Chapter 15

Drugs

01. 0610_s20_qp_43 Q: 5

Bacteria are classified in the Prokaryote kingdom.

(a) State **two** features of animal **and** plant cells that are **not** found in prokaryotes.

1 .....

2 .....

[2]

(b) Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacterium that is resistant to some antibiotics.

Fig. 5.1 shows how a population of bacteria may develop antibiotic resistance and how the antibiotic resistance can be passed from one strain of bacterium to another.

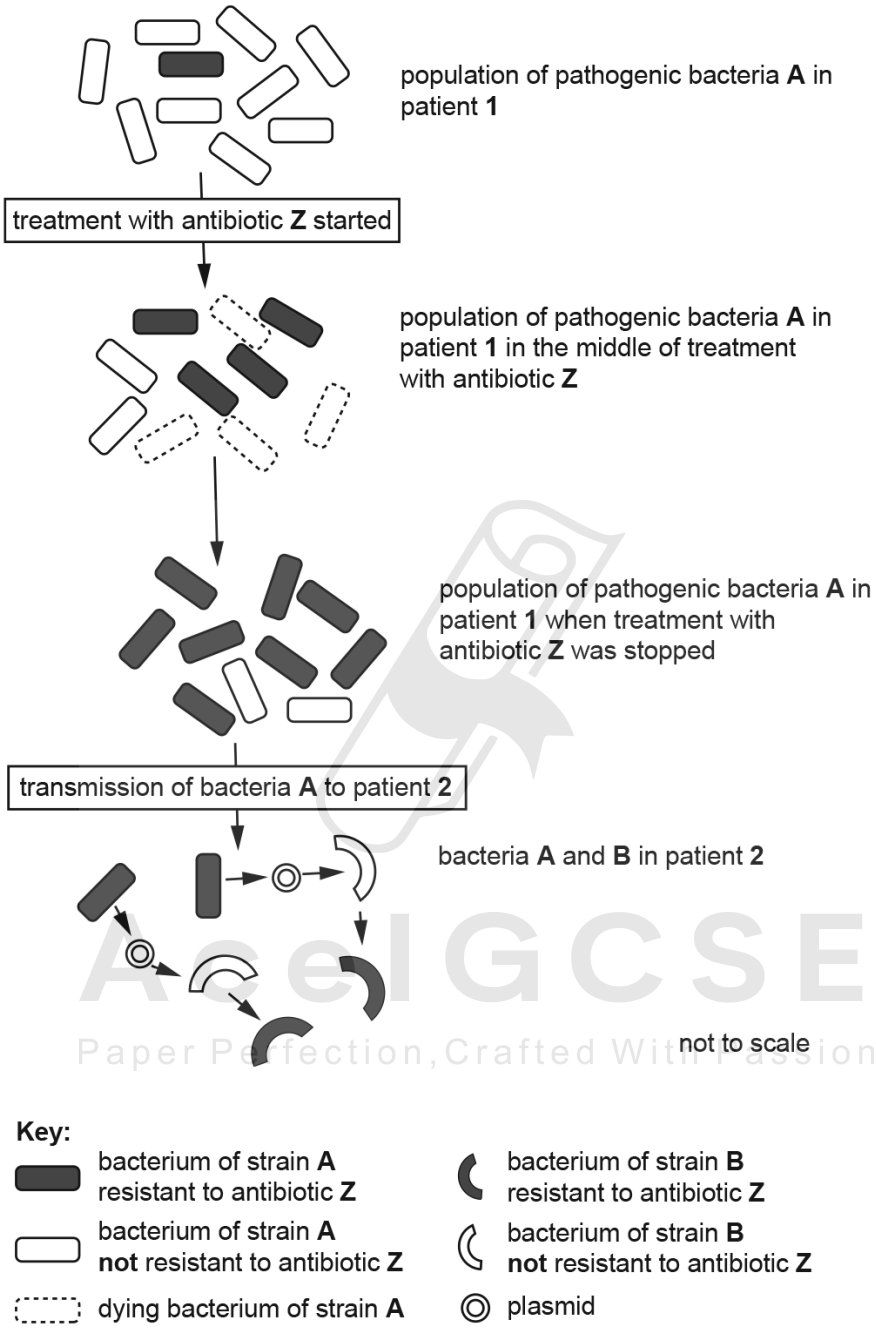

Fig. 5.1

Explain how resistance to an antibiotic develops in a population of bacteria and spreads in the human population.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(c) Explain how the development of resistant bacteria, such as MRSA, can be minimised.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

02. 0610_w19_qp_41 Q: 4

(a) The body has defence mechanisms to protect it from infection.

Outline the body's defence mechanisms.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(b) State the name of a type of drug that can be used to treat bacterial infections.

..... [1]

[Total: 6]

03. 0610_m17_qp_42 Q: 2

Bacteria are classified as belonging to the Prokaryote kingdom.

(a) State **two** features of **all** prokaryotes.

1 .....

2 .....
[2]

MRSA is a type of bacterium that is resistant to antibiotics. The number of cases of MRSA identified in hospitals in the USA between 1995 and 2005 was recorded.
Fig. 2.1 shows these data.

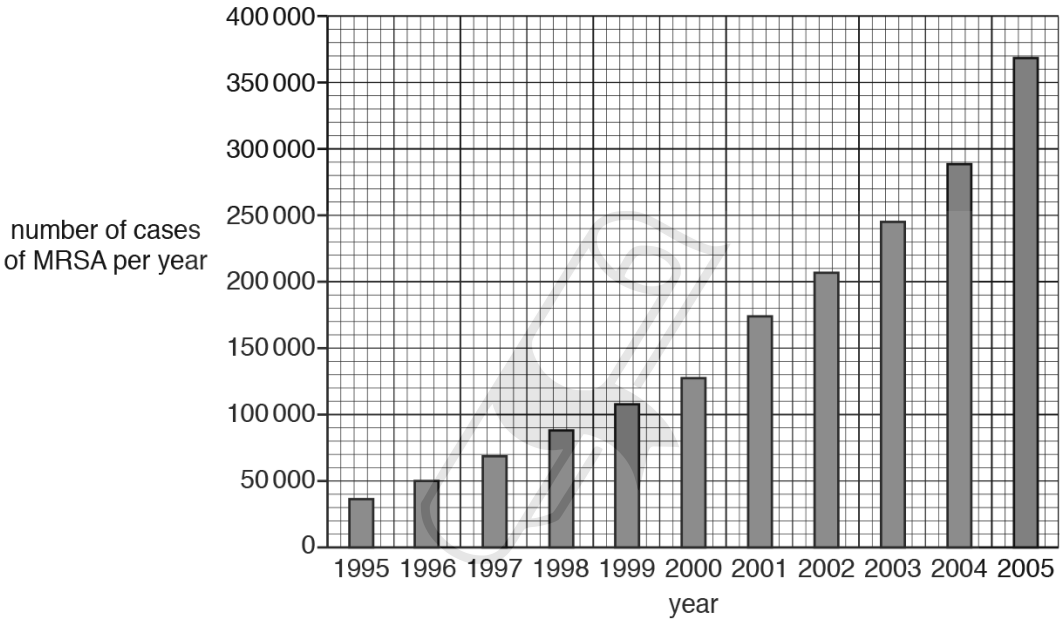

Fig. 2.1

(b) (i) Describe the results shown in Fig. 2.1.

