CAMBRIDGE IGCSE BIOLOGY · 0610

BIOLOGY



EXAM QUESTION PACK

TOPIC 11: GAS EXCHANGE IN HUMANS

SCORE	PERCENTAGE
/	%

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Gas exchange in humans – 2023 November IGCSE 0610

1. Nov/2023 /Paper_ 0610/11/No.21

A

	inspired air	expired air
oxygen	less	more
carbon dioxide	less	more

B

	inspired air	expired air
oxygen	less	more
carbon dioxide	more	less

C

	inspired air	expired air
oxygen	more	less
carbon dioxide	less	more

D

	inspired air	expired air
oxygen	more	less
carbon dioxide	more	less

2. Nov/2023 /Paper_ 0610/11/No.22

What is the site of gas exchange in humans?

A nose

B alveoli

C bronchus

D trachea

3. Nov/2023 /Paper_ 0610/13/No.21

Which row shows the composition of expired air from a healthy person?

	carbon dioxide %	oxygen %	water vapour
A	0.04	21	saturated
B	0.04	16	variable
C	4	21	variable
D	4	16	saturated

4. Nov/2023 /Paper_ 0610/13/No.22

What is the path of carbon dioxide as it leaves the lungs?

A alveolus → bronchiole → bronchus → trachea

B alveolus → bronchus → bronchiole → trachea

C trachea → bronchiole → bronchus → alveolus

D trachea → bronchus → bronchiole → alveolus

5. Nov/2023 /Paper_ 0610/21/No.21

Which table correctly shows the difference in composition of inspired air compared with expired air?

A

	inspired air	expired air
oxygen	less	more
carbon dioxide	less	more

B

	inspired air	expired air
oxygen	less	more
carbon dioxide	more	less

C

	inspired air	expired air
oxygen	more	less
carbon dioxide	less	more

D

	inspired air	expired air
oxygen	more	less
carbon dioxide	more	less

6. Nov/2023 /Paper_ 0610/21,22/No.21

What is the composition of expired air compared with inspired air?

	carbon dioxide	oxygen	water vapour
A	decreased	increased	increased
B	decreased	decreased	increased
C	increased	decreased	decreased
D	increased	decreased	increased

7. Nov/2023 /Paper_ 0610/33/No.4(a _ c)

(a) During inspiration air is taken into the lungs.

Table 4.1 shows the structures that air passes through during inspiration.

The structures are **not** in the correct order.

Table 4.1

A	alveoli
B	bronchi
C	bronchioles
D	larynx
E	nose
F	trachea

Identify the order of structures that air travels through during inspiration.

Write the letters from Table 4.1 in the boxes provided to show the correct order.

One has been done for you.

		F			

[3]

(b) The composition of inspired air is different from the composition of expired air.

Describe the differences in composition between inspired and expired air.

.....

.....

.....

.....

.....

.....

..... [4]

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(c) A student investigated the composition of inspired and expired air.

Fig. 4.1 shows the apparatus that was used.

The student breathed in and out, through the mouthpiece, for 15 seconds.

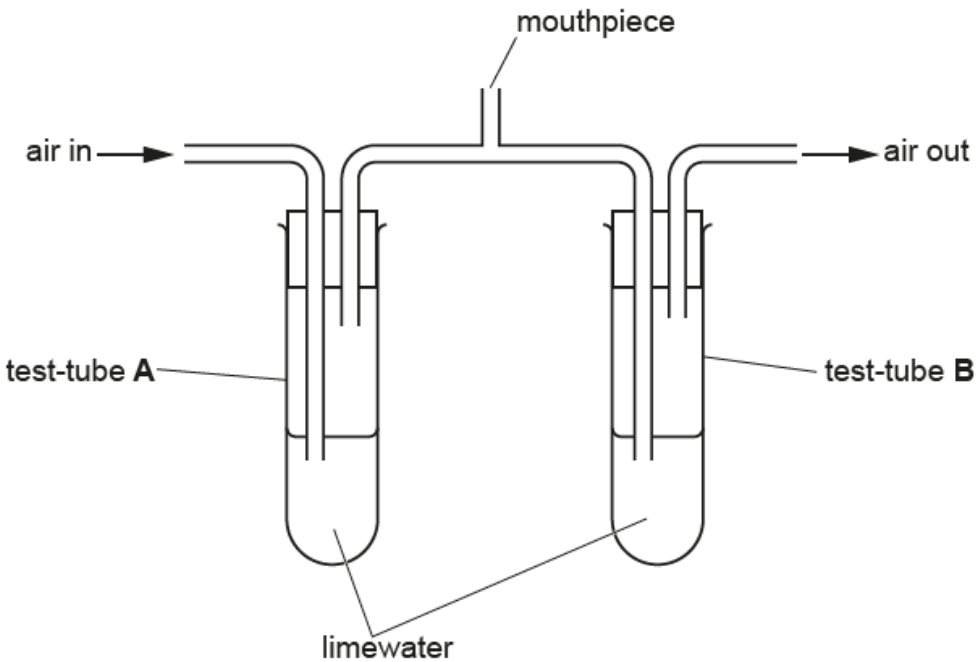


Fig. 4.1

(i) State the name of the gas that can be identified using limewater.

