

Gas Exchange and Smoking

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Gas Exchange and Smoking
Sub Topic	
Booklet	Multiple Choice
Paper Type	Question Paper 2

Time Allowed : 48 minutes

Score : / 40

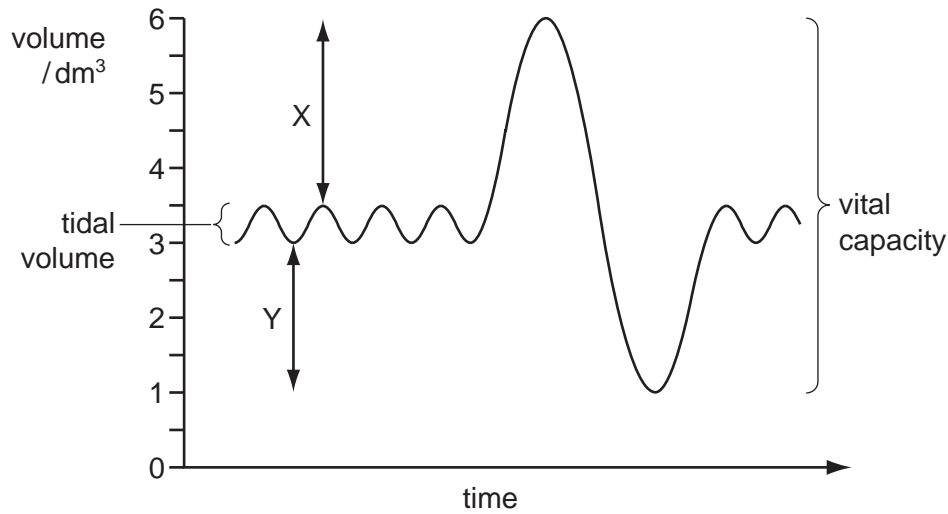
Percentage : /100

Grade Boundaries:

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

- 1 Which statement is an example of epidemiological evidence linking smoking to lung cancer?
- A Chemical analysis of tar from cigarettes shows that it contains carcinogens.
 - B Dogs made to inhale the smoke from cigarettes develop lung tumours.
 - C The incidence of lung cancer increases in a population as more cigarettes are smoked.
 - D When tar from cigarettes is rubbed onto the skin of mice, the mice develop skin tumours.

2 The diagram shows a spirometer trace with tidal volume and vital capacity.



What happens to the volumes labelled X and Y during moderate exercise?

	volume X	volume Y
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

3 Which component of cigarette smoke makes blood platelets more sticky and therefore increases the risk of blood clot formation?

- A carbon monoxide
- B carcinogens
- C nicotine
- D tar

4 When a person suffers an asthma attack, the tubes of the gas exchange system narrow and extra mucus is produced.

Which of these changes occur during an asthma attack?

- 1 Activity of ciliated epithelium increases.
- 2 Endocytosis in goblet cells increases.
- 3 Smooth muscles respire faster.