.....

.....

.....

.....

.....[2]

(ii) Explain how bacteria become resistant to antibiotics.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(c) The number of cases of MRSA has decreased since 2005.

Suggest reasons for this decrease.

.....

.....

.....

.....

.....[2]

[Total: 10]

Fig. 6.1 is a flow diagram that shows what happens at the start of a bacterial infection.

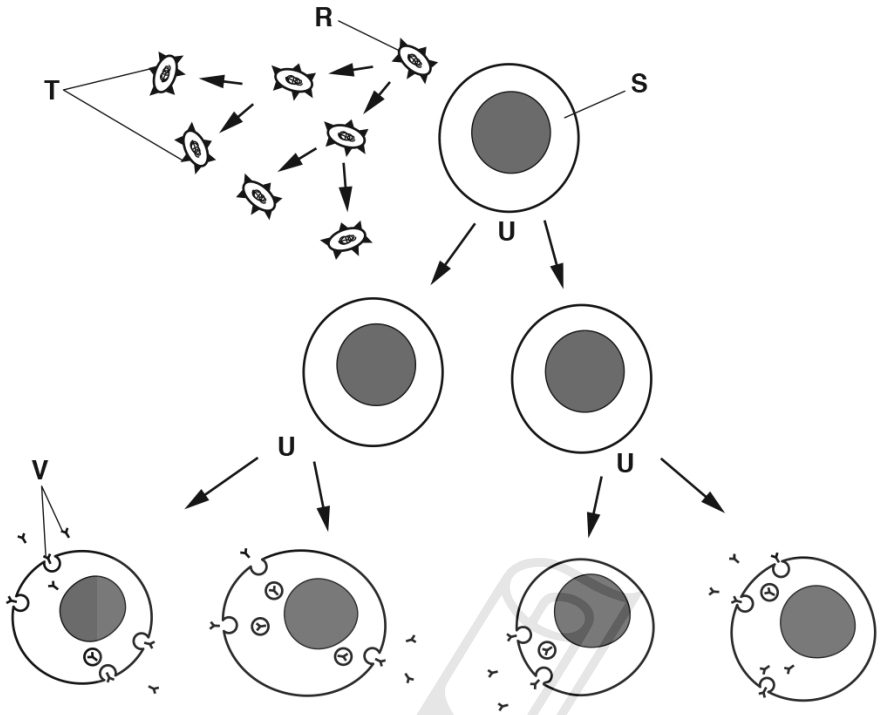

Fig. 6.1

(a) Cell **R** is a prokaryote and cell **S** is a lymphocyte.

(i) State the names of **two** cellular structures that would be found in **both** prokaryotes and white blood cells.

1 .....

2 .....
[2]

(ii) Describe how the cellular structure of white blood cells differs from the cellular structure of prokaryotes.

.....

.....

.....

.....

.....

.....

.....[3]

(b) Cell **R** is a pathogen that has structures **T** on its surface. These structures are recognised by cell **S**. Cell **S** is a lymphocyte and it produces structures **V**. Cell **R** reproduces by binary fission and cell **S** divides by process **U**.

Identify **T** to **V** from the passage and Fig. 6.1.

T .....

U .....

V .....

[3]

(c) Cell **W** in Fig. 6.2 also responds to pathogens.

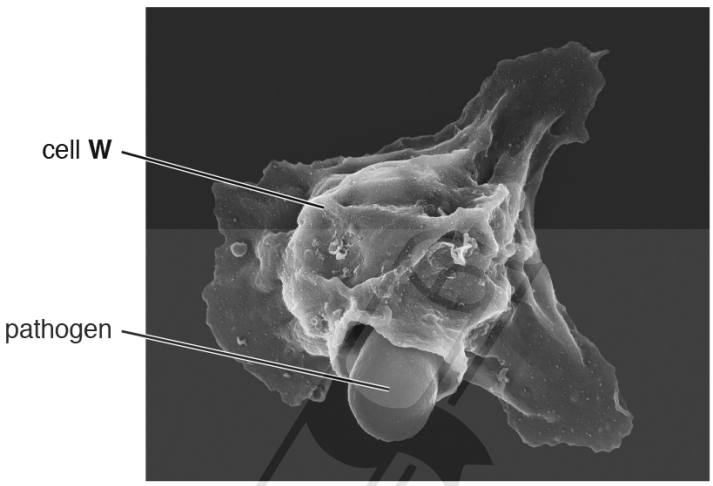

Fig. 6.2

(i) State the name of the process shown in Fig. 6.2.

.....[1]

(ii) Describe what happens to the pathogen during the process shown in Fig. 6.2.

.....

.....

.....[1]

Fig. 6.3 shows some human teeth that require dental treatment.

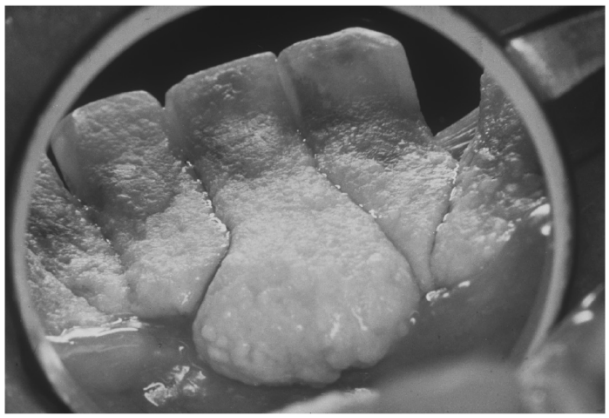

Fig. 6.3

(d) **(i)** Identify the type of teeth in Fig. 6.3.

.....[1]

(ii) Explain how bacteria dissolve enamel to cause tooth decay.

.....

.....

.....

.....

.....[2]

(e) Describe **two** ways of preventing tooth decay.

.....

.....

.....

.....

.....[2]

[Total: 15]

05. 0610_m20_qp_42 Q: 1

(a) Fig. 1.1 is a diagram of the human gas exchange system.