..... [1]

(ii) Using the information in Fig. 4.1, predict what happened to the limewater in test-tube **A** and in test-tube **B**.

test-tube **A** .....

test-tube **B** .....

[2]

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8. Nov/2023 /Paper_ 0610/43/No.3

(a) (i) Complete Table 3.1 by writing in the percentages of carbon dioxide and oxygen in inspired air and in expired air.

Table 3.1

component	percentage in inspired air	percentage in expired air
carbon dioxide		
oxygen		

[2]

(ii) A scientist measured the number of dust particles in inspired air and in expired air.

They found fewer dust particles in expired air.

Suggest a reason for their observation.

.....

.....

..... [1]

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(b) Fig. 3.1 is a diagram of alveoli and associated blood vessels.

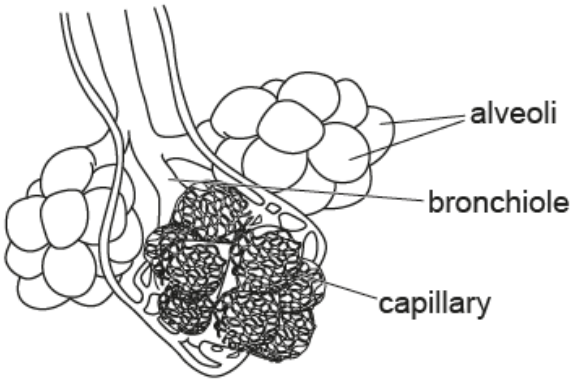


Fig. 3.1

(i) Explain how the structure of a capillary is related to its function.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) State the name of the component of blood that transports oxygen.

..... [1]

(iii) State the name of the blood vessel that transports blood from the heart towards the capillaries in the lungs.

..... [1]

(iv) State the location and function of cartilage in the breathing system.

location .....

function .....

.....

..... [2]

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(c) A student measured the rate and depth of breathing of an athlete for 30 seconds at rest.

The data are shown in Fig. 3.2.

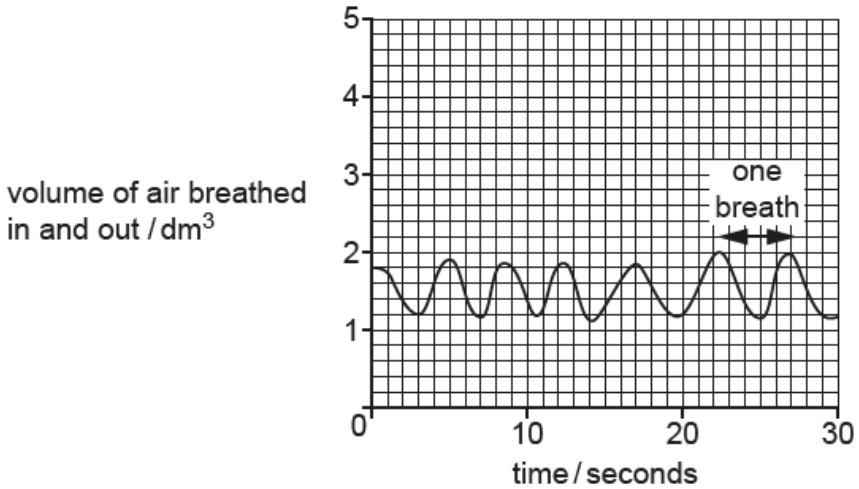


Fig. 3.2

(i) Using the information in Fig. 3.2, calculate the rate of breathing at rest.

..... breaths per minute [1]

The measurements were repeated while the athlete was running on a treadmill.

The data are shown in Fig. 3.3.