A 1 and 2 only B 1 and 3 only C 2 and 3 only D 1, 2 and 3

5 When mucus is secreted from a goblet cell in the trachea, these events take place.

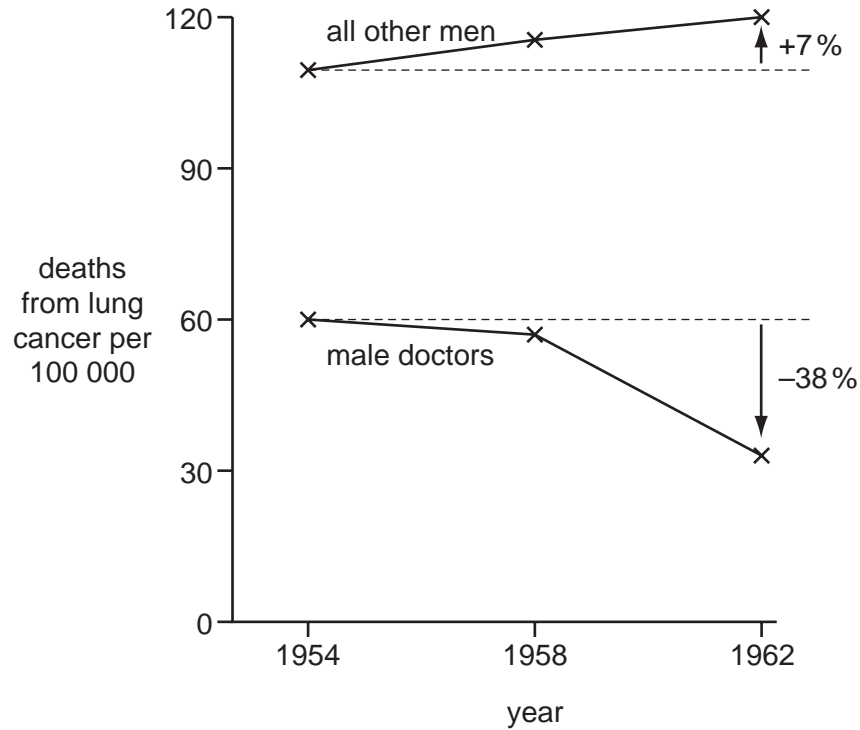
- 1 addition of carbohydrate to protein
- 2 fusion of the vesicle with the plasma membrane
- 3 secretion of a glycoprotein
- 4 separation of a vesicle from the Golgi apparatus

What is the sequence in which these events take place?

- A 1 → 4 → 2 → 3
- B 1 → 4 → 3 → 2
- C 4 → 1 → 2 → 3
- D 4 → 1 → 3 → 2

- 6 Between 1954 and 1958 many doctors read a report that linked smoking cigarettes to deaths from lung cancer.

The graph shows deaths from lung cancer among male doctors and 'all other men' in England and Wales between 1954 and 1962.



Which statements best explain the changes in deaths from lung cancer between 1954 and 1962?

- 1 'All other men' are more at risk of dying from lung cancer than male doctors.
- 2 Male doctors are more at risk of dying from lung cancer than 'all other men'.
- 3 Proportionally more 'all other men' gave up smoking than male doctors.
- 4 Proportionally more male doctors gave up smoking cigarettes than 'all other men'.

- A** 1 and 3 **B** 2 and 3 **C** 2 and 4 **D** 1 and 4

7 Which component of tobacco smoke affects blood pressure?

- A carbon dioxide
- B carbon monoxide
- C nicotine
- D tar

8 Which tissues are present in a bronchus?

	cartilage	ciliated epithelium	smooth muscle
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

9 How would health improve if a person suffering from mild emphysema stopped smoking cigarettes?

- A goblet cells secrete more mucus, allowing a greater number of pathogens to be trapped
- B increased numbers of phagocytic macrophages arrive in the lungs
- C less atheroma build-up on the inner lining of arteries, increasing lumen diameter
- D less carboxyhaemoglobin produced, increasing oxygen transport by haemoglobin

10 What correctly describes the cause and effect of carcinogens on lung tissue?

- A** Cells of the alveoli walls divide more rapidly than normal by reduction division causing a tumour to develop.
- B** Cilia are paralysed, mucus accumulates in the lungs, causing DNA to change, reduction division and a tumour to develop.
- C** DNA changes, causing bronchial epithelial cells to divide in an uncontrolled way by mitosis and a tumour to develop.
- D** Haemoglobin carries less oxygen, causing bronchial cells to divide in an uncontrolled way by mitosis and a tumour to develop.