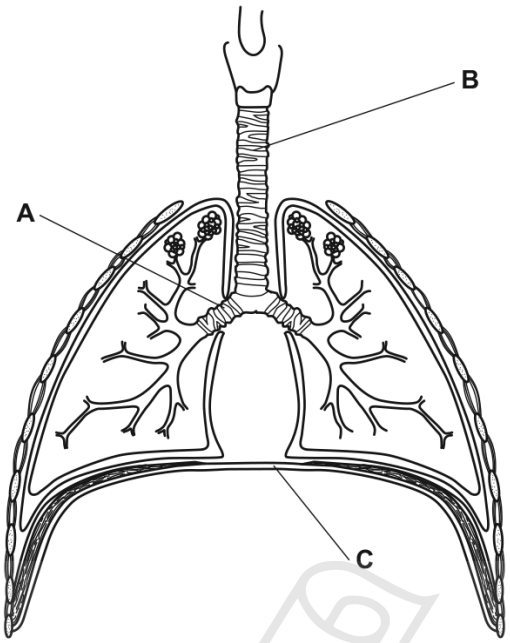

Fig. 1.1

(i) Identify the structures labelled **A**, **B** and **C** in Fig. 1.1.

A .....

B .....

C .....

[3]

(ii) Explain how the structures in the gas exchange system cause inspiration.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) A person who does not smoke can be exposed to tobacco smoke from other people smoking.

Researchers studied the effect of exposure to tobacco smoke on the development of lung cancer in three groups of women who did not smoke:

- group 1 – no exposure to tobacco smoke
- group 2 – low level exposure to tobacco smoke
- group 3 – high level exposure to tobacco smoke.

Their results are shown in Table 1.1.

Table 1.1

group	number of women studied	number of women who died from lung cancer	percentage of women who died from lung cancer
1	21 895	32	0.15
2	44 184	86	
3	25 461	56	0.22

(i) Calculate the percentage of women in group 2 who died from lung cancer.

Write your answer, to **two** significant figures, in Table 1.1.

[2]

(ii) Many countries have laws that ban smoking in public buildings.

Discuss the evidence from Table 1.1 that supports these laws.

.....

.....

.....

.....

.....

.....

..... [3]

(iii) Smoking has been found to increase the risk of developing diseases other than cancer.

State **two** other diseases that can be caused by smoking.

1 .....

2 .....

[2]

[Total: 14]

06. 0610_m19_qp_42 Q: 3

Reflexes are simple responses that protect the body.

(a) The letters **A** to **G** show the components involved in a reflex action.

A stimulus
B motor neurone
C sensory neurone
D receptor cell
E response
F relay neurone
G effector

Put the letters into the correct sequence involved in a reflex action. Two have been done for you.

A						**E**

[1]

(b) Impulses travel along neurones.

Describe how impulses pass from one neurone to another neurone across a synapse.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Drugs such as heroin affect the nervous system. When users stop taking heroin they may experience withdrawal symptoms.

(i) Outline the short-term effects of heroin on the body.

.....

.....

.....

.....

.....

.....

..... [3]

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

.....

..... [2]

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

.....

..... [1]

[Total: 11]

07. 0610_s19_qp_41 Q: 3

(a) Complete the five sentences about the eye and the nervous system.

Structures in the eye change the shape of the lens so that the eye can focus on near and distant objects. This is called .....

The radial and circular muscles in the iris of the eye are a pair of ..... muscles that work against each other.

Muscles in the eye are controlled by the nervous system. The ..... nervous system contains only sensory and motor neurones.

The ..... nerve from the eye contains sensory neurones that conduct impulses to the .....

[5]

(b) Transmission of impulses relies on the flow of ions through the cell membranes of neurones down their concentration gradients. Active transport is responsible for maintaining the concentration gradients of ions across the membranes of neurones.

Explain how ions are moved across membranes by active transport.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Fig. 3.1 shows the junction between two neurones.

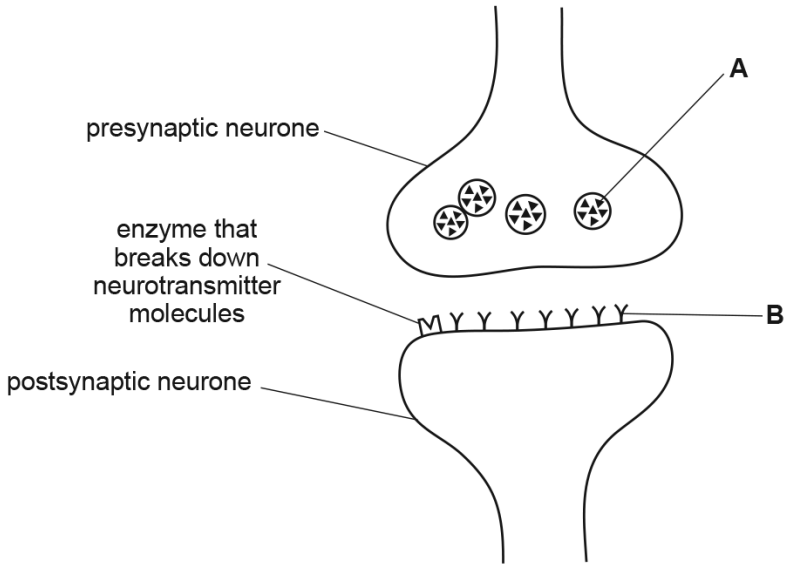

Fig. 3.1

Many drugs interfere with the action of neurotransmitters at the junctions between neurones.

Two drugs that influence the transmission of impulses between neurones are atropine and eserine. The actions of these drugs are shown in Table 3.1.

Table 3.1

drug	action at junctions between neurones
atropine	blocks receptor molecules for neurotransmitters
eserine	blocks the enzyme that breaks down neurotransmitters

Explain the effects of these two drugs on the nervous system using the information in Fig. 3.1 and Table 3.1.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(d) A scientific paper was published in 1997 that described the effects of anabolic steroids on female athletes. Many of these athletes achieved great success in international sport competitions during the 1960s and 1970s.

Discuss the arguments against the use of anabolic steroids in sport.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 17]

08. 0610_w19_qp_42 Q: 4

(a) Explain how the human gas exchange system is protected against pathogens.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Tuberculosis (TB) is a transmissible disease caused by a bacterial pathogen. The spread of this disease can be controlled by vaccination.

Explain how vaccination provides a defence against transmissible diseases.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) TB is a disease that can be treated with antibiotics. HIV infection cannot be treated with antibiotics.

Explain why viral diseases **cannot** be treated with antibiotics.

.....

.....

.....

.....

..... [2]

(d) Lung cancer is a disease that is strongly linked with smoking tobacco.

Fig. 4.1 shows some data about smoking and lung cancer in country **A** between 1900 and 2020 (2020 data has been estimated):

- percentage of the male population that smoke tobacco
- percentage of the female population that smoke tobacco
- number of deaths in males from lung cancer per 100 000 of the male population
- number of deaths in females from lung cancer per 100 000 of the female population.

