



1. Heroin is a drug that acts on the nervous system.

Define the term *drug*.

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2 a) Drugs such as heroin restrict the movement of impulses across synapses. Users can become addicted to heroin. When users stop taking heroin, they may experience withdrawal symptoms.

(i) State **two** withdrawal symptoms that heroin users may experience.

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(ii) Suggest why heroin abuse may increase criminal activity.

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b) Heroin abuse may lead to HIV infection. There is currently no approved vaccine that prevents the spread of HIV. Vaccination stimulates active immunity against specific pathogens.

(i) Explain how vaccination stimulates active immunity.

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3) The half-life of a drug is the time it takes for the concentration in the blood to decrease by a factor of a half. The half-life of one form of testosterone taken to improve sporting performance is 7 days.

A person received an injection of this form of testosterone. A blood sample taken almost immediately showed its concentration to be 50 ng cm^{-3} .

Predict the concentration after 14 days, assuming the person does not have another injection, **and** show your working.

..... ng cm^{-3}

4a) Tobacco smoke is made up of over 7000 chemicals.

Nicotine is a component of tobacco smoke.

(a) Explain why nicotine is a drug.

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b) Describe the effect on the gas exchange system of the following components of tobacco smoke:

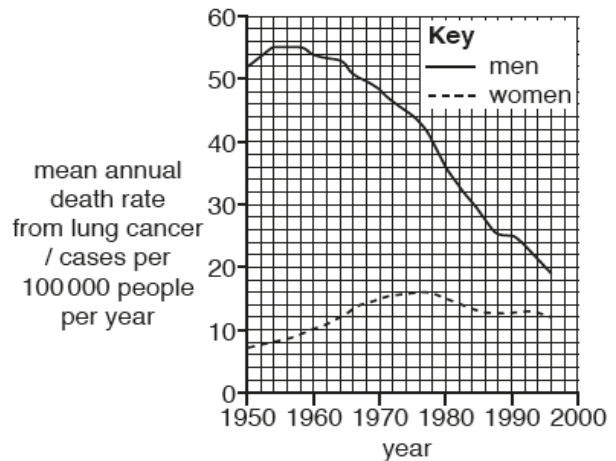
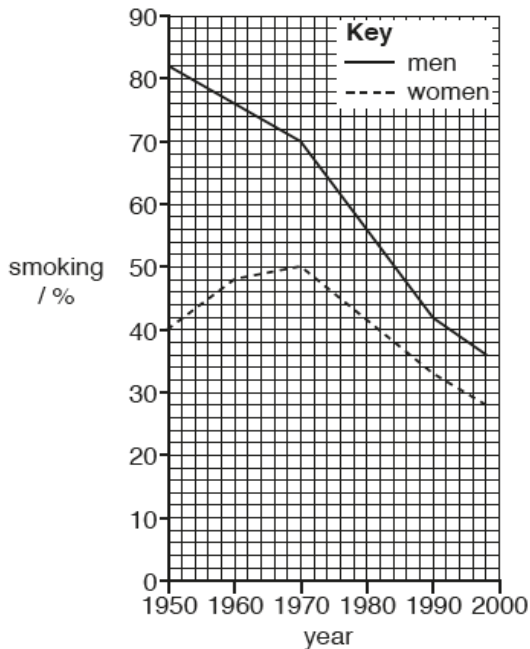
carbon monoxide

tar



c) A study compared the percentages of men and women aged between 35 and 54 years who smoked cigarettes. The annual death rate caused by lung cancer was also recorded.

The results are shown in the two graphs in Fig. 4.1.



(i) Use the data shown in Fig. 4.1 to compare the percentages of men and women who smoked cigarettes between 1950 and 1998.

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(ii) Use the information from **both** graphs in Fig. 4.1 to discuss the link between smoking and lung cancer.

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(d) Explain why it is recommended that pregnant women do not smoke.

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5) Explain why antibiotics can be used to treat bacterial infections but not viral infections.

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