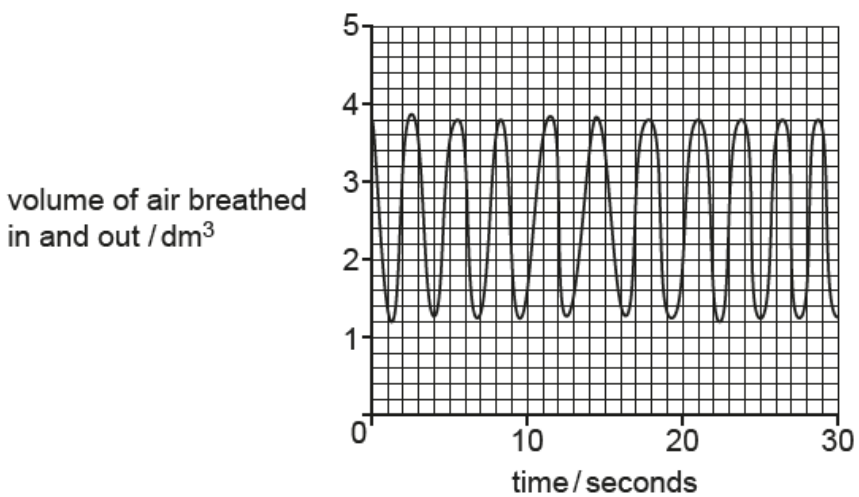


Fig. 3.3

(ii) Using the information in Fig. 3.3, calculate the volume of air inspired in **one** breath from 25 seconds.

..... dm^3 [1]

(iii) Explain the effect of exercise on the rate and depth of breathing shown in Fig. 3.2 and Fig. 3.3.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 16]

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Gas exchange in humans – 2023 June IGCSE Biology 0610

1. June/2023/Paper_0610/11/No.22

What is the pathway of expired air as it travels out of the body?

A alveoli → trachea → bronchiole → bronchi

B alveoli → bronchiole → bronchi → trachea

C trachea → alveoli → bronchiole → bronchi

D trachea → bronchi → bronchiole → alveoli

2. June/2023/Paper_0610/12/No.21

What are features of gas exchange surfaces in animals?

A thick-walled and large surface area

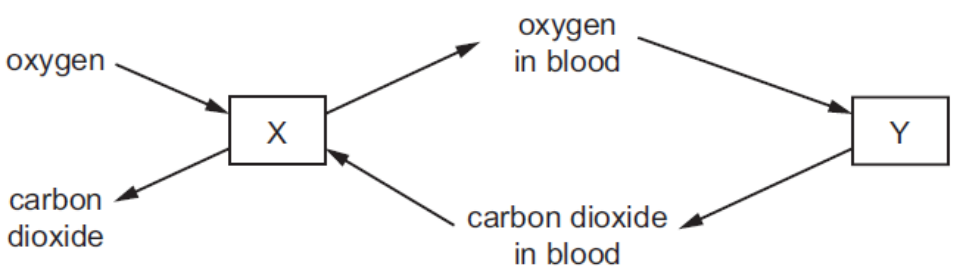
B thick-walled and small surface area

C thin-walled and small surface area

D thin-walled and large surface area

3. June/2023/Paper_0610/12/No.23

The diagram represents the exchange of gases during breathing and during respiration in the body.



What is represented by X?

A heart

B kidneys

C liver

D lungs

4. June/2023/Paper_0610/13/No.21

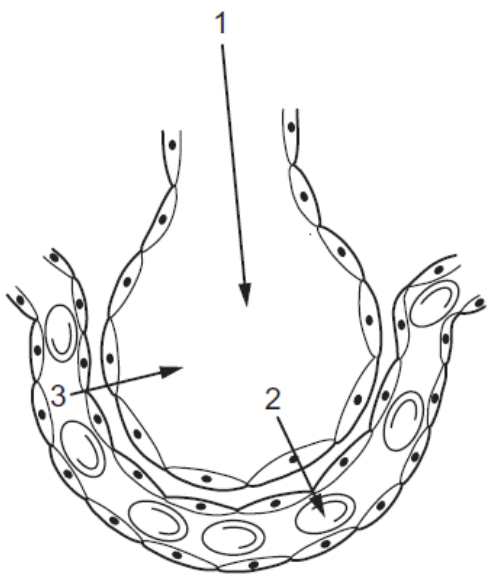
In some animals, gas exchange occurs through the skin.

What are the most likely characteristics of the skin in these animals?

	surface area	skin	blood supply
A	large	thick	poor
B	large	thin	good
C	small	thick	poor
D	small	thin	good

5. June/2023/Paper_0610/13/No.22

The diagram shows an alveolus and part of a blood vessel. The arrows show the direction of movement of gases.



Which arrows represent oxygen only and carbon dioxide only?

	oxygen only	carbon dioxide only