11 What is a correct description of part of the respiratory system?

	part of respiratory system	cartilage present	ciliated epithelium present	goblet cells present	smooth muscle present
A	alveolus	x	✓	x	x
B	bronchus	✓	✓	✓	✓
C	bronchiole	x	✓	✓	x
D	trachea	✓	✓	✓	x

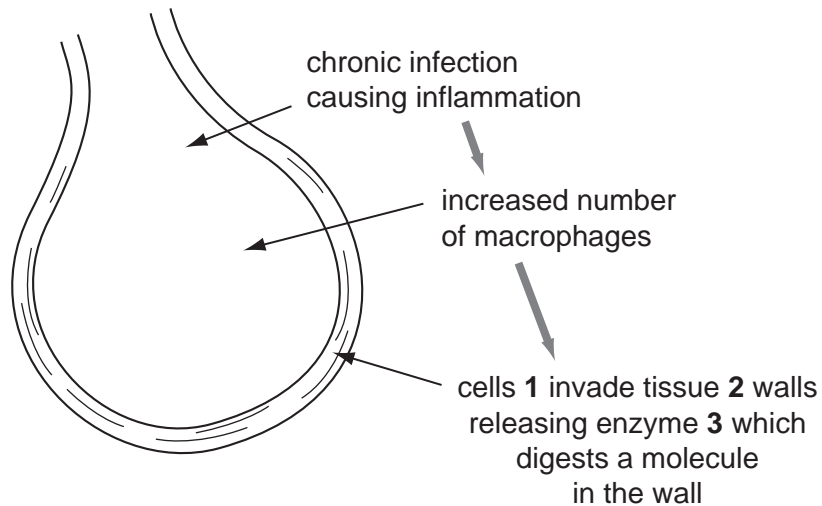
12 Which statement describes the vital capacity of a human lung?

- A** the additional volume of air that can be exhaled after breathing out normally
- B** the additional volume of air that can be inhaled after breathing in normally
- C** the volume of air inhaled and then exhaled during a single tidal breath
- D** the volume of air that can be exhaled following a maximum inhalation

- 13 Which correctly shows the areas of the respiratory tract that contain cartilage, goblet cells, smooth muscle and cilia (ciliated epithelium)?

	cartilage	goblet cells	smooth muscle	cilia
A	bronchus bronchiole	alveoli bronchiole	bronchus alveoli	bronchus bronchiole
B	trachea bronchus	bronchiole alveoli	bronchus bronchiole	trachea bronchus
C	trachea bronchiole	trachea bronchus	trachea alveoli	bronchiole alveoli
D	trachea bronchus	trachea bronchus	bronchus bronchiole	trachea bronchiole

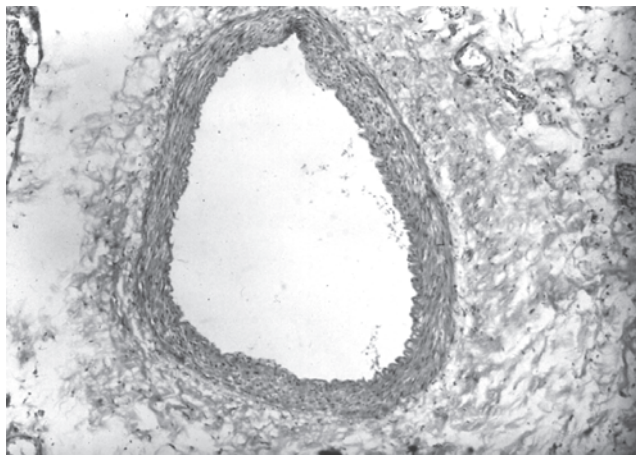
- 14 The diagram shows stages in the development of the disease emphysema.