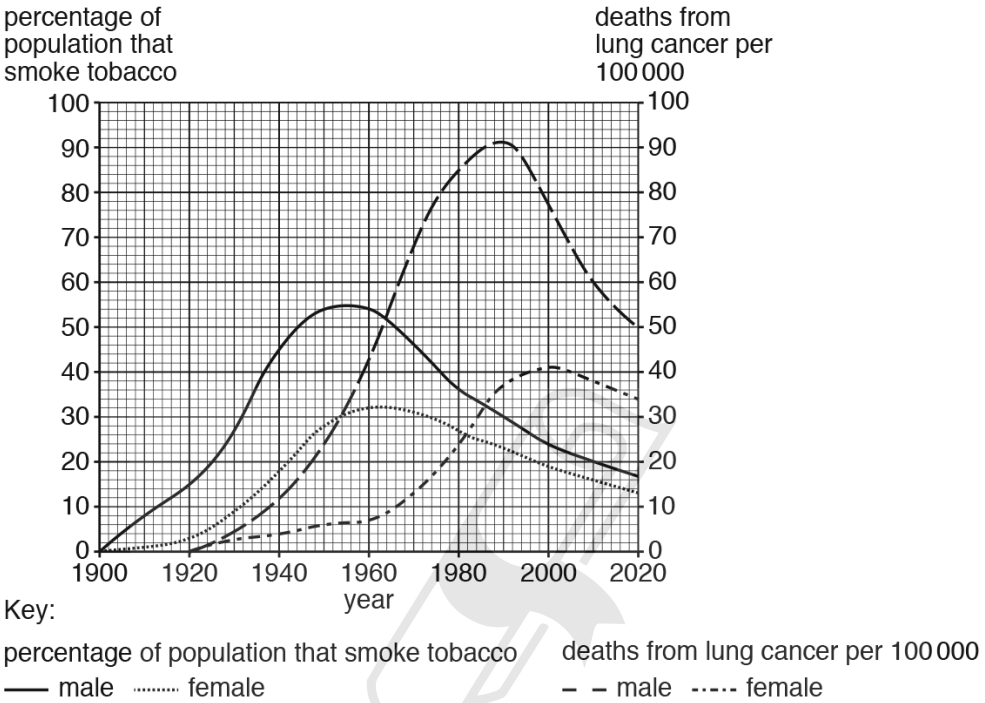

Fig. 4.1

(i) Describe the differences between the percentages of males and females in country **A** that smoke as shown in Fig. 4.1.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Fig. 4.2 shows the same smoking statistics for country **B** between 1950 and 2020.

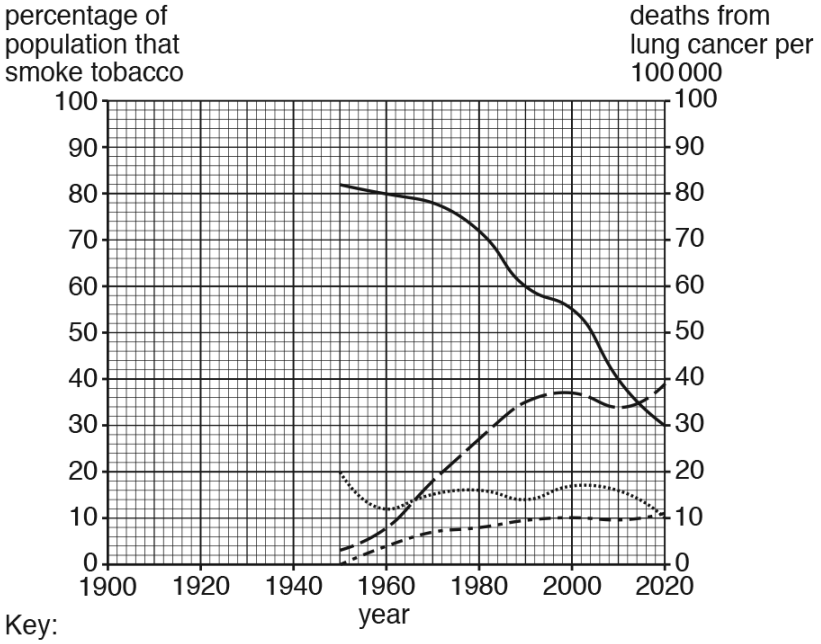

Fig. 4.2

Discuss the evidence **for** and **against** this statement:

'The changes in the percentage of the population that smoke tobacco, and the deaths from lung cancer per 100 000, follow the same trends in males and in females.'

Use the information for country **A** in Fig. 4.1 and country **B** in Fig. 4.2 in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 19]

09. 0610_m18_qp_42 Q: 2

A study estimated the number of people with chronic obstructive pulmonary disease (COPD) in India. Data were collected from two groups of people, those who lived in cities and those who lived in villages.

Fig. 2.1 shows the results.

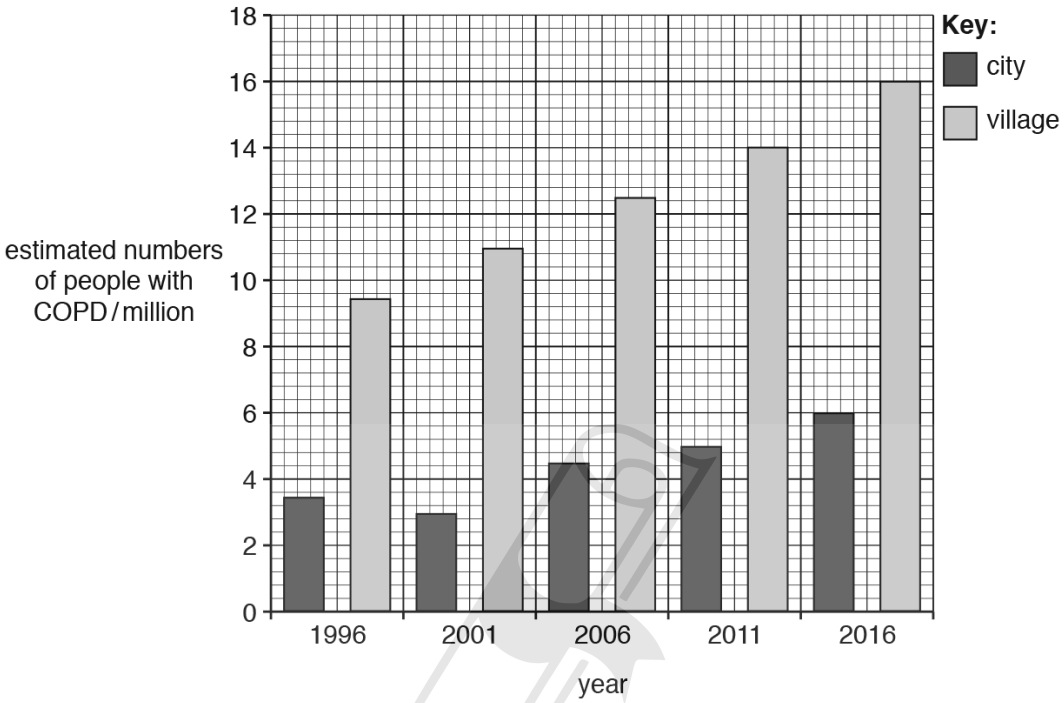

Fig. 2.1

(a) Compare the number of people with COPD in cities with the number of people with COPD in villages **and** suggest reasons for the differences.

