

Past-paper walk-through

The gas exchange system ■ 9.1

eXercise

Questions in this set

- 9700/11 N25 Q34 ■ 1 mark
- 9700/11 N25 Q35 ■ 1 mark
- 9700/12 N25 Q36 ■ 1 mark
- 9700/12 N25 Q37 ■ 1 mark
- 9700/13 N25 Q34 ■ 1 mark
- 9700/14 N25 Q35 ■ 1 mark
- 9700/21 N25 Q6 ■ 9 marks
- 9700/24 N25 Q4 ■ 8 marks

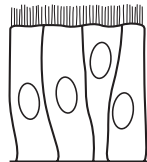
Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 34

9700/11 N25 ■ Q34 ■ 1 mark

- 34** Two types of epithelial cells, 1 and 2, occur in the mammalian gas exchange system in a healthy human.



Question 34

1

2

Which row shows the function and distribution of these types of epithelial cells?

	cell type 1	cell type 2
A	absorption in bronchi	secrete mucus in alveoli
B	exchange surface in alveoli	secrete mucus in bronchi
C	absorption in bronchi	move mucus in alveoli
D	exchange surface in alveoli	move mucus in bronchi

Solution 34

Answer: **D**

Why

- Squamous epithelium is extremely thin, which suits the alveoli where gases must diffuse quickly.
- Ciliated epithelium lines the airways, where it sweeps mucus upwards.
- So match the flat thin cell to the alveolus and the ciliated cell to the bronchi.

Question 35

9700/11 N25 ■ Q35 ■ 1 mark

35 Which tissues would be seen in a photomicrograph of the wall of the trachea?

	elastic fibres	smooth muscle
A	x	✓
B	✓	x
C	✓	✓
D	x	x

key

✓ = present

x = **not** present

Solution 35

Answer: **C**

Why

- The trachea wall contains both elastic fibres, which let it stretch and recoil, and smooth muscle, which alters its diameter.
- Cartilage rings hold it open, but the question asks only about these two tissues.
- Both are present.

Question 36

9700/12 N25 ■ Q36 ■ 1 mark

- 36** The diagram shows parts of the gas exchange system in humans and the associated cells or structures.

alveolus

ciliated cells

bronchiole

squamous epithelial cells

bronchus

C-shaped rings of cartilage

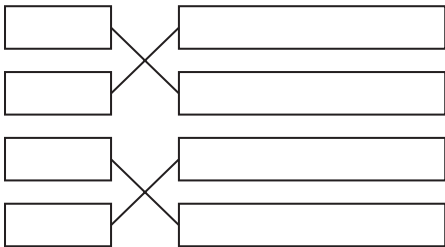
Question 36

trachea

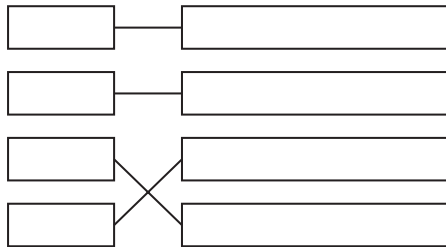
ciliated cells and goblet cells

Which diagram shows the lines that correctly match the parts to their cells or structures?

A

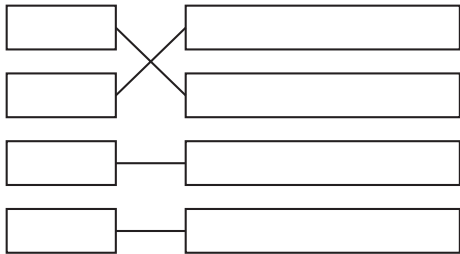


B

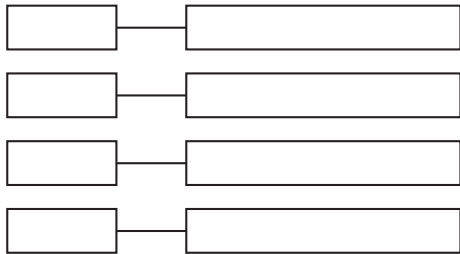


Question 36

C



D



Solution 36

Answer: **A**

Why

- Follow the airway inwards: trachea, bronchus, bronchiole, alveolus.
- Cartilage rings hold the trachea and bronchi open but disappear in the bronchioles.
- Ciliated and goblet cells line the airways, while alveoli have thin squamous epithelium.