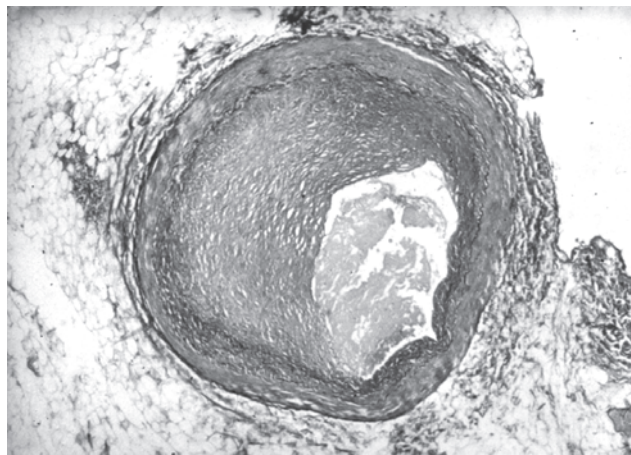
What is correct for 1, 2 and 3?

	1	2	3
A	lymphocytes	alveoli	elastase
B	lymphocytes	bronchiole	ligase
C	phagocytes	alveoli	elastase
D	phagocytes	bronchiole	ligase

15 The photomicrographs show an artery from a non-smoker and a smoker.



non-smoker



smoker

What is the reason that the smoker's artery looks like this?

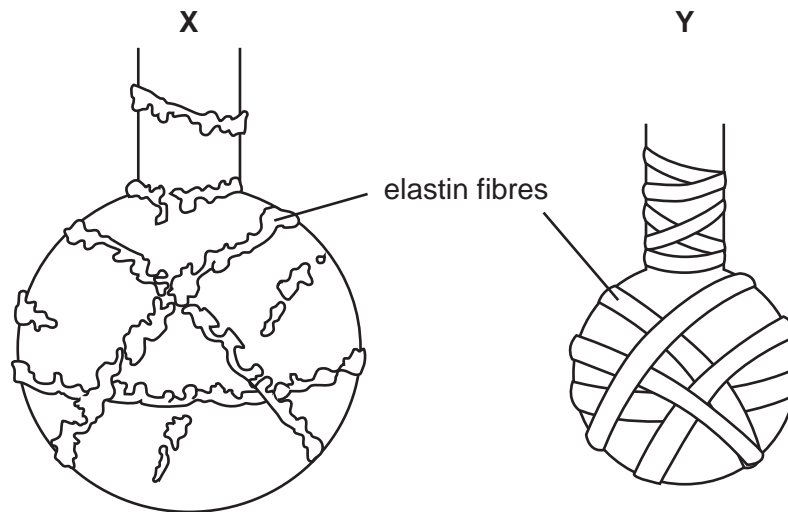
- A A cancerous tumour has formed and is blocking the lumen.
- B Nicotine has damaged the artery endothelium causing a plaque.
- C Tar has stuck to the artery wall forming a blockage.
- D The artery has become constricted due to carbon monoxide.

16 What are the approximate diameters of a trachea, an alveolus, a bronchiole and a bronchus?

	trachea / mm	alveolus / mm	bronchiole / mm	bronchus / mm
A	18	0.25	0.50	12
B	18	0.50	0.25	12
C	12	0.25	0.50	18
D	12	0.50	0.25	18

- 17 What is an effect of inhaling tobacco smoke?
- A decreased mucus production by goblet cells
 - B increased movement of cilia in bronchial epithelium
 - C reduced oxygen transport by blood
 - D thinning of bronchial epithelium

- 18 The diagram shows two alveoli.



A cigarette smoker has more alveoli like **X** and fewer like **Y**.

From which disease does he suffer?

