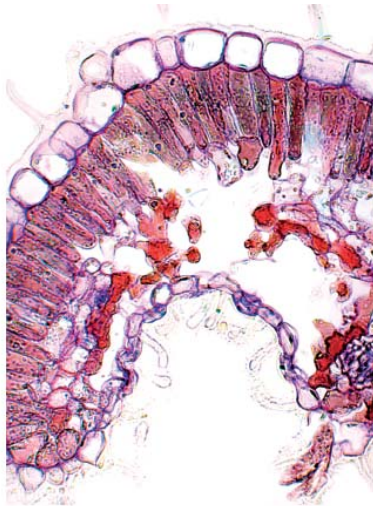


Fig. 5.1

- (ii) Fig. 5.1, **on the insert**, is a photograph of a transverse section of a leaf taken from a xerophyte.

Describe the xerophytic features of this leaf **and** explain how each feature reduces loss of water vapour.



In your answer you should use appropriate technical terms, spelt correctly.

..... [5]