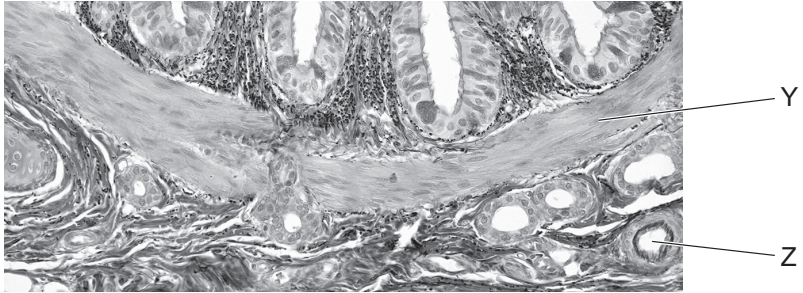
Question 37

9700/12 N25 ■ Q37 ■ 1 mark

37 The photomicrograph shows the wall of a bronchus as seen with a light microscope.



Question 37



Question 37



Which row correctly identifies the structures labelled?

	X	Y	Z
A	epithelium	elastic fibres	bronchiole
B	endothelium	smooth muscle	bronchiole
C	epithelium	smooth muscle	blood vessel
D	endothelium	elastic fibres	blood vessel

Solution 37

Answer: **C**

Why

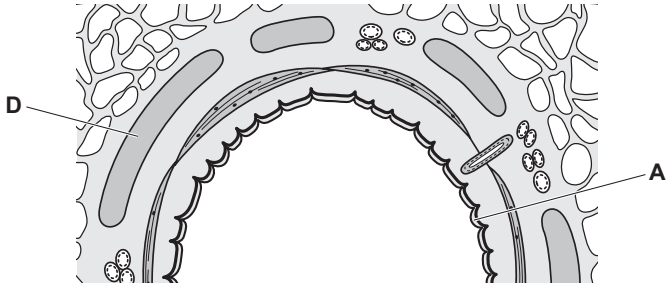
- The lining of an airway is *epithelium*; endothelium lines blood vessels.
- Below it sits smooth muscle, which alters the airway diameter.
- Any small tube with a lining of its own and blood inside is a blood vessel, not a bronchiole.

Question 34

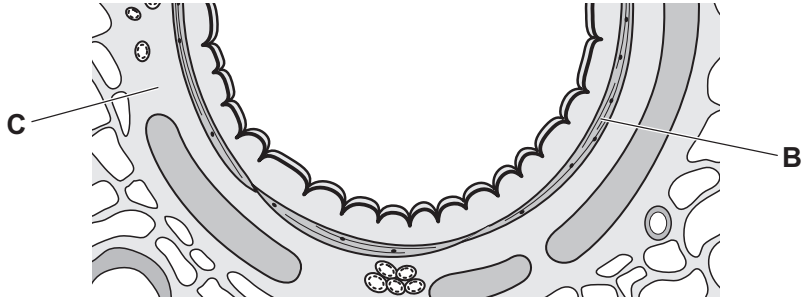
9700/13 N25 ■ Q34 ■ 1 mark

34 The diagram shows a transverse section through a human bronchus.

Which labelled tissue is the cartilage?



Question 34



Solution 34

Answer: **D**

Why

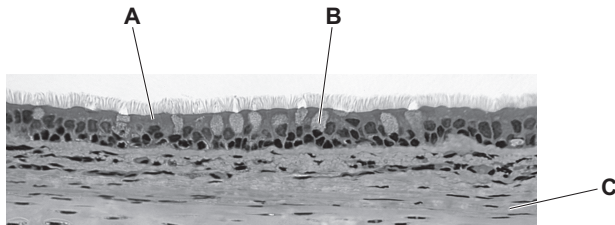
- The bronchus wall has a lining epithelium, then smooth muscle, then cartilage plates.
- Cartilage stains differently and sits as irregular blocks towards the outside.
- It is there to hold the airway open, so look for the outermost supporting tissue.