Use the data in Fig. 2.1 to support your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[6]

(b) **(i)** Explain how the body prevents particles in inspired air from reaching the gas exchange surfaces.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(ii) State **two** ways in which the composition of inspired air differs from the composition of expired air.

1 .....

2 .....
[2]

(c) Alveoli are well-ventilated to provide efficient gas exchange.

(i) State the name of the muscles that cause the ribs to move during ventilation.

.....[1]

(ii) During inspiration the pressure and volume in the thorax changes.

State these changes.

pressure .....

volume .....
[1]

[Total: 14]

10. 0610_w18_qp_41 Q: 5

The liver is an important organ in many processes.

(a) The liver responds to changes in insulin concentration.

Insulin is a hormone.

(i) Define the term *hormone*.

.....

.....

.....

.....

.....

.....

.....[3]

(ii) Describe how the liver responds to an increase in insulin concentration.

.....

.....

.....

.....

.....[2]

(b) The liver is also involved in the processing of amino acids.

(i) Describe how excess amino acids are broken down.

.....

.....

.....[2]

(ii) State the name of the process that assembles amino acids to form proteins.

.....[1]

(c) The liver is also involved in the processing of toxins.

(i) Lactic acid is an example of a toxin that is produced during vigorous exercise and processed in the liver.

Describe how lactic acid is processed.

.....

.....

.....[2]

(ii) Alcohol is another toxin that is processed in the liver.

The effect of alcohol consumption on the risk of dying from liver disease was investigated in men and women.

The results are shown in Fig. 5.1.

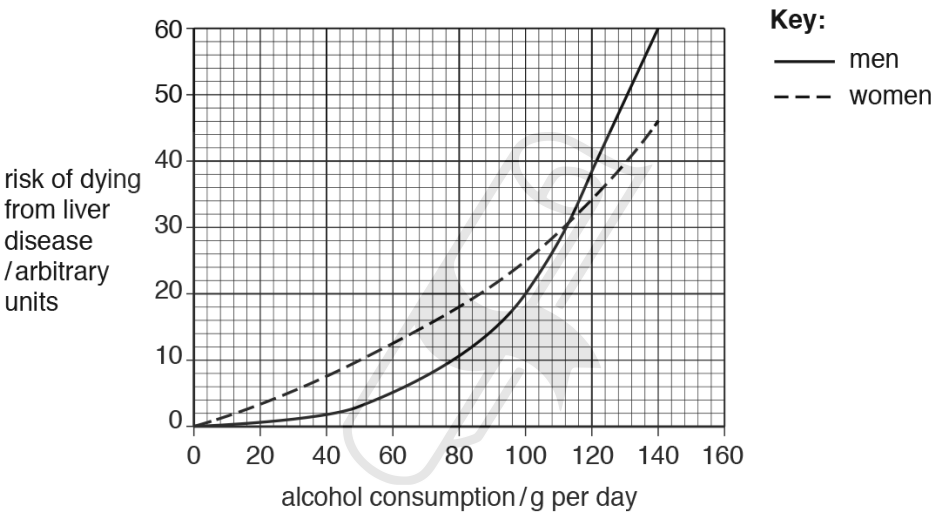

Fig. 5.1

Describe the results shown in Fig. 5.1.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 14]

11. 0610_m16_qp_42 Q: 2

Reflexes are simple responses that protect the body.
The pathway that nerve impulses travel along during a reflex is called a reflex arc.

(a) Letters **A** to **G** show the components of a reflex arc.

A stimulus
B motor neurone
C sensory neurone
D receptor cell
E response
F relay neurone
G effector

Put the components into the correct sequence. Two have been done for you.

A						**E**

[1]

(b) Impulses travel between neurones across a synapse.

Describe how impulses travel across the synapse from one neurone to another.

.....

.....

.....

.....

.....

.....

.....[3]

(c) 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.

1 .....

2 .....
[2]

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

.....

.....

.....[1]

(d) 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.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

(ii) Explain what is meant by passive immunity.

.....

.....

.....

.....

.....[2]

[Total: 13]

12. 0610_w16_qp_42 Q: 3

Fig. 3.1 shows a section through a kidney.

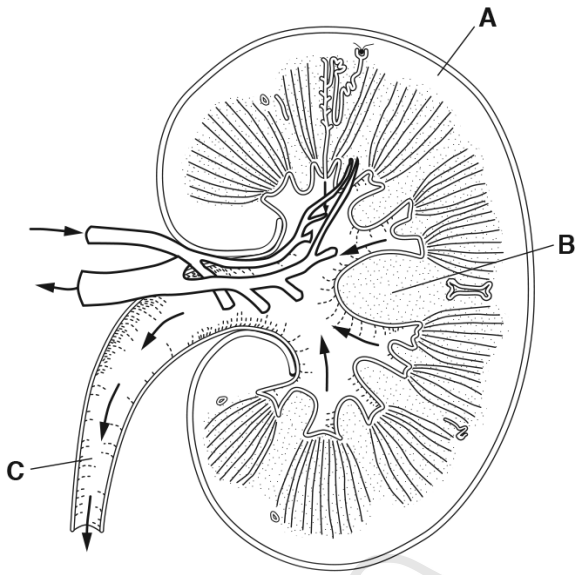

Fig. 3.1

(a) Complete the table by stating the name of the parts labelled **A**, **B** and **C** on Fig. 3.1.

letter	name of part
A	
B	
C	

[3]

(b) **(i)** Name the blood vessel in Fig. 3.1 that has the highest concentration of urea.

..... [1]

(ii) Name the blood vessel in Fig. 3.1 that has the lowest concentration of glucose.

..... [1]

(c) Explain the role of the kidney in excretion.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(d) Testosterone is a steroid hormone that is also taken as a drug to improve sporting performance.

(i) Define the term *hormone*.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State where testosterone is produced in the body.

..... [1]

(iii) State why testosterone is taken by some people to improve sporting performance.

.....

.....

.....

.....