- A atherosclerosis
 - B chronic bronchitis
 - C emphysema
 - D lung cancer
- 19 How does nicotine in cigarette smoke increase the risk of cardiac disease?
- A by binding with haemoglobin
 - B by constricting blood vessels
 - C by inhibiting nerve transmission
 - D by stimulating the pacemaker

20 What are the causative agents of cholera, malaria and TB?

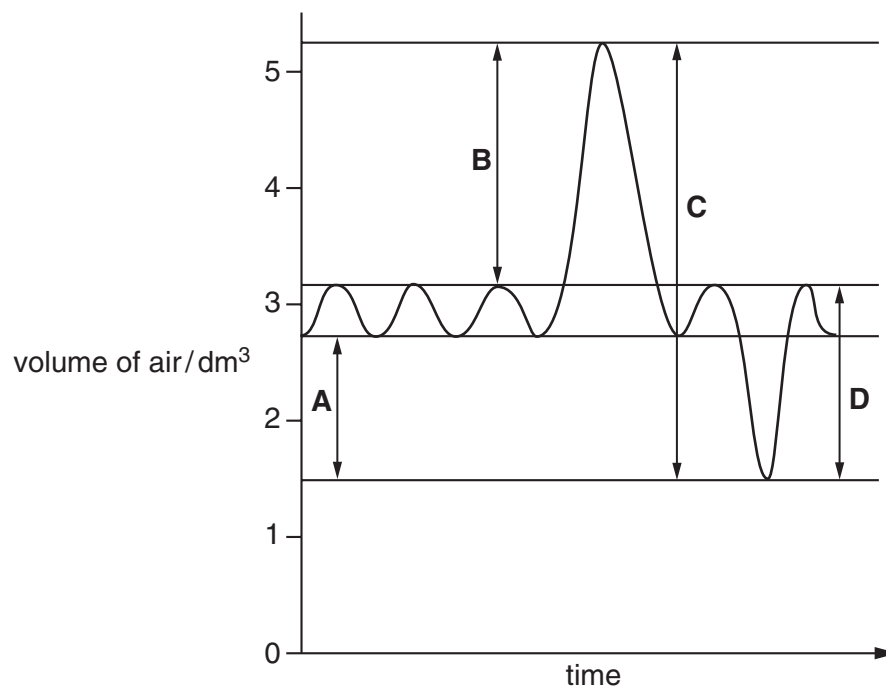
	cholera	malaria	TB
A	bacterium	insect	virus
B	bacterium	protozoan	bacterium
C	virus	insect	virus
D	virus	protozoan	bacterium

21 Which tissues are present in the walls of a trachea and an alveolus?

		tissue		
		cartilage	epithelium with goblet cells	smooth muscle
A	trachea	✓	✓	✓
	alveolus	✓	✓	x
B	trachea	✓	✓	✓
	alveolus	x	x	x
C	trachea	✓	✓	x
	alveolus	x	✓	✓
D	trachea	✓	✓	✓
	alveolus	x	x	✓

22 The diagram shows the changes in human lung volume obtained using a spirometer.

Which part of the trace represents the vital capacity?



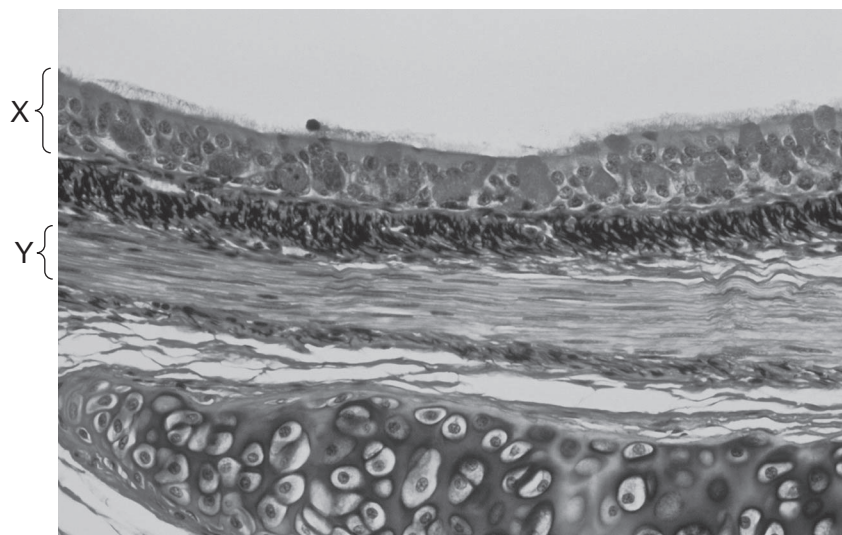
23 Which component of tobacco smoke affects blood pressure?