Question 35

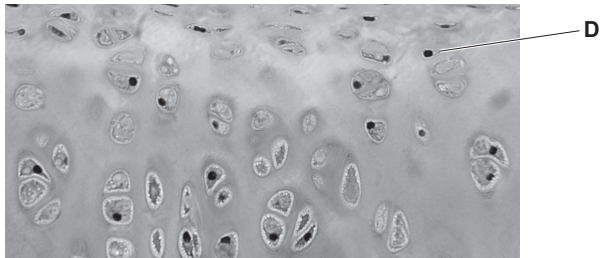
9700/14 N25 ■ Q35 ■ 1 mark

35 The photomicrograph shows a transverse section of part of the human gas exchange system.

Which row shows the correct name and function of one of the labelled structures in the photomicrograph?



Question 35



	name	function
A	ciliated epithelial cell	traps particles
B	goblet cell	secretes mucus
C	cartilage	prevents collapse of trachea
D	smooth muscle	contracts to expand airways

Question 35

D	smooth muscle	contracts to expand airways
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Solution 35

Answer: **B**

Why

- A goblet cell is shaped like a wine glass and stains for the mucus it holds.
- It secretes the mucus that traps particles.
- The ciliated cells then sweep that mucus away – trapping and sweeping are different jobs.

Question 6

9700/21 N25 ■ Q6 ■ 9 marks

- 6 (a)** Alveolar macrophages are phagocytes found in the human gas exchange system. They produce hydrolytic enzymes, such as lysozyme, to digest pathogens entering the alveolus.
- (i)** State the term used to describe the sequence of nucleotides in the DNA of the alveolar macrophage that codes for a protein, such as lysozyme.

Question 6

- (ii) Synthesis of lysozyme occurs in two stages. The first stage occurs in the nucleus using one strand of DNA to synthesise mRNA.

State the name of the strand of DNA that is used to synthesise mRNA.

Question 6

- (iii) Name the organelle where the translation of mRNA takes place to produce lysozyme.

Question 6

- (iv) Lysozyme destroys bacterial cells by hydrolysing bonds in peptidoglycan.

Explain how the hydrolysis of bonds in peptidoglycan leads to the destruction of bacterial cells.

Question 6

- (b) (i)** Alveolar macrophages are found in contact with squamous epithelial cells in the walls of alveoli.

Explain how the cells lining the alveoli are adapted for gas exchange.

Question 6

- (ii) Describe the role of elastic fibres in the wall of an alveolus.

Question 6

[Total: 9]

Solution 6

(a)(i)

Mark scheme

- gene ;
- 1

(a)(ii)

Mark scheme

- transcribed / template, strand ;
- 1

Solution 6

(a)(iii)

Mark scheme

- ribosome ; I 70S / 80S
- 1

Solution 6

(a)(iv)

Mark scheme

- weakens / AW, bacterial cell wall ;
- cell cannot maintain turgor / AW ;
- leads to (osmotic) lysis / AW ;
- 2

Solution 6

(b)(i)

Mark scheme

- flattened cells / AW ;
- short diffusion distance, (for gas exchange / described) ;
- 2

Solution 6

(b)(ii)

Mark scheme

- stretch / expand, on inhalation, to prevent alveoli bursting / rupturing / overstretching ;
- recoil on exhalation to help expel air from the lungs ;
- if no marks gained, allow one mark for stretch and recoil
- 2

Question 4

9700/24 N25 ■ Q4 ■ 8 marks

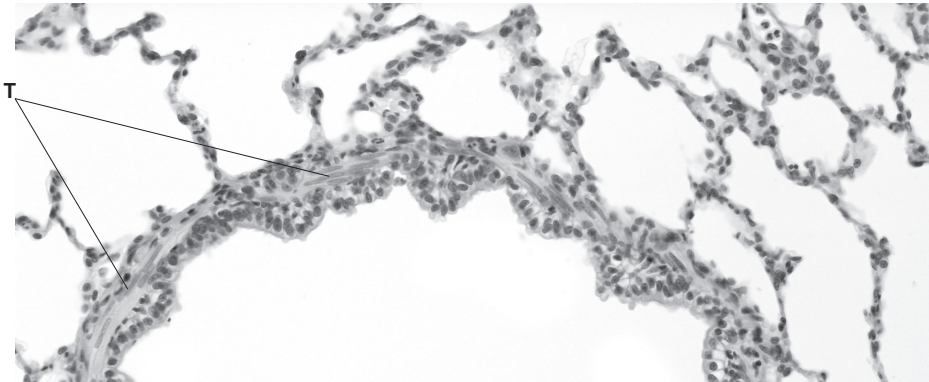
- 4** In mammals, the gas exchange system includes a set of branching airways that carry air to and from the gas exchange surface.