..... [2]

(e) 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} [2]

[Total: 17]

---

13. 0610_w16_qp_43 Q: 4

Tobacco smoke is made up of over 7000 chemicals.

Nicotine is a component of tobacco smoke.

(a) Explain why nicotine is a drug.

.....

.....

.....

.....

.....[2]

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

carbon monoxide .....

.....

.....

.....

tar .....

.....

.....

.....

[4]

(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.

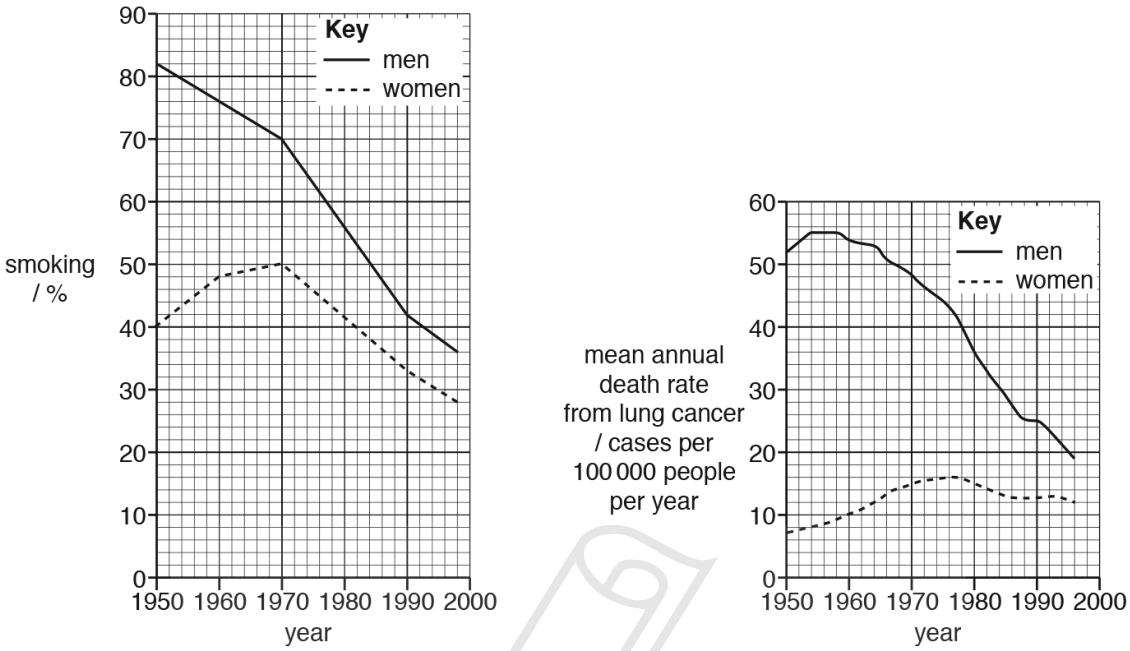

Fig. 4.1

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

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

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

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

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

.....

.....

.....

.....

.....[3]

[Total: 17]

01. 0610_s20_MS_43 Q: 5

(a)	*any two from:* nucleus / nuclear membrane / nuclear envelope ; (linear) chromosomes ; mitochondrion ; endoplasmic reticulum ; vacuoles / vesicles ; AVP ;	**2**
(b)	*any six from:* resistance arises by mutation ; in small number of bacteria ; ref. to a random event (not related to presence of antibiotic) ; antibiotic kills bacteria that do not have the mutation / AW ; resistant bacteria have no competition ; resistant bacteria reproduce ; pass on, gene / allele, for resistance ; natural selection ; method of transmission from one person to another described ; gene transferred to other bacteria (of different type) in a plasmid ; AVP ;	**6**
(c)	*any three from:* prescribe / use, antibiotics less often ; do not use for, viral / fungal, infections ; make sure people complete the course of antibiotics / AW ; develop new antibiotics ; do not use the same antibiotics for too long / rotate antibiotics / AW ; use combinations of antibiotics ; AVP ;; e.g. isolation of patients with antibiotic-resistant infections / good hygiene to prevent spread of infection / reduce use of antibiotics in farming	**3**

02. 0610_w19_MS_41 Q: 4

	Answer	Mark	Partial Marks
(a)	(named) mechanical (barriers) ; (named) chemical barriers ; ref. to active immunity ; white blood cells / lymphocytes / phagocytes ; (phagocytes) engulf (named) microorganisms / phagocytosis ; lymphocytes produce antibodies ; ref. to specific, antigens / pathogens ; ref. to long term immunity / memory cells ; AVP ;	**5**	
(b)	antibiotics ;	**1**	

03. 0610_m17_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)	no nucleus ; cell wall ; loop of DNA ; AVP ;;	**2**	
(b)(i)	overall increase in number of cases of MRSA ; largest increase, between 2004–2005 / exponential ; data quote including the number of cases and the year / data manipulation ;	**2**	
(b)(ii)	**1** correct ref to mutation of bacteria ; **2** variation in ability of bacteria to survive antibiotic treatment ; **3** bacteria with no / little resistance, die ; **4** bacteria with resistance, survive and breed ; **5** passing on resistant allele ; **6** ref to natural selection ; **7** AVP ; e.g. ref to strengthening of cell wall	**4**	
(c)	more responsible use of antibiotics ; improved, detection / screening to avoid spread ; ref to improved cleanliness ; isolating infected patients ; development of new antibiotics / treatment ;	**2**	

04. 0610_s17_MS_42 Q: 6

	Answer	Mark	Partial Marks
(a)(i)	cell membrane ; DNA ; ribosomes ; cytoplasm ;	2	**A** genes / genetic material / chromosome(s)
(a)(ii)	<table><tr><th></th><th>*white blood cell (**S**)*</th><th>*prokaryote (**R**)*</th></tr><tr><td>1</td><td>no cell wall</td><td>cell wall ;</td></tr><tr><td>2</td><td>(named) organelles</td><td>no (membrane-bound) organelles ;</td></tr><tr><td>3</td><td>nucleus</td><td>nucleoid / no nucleus ;</td></tr><tr><td>4</td><td>linear, chromosomes / DNA</td><td>loop of DNA / circular / naked, chromosome ;</td></tr><tr><td>5</td><td>large ribosomes</td><td>small ribosomes ;</td></tr><tr><td>6</td><td>no plasmids (in cytoplasm)</td><td>plasmids (in cytoplasm) ;</td></tr><tr><td>7</td><td>large</td><td>small ;</td></tr><tr><td>8</td><td>antibodies</td><td>no antibodies ;</td></tr></table>	3	
(b)(i)	**T** = antigen ; **U** = mitosis ; **I** cell division **V** = antibodies ;	3	
(c)(i)	phagocytosis ;	1	**A** endocytosis
(c)(ii)	(phagocyte) engulfs pathogen ; phagosome / vacuole, forms ; (enzymes) digest / breakdown / destroy, pathogen ; AVP ;	1	e.g. antigens presented on cell surface
(d)(i)	incisors ;	1	
(d)(ii)	bacteria use sugar / AW (on teeth as a food source) ; bacteria respire ; acid is produced ; AVP ;	2	e.g. plaque / tartar, forms – *ref to* CO_2 is acidic – *ref to* lactic acid
(e)	regular, brushing / mouthwash / flossing / wash / clean, teeth ; avoid sugary foods / diet described ; dental check-ups ; fluoride, toothpaste / in water ;	2	