- A carbon dioxide
- B carbon monoxide
- C nicotine
- D tar

24 Which row is correct for the pulmonary vein?

	blood carried	muscle in walls	lumen size
A	deoxygenated	thick	small
B	deoxygenated	thin	large
C	oxygenated	thick	small
D	oxygenated	thin	large

25 The photomicrograph shows a cross-section through a bronchus.



What is the function of the tissues X and Y?

	X	Y
A	secrete mucus	prevent collapse of the airway
B	support the airway	dilate airway
C	trap dust and dirt	secrete mucus
D	waft dust and dirt upwards	constrict airway

26 Which component(s) of tobacco smoke cause an increase in blood pressure and clot formation?

1 carcinogens

2 nicotine

3 tar

A 1, 2 and 3 **B** 1 and 3 only **C** 2 and 3 only **D** 2 only

27 Peak Flow is used in hospitals to diagnose some lung diseases. It measures the maximum rate at which air can be breathed out from the lungs.

How will the Peak Flow for a person with emphysema differ from that for a healthy person?

A It falls as carbon monoxide reduces oxygen-carrying capacity of the blood.

B It falls as elastic fibres are damaged in the alveoli.

C It remains constant as the damage to the lungs does not affect the lung volume.

D It rises as larger air spaces make it easier for the air to flow.

28 Which are effects on the body of carbon monoxide in tobacco smoke?

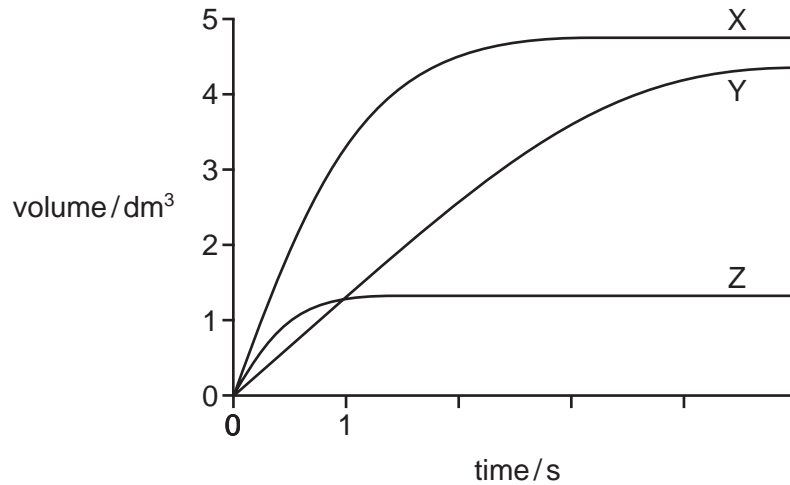
1 It reduces the amount of haemoglobin available to transport oxygen.

2 It reduces the rate of diffusion of oxygen from the alveoli into the blood.

3 It inhibits the release of oxygen from haemoglobin.

A 1, 2 and 3 **B** 2 and 3 only **C** 1 only **D** 3 only

- 29 The graph shows the volume of air breathed out quickly and with force, following a deep breath in, for three different people, X, Y and Z.



What is a possible explanation for the differences in the volume of air breathed out by these people shown?

	chronic bronchitis	emphysema	normal lung function
A	X	Z	Y
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

- 30 Which flow diagram correctly describes the effect of tar entering the lungs?