Air from the external atmosphere passes through different types of airway to reach the gas exchange surface.

- (a)** Name the type of airway of the gas exchange system that branches into airways known as bronchioles.

Question 4

(b) Fig. 4.1 is a photomicrograph of a section through a bronchiole.



Question 4

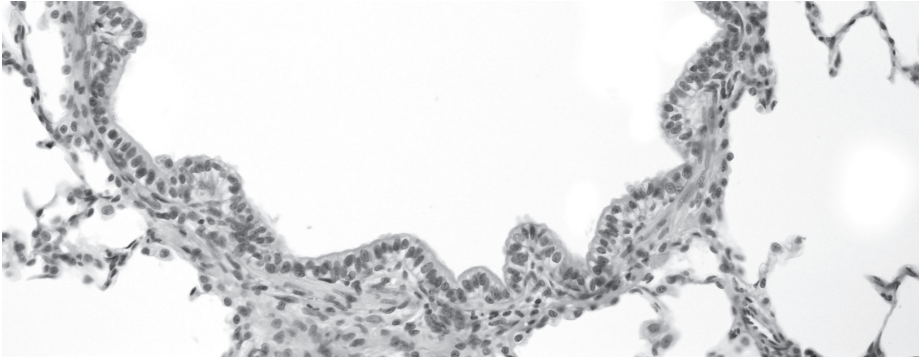


Fig. 4.1

- (i) The bronchiole shown in Fig. 4.1 is **not** part of the gas exchange surface.

Question 4

Name **one** structure in the gas exchange system, **visible in Fig. 4.1**, where gas exchange is carried out.

Question 4

(ii) Name the type of cell found in the tissue labelled **T** in Fig. 4.1.

Question 4

- (iii) State the features that help to identify the type of airway shown in Fig. 4.1 as a bronchiole and **not** the other types of airway present in the gas exchange system.

Question 4

(c) Blood is pumped to the lungs in the pulmonary circulation.

The lungs also receive a supply of blood from the systemic circulation.

Explain why the pulmonary circulation **and** the systemic circulation need to supply blood to the lungs.

Question 4

[Total: 8]

Solution 4

(a)

Mark scheme

- bronchus ;
- 1

Solution 4

(b)(i)

Mark scheme

- alveolus ;
- A alveolar sac / alveolar duct
- 1

Solution 4

(b)(ii)

Mark scheme

- smooth muscle (cell) ;
- 1

Solution 4

(b)(iii) Mark scheme

- any three from:
- no cartilage ;
- A no, cartilage rings / C-shaped cartilage
- A no, irregular cartilage / cartilage plates
- few / no, goblet cells ; ora trachea / bronchus, have (more) goblet cells
- thin layer / patches / areas, of smooth muscle ; ecf from (b)(ii)
- A idea of quantity of smooth muscle less (than in, trachea / bronchus)
- thin(ner) wall ;

Solution 4

- (more) convoluted / wavy, lumen lining ; AW
- e.g. folded / curvy
- A lumen lining not smooth
- less, elastic, tissue / fibres, (than, trachea / bronchus) ;
- AVP ; e.g. ciliated epithelium not, pseudostratified / layered appearance
- in context of the trachea / larger bronchi
- no mucous glands present
- 3
- 9700/24
- October/November 2025

Solution 4

(c) Mark scheme

- any two from:
- allow O₂ for oxygen and CO₂ for carbon dioxide
- systemic circulation (needed) to bring, oxygen / glucose, and pulmonary circulation brings deoxygenated blood ;
- idea that lungs are location, of gas exchange (surface) / where absorption of oxygen occurs / where excretion of
- carbon dioxide occurs
- or

Solution 4

- pulmonary circulation for, oxygen uptake / carbon dioxide excretion ;
- cells need, oxygen / glucose, for (aerobic) respiration / for cell metabolism / AW ;
R body cells
- 2