05. 0610_m20_MS_42 Q: 1

	Answer	Mark	Partial Marks
(a)(i)	**A** – bronchus ; **B** – trachea ; **C** – diaphragm ;	3	
(a)(ii)	**1** diaphragm, contracts / flattens ; **2** external intercostal muscles contract ; **3** ribs move, upwards / outwards ; **4** volume, increases ; **5** pressure, decreases ; **6** air enters (the, mouth / trachea / lungs,) to equalise the pressure ;	4	
(b)(i)	86 / 44184 × 100 = 0.194 ; 0.19 (%) ;	2	
(b)(ii)	*idea that* non-smokers / passive smokers / AW, can die from / can develop lung cancer ; the greater the exposure to tobacco smoke the greater the risk (of dying from lung cancer) ; comparative data quote ;	3	
(b)(iii)	COPD ; CHD ; AVP ;;	2	apply list rule

06. 0610_m19_MS_42 Q: 3

	Answer	Mark	Partial Marks
(a)	(**A**) **D C F B G** (**E**) ;	1	
(b)	correct ref. to neurotransmitter ; released from vesicles (into synapse / synaptic gap) ; ref. to movement (of neurotransmitter) by diffusion ; (neurotransmitter) binds with receptor (molecules on neurone on the other side of synapse) ; causing impulse to continue / AW ;	4	
(c)(i)	depressant ; increases reaction times / slows down impulses / slows down the nervous system ; ref. to effect on synapse / AW ; loss of self-control / mental function is affected / inability to walk or talk ; AVP ;;;	3	
(c)(ii)	sleeplessness / insomnia / restlessness ; fatigue / yawning ; diarrhoea ; hallucinations ; anxiety / depression / mood swings / aggression / irritation / confusion ; muscle cramps / aches / pain ; nausea / vomiting ; headaches / dizziness ; shivering / chills / fever ; itching ; runny nose / sweating / clammy skin / crying ; dehydration / (extreme) thirst ; rapid heart rate / hypotension ; AVP ; cravings / double vision	2	
(c)(iii)	(addicts) turn to crime to finance their addiction / AW ;	1	

07. 0610_s19_MS_41 Q: 3

	Answer	Mark	Partial Marks
(a)	accommodation ; antagonistic ; peripheral ; optic ; brain ;	5	
(b)	involves, proteins / carriers / pumps (in neurone membrane) ; (named) ion(s) bind to, proteins / carriers / pumps, to move ions / AW ; move ions, against concentration gradient / from low to high concentration ; using energy ; AVP ; e.g. change in shape of carrier (protein)	3	
(c)	*general marking point* neurotransmitters move across, synapse / gap / junction / AW ; *atropine* neurotransmitter cannot, bind to / enter / reach, receptors ; therefore no impulses (along, next / postsynaptic, neurone) / no impulses reach the CNS ; no sensitivity to stimuli / feels no pain / painkiller ; no, contraction of muscle / response ; depressant ; *eserine* neurotransmitter stays in, synapse / synaptic gap ; neurotransmitter can bind to receptor (rather than stay in synapse) ; continuously stimulates the, next / postsynaptic, neurone ; (more) impulses are sent (in, next / postsynaptic, neurone) ; repeated, contraction of muscle / response ; stimulant ;	6	**A** reaction time is longer / no reflex
(d)	anabolic steroids increase, muscle mass / AW ; gives athletes unfair advantage / ref. to cheating / unethical / immoral ; (named), side effect / effect on health ; can be banned from taking part in sport if found using them ; ref. to illegality ; AVP ; e.g. can lose sponsorship / loss of reputation / AW	3	

08. 0610_w19_MS_42 Q: 4

	Answer	Mark	Partial Marks
(a)	ref. to, mechanical / chemical, barriers ; nasal hairs, trap / filter / AW, pathogens ; mucus traps pathogens / pathogens stick to mucus ; mucus, produced / secreted, by goblet cells ; cilia move mucus (upwards / towards mouth / away from alveoli) ; coughing / sneezing / swallowing ; phagocytes / phagocytosis / described ;	4	
(b)	introduces harmless form of pathogen / AW ; ref. to antigen(s) ; stimulates an immune response ; ref to active immunity ; lymphocytes produce antibodies ; (lymphocytes develop into) memory cells ; memory cells, remain in the body / give long-term immunity / can produce antibodies (at a later time) ; respond quickly when an infection (of the same pathogen) occurs / before symptoms occur ; AVP ;	4	
(c)	*idea that* viruses have no antibiotic targets ; viruses, are not alive / are not living / cannot be killed / not cells ; no cell membrane ; no cell wall ; no protein synthesis / no ribosomes ; no metabolism / do not respire ; AVP ; e.g. viruses are inside (host) cells	2	
(d)(i)	percentage of males smoking increases faster than females ; **ora** more men smoked than women / higher percentage of men smoked (over all the time) ; **ora** peak for percentage of men smoking occurred earlier ; **ora** decrease in percentage of men smoking is greater than in females ; **ora** difference between percentages smoking decreases after peaks ; any comparative use of percentages ;	3	
(d)(ii)	***for from* A** percentage of men and women that smoke increases **and** decreases ; numbers of deaths from lung cancer in both groups increases **and** decreases ; both show lag between peak smoking and peak deaths from lung cancer ; country A shows, same time gap / 40-year gap, between peaks for smoking and deaths from smoking ; ***for from* B** percentage of men and women who smoke has decreased (overall) ; numbers of deaths from lung cancer in both groups increase ; ***against from* B** percentage female smokers, fluctuates / AW, but no fluctuation in men ; numbers of deaths in men increase (continually), whereas deaths in females does not ; country **B** may show the same but no data to be sure / no data from before 1950 ; any data quote - percentage / number **and** approximate year and units ;	6	