- A** carcinogens come into contact with DNA → mutation occurs → uncontrolled cell division → mass of cells produced
- B** goblet cells secrete more mucus → mucus accumulates causing infection → phagocytes attracted by inflammation → causes irritation and coughing
- C** goblet cells secrete more mucus → mutation occurs → phagocytes attracted by inflammation → mass of cells produced
- D** phagocytes attracted by inflammation → mutation occurs → uncontrolled cell division → elastase destroys the alveolar walls

- 31 Which row correctly shows the areas of the gas exchange system that contain cartilage, ciliated epithelium, goblet cells and smooth muscle?

	cartilage	ciliated epithelium	goblet cells	smooth muscle
A	bronchiole, trachea	bronchiole, trachea	bronchus, trachea	bronchiole, trachea
B	bronchus, trachea	bronchiole, bronchus	bronchus, trachea	bronchiole, trachea
C	bronchiole, trachea	bronchus, trachea	bronchiole, bronchus	bronchiole, bronchus, trachea
D	bronchus, trachea	bronchiole, bronchus, trachea	bronchus, trachea	bronchiole, bronchus, trachea

- 32 Which observation would indicate a difference between the structure of the gas exchange system of a cigarette smoker and a non-smoker?

- A** absence of ciliated epithelium
- B** decrease in elastic fibres
- C** enlargement of goblet cells
- D** increase in smooth muscle

- 33 Asthma is a lung disease triggered by the inhalation of an allergen such as pollen or dust. The allergen triggers;

- bronchi and bronchioles to become inflamed and narrow
- goblet cells lining these airways to secrete excess mucus.

Which effects will these responses have on the gaseous exchange system of a person with asthma?

- 1 decrease the diffusion gradient for oxygen in the lungs
- 2 increase the diffusion distance from the alveoli into the blood
- 3 increase the risk of developing a lung infection

- A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

34 What correctly describes the effect of carcinogens on lung tissue?

- A** Cells of the alveoli walls divide more rapidly than normal by reduction division causing a tumour to develop.
- B** Cilia are paralysed and mucus accumulates in the lungs, causing DNA to change and a tumour to develop.
- C** DNA changes, causing bronchial epithelial cells to divide by mitosis in an uncontrolled way, causing a tumour to develop.
- D** Haemoglobin carries less oxygen, causing bronchial cells to divide by mitosis in an uncontrolled way, causing a tumour to develop.

35 A disease damages alveoli walls.

What effect does this have on the gas exchange surface area and on the volume of the lungs?

	surface area	volume
A	decreased	decreased
B	decreased	increased
C	decreased	no change
D	no change	no change

36 Which is a correct description of part of the gas exchange system?

	part of gas exchange system	cartilage	ciliated epithelium	goblet cells	smooth muscle
A	alveolus	x	✓	x	x
B	bronchus	✓	✓	✓	✓
C	bronchiole	x	✓	✓	x
D	trachea	✓	✓	✓	x

key

✓ present

x absent

37 Goblet cells are found in the trachea.

Which organelles would be found in large numbers in a goblet cell?

- 1 lysosomes
- 2 mitochondria
- 3 rough endoplasmic reticulum
- 4 secretory vesicles

- A** 1, 2 and 3 only
- B** 2, 3 and 4 only
- C** 1 and 3 only
- D** 2 and 4 only

38 Which tissues are present in a bronchus?

	cartilage	ciliated epithelium	smooth muscle
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

key
 ✓ present
 x absent

39 Which statements are correct effects of tar in tobacco smoke on the human gas exchange system?

	goblet cells are stimulated to secrete more mucus	mucus glands in the trachea are enlarged	mutations may occur in epithelial cells forming tumours	the activity of cilia in the airways is inhibited
A	✓	✓	x	x
B	x	✓	✓	✓
C	✓	✓	✓	✓
D	✓	x	✓	✓

key
 ✓ correct
 x not correct

40 Goblet cells are found in the trachea.

Which organelles would be found in large numbers in a goblet cell?

	Golgi apparatus	mitochondria	ribosomes
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

key

✓ = present in large numbers

x = not present in large numbers