09. 0610_m18_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)	*describe and compare* **1** COPD higher in villages than cities ; **ora** **2** COPD increasing in both areas ; **3** increasing more rapidly in villages ; **4** fluctuation / COPD decreases, in cities in 2001 ; **5** data quote comparing villages and cities including year and million ; *suggest* **6** lack of healthcare in villages ; **7** more people smoke in villages / passive smoking ; **8** lack of awareness / education, in villages ; **9** pollution in villages ; **10** poor quality housing in villages ; **11** differences in diet ; **12** AVP ; e.g. lack of physical activity ;	6	
(b)(i)	**1** nasal hairs, trap particles / AW ; **2** goblet cells secrete mucus ; **3** particles trapped in the mucus ; **4** cilia moving the mucus ; **5** mucus (containing particles) moved, away from the gas exchange surface / towards the throat / AW ; **6** mucus, swallowed / AW ; **7** AVP ; phagocytes / sneezing	4	
(b)(ii)	more oxygen ; less carbon dioxide ; less water vapour ;	2	
(c)(i)	intercostal ;	1	
(c)(ii)	(pressure) decreases and (volume) increases ;	1	

10. 0610_w18_MS_41 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	chemical substance produced by a (endocrine) gland ; carried by the blood ; alters the activity of specific target organs / AW ;	3	
(a)(ii)	(insulin) stimulates enzymes (production) ; conversion of glucose to glycogen ; glycogen is stored / insoluble ; increased, uptake / absorption / respiration, of glucose by liver (cells) ;	2	
(b)(i)	deamination / removal of nitrogen containing part (of amino acids) ; to form urea ; (part of) amino acid converted to ammonia ; ammonia converted to urea ;	2	
(b)(ii)	(protein) synthesis ;	1	
(c)(i)	aerobic / using oxygen ; respiration / (to produce) carbon dioxide and water; *ref. to* enzymes ; AVP ; converted back to, glucose	2	
(c)(ii)	as alcohol consumption increases risk of dying of liver disease increases ; similar trend in males and females ; comparative data quote with units for g per day ; men exponential / women are not exponential / AW ; at low consumption females have higher risk ; ora same risk at 112 g per day ;	4	

11. 0610_m16_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)	ADCFBGE	[1]	
(b)	1 *ref to* chemical neurotransmitter ; 2 from / in, vesicles / sacs ; 3 neurotransmitter diffuses ; 4 across synaptic cleft / gap ; 5 neurotransmitter binds with receptors ;	[max 3]	**A** named neurotransmitter **mpt 3/5 R** impulse
(c) (i)	sleeplessness ; hallucinations ; muscle cramps / restless legs ; nausea ; vomiting ; headaches ; sweating ; aggression / agitation / restlessness / anxiety / mood swings / panic attacks ; AVP ; e.g. shivering / diarrhoea	[max 2]	**I** symptoms of use
(ii)	(addicts) turn to crime to finance their addiction / AW ; more opportunity to become drug dealers / mule/ AW ;	[max 1]	
(d) (i)	1 harmless / dead / weakened / attenuated, (named) pathogen / microorganisms ; 2 injected / ingested ; 3 *ref to* antigens ; 4 antigen / vaccine, triggers antibody production ; 5 by lymphocytes ; 6 memory cells are produced ; 7 long-term immunity / rapid immune response ;	[max 4]	**mpt 7 R** resistance **I** permanent
(ii)	1 short-term defence against pathogens ; 2 no immune response / immediate protection / no memory cells produced / no antibodies produced by the body ; 3 from antibodies, acquired from elsewhere / AW ; 4 e.g. across placenta / breast-feeding / breast milk / colostrum / antitoxin / antivenom / tetanus injection / immunoglobulins ;	[max 2]	
		[Total: 13]	

12. 0610_w16_MS_42 Q: 3

	Answer	Mark	Partial Marks
(a)	cortex; medulla; ureter;	3	
(b)(i)	renal artery;	1	
(b)(ii)	renal vein;	1	
(c)	1 filters, blood / plasma; 2 (filtration occurs) in the glomerulus; 3 reabsorption of (named) useful substances; *removes / excretes / loses* 4 (named) nitrogenous waste; e.g. urea 5 excess, (named) salt(s) / mineral(s) / ion(s); 6 (named) hormones; 7 excess water;	4	
(d)(i)	chemical / substance, secreted / produced / released, by a (endocrine) gland; into the blood / carried in the blood; controls / regulates / affects, (activity of) target organ(s);	3	**R** impulse(s)
(d)(ii)	testis / testes;	1	
(d)(iii)	anabolic (steroid); promotes protein synthesis; promotes, growth / strength, of muscle (tissue); makes people more, aggressive / competitive / AW; AVP; e.g. ref to bone density / bone mass / changes body composition	2	
(e)	12.5 (ng cm^{-3});;	2	*working* *either* after 7 days it has fallen from 50 to 25 ng cm^{-3}, after another 7 days it has fallen to 12.5 ng cm^{-3} *or* decreases by ½ × ½ = ¼, ¼ × 50 = 12.5 (ng cm^{-3}) *or* $\frac{50}{2\times2} = 12.5$(ng cm^{-3})
		Total: 17	

13. 0610_w16_MS_43 Q: 4

	Answer	Mark	Partial Marks
(a)	(nicotine is) a (chemical) substance taken into the body; that modifies / affects / influences, (chemical reactions in) the body; addictive / can cause withdrawal symptoms (when stopped) / AW;	2	
(b)	*carbon monoxide:* binds to haemoglobin (permanently); Accept carboxyhaemoglobin reduced oxygen (transport); *tar (max 3):* carcinogenic / causes lung cancer; sticks to / blocks / damages, alveoli / cilia; produce more mucus; making prone to (named) respiratory infections; reduced, diffusion / gas exchange;	4	**A** irritates, gas exchange surface / airways / emphysema
(c)(i)	1 more men smoked (between 1950–1998 than women); ORA 2 both decrease overall / between 1950 and 1998; 3 (overall) drop in men is more (than in women); ORA Ignore data 4 (1950)–1970: men decreasing and women increasing; 5 1970 onwards : both genders decreasing; 6 larger difference in numbers / %, before 1970s / earlier OR smaller difference in numbers / %, after 1970s / later; AW 7 maximum (implied) for women was 50% and 82% for men; 8 comparative data quote between men and women with units stated once;	4	
(c)(ii)	number of deaths by (lung) cancer shows similar trend as percentage smokers; (correlation) in both men and women / AW; lag in the death rate trend (compared with smokers) / AW; relevant data quote from both graphs; trend more obvious in men / death rate in women is increasing overall; impossible to show conclusive link; (because) cannot control experimental conditions / other lifestyle factors; AVP;	4	e.g. lag in/ drop of 7–8 years in men
(d)	toxins / AW, in smoke can cross the placenta; increased risk, of miscarriage / still birth / premature birth / low birth weight / deformities; reduces oxygen available to the foetus / foetal brain damage; increased risk, of reduced lung, function / infection, in foetus / infants; babies more likely to become addicted / have withdrawal symptoms; AVP;	3	
		Total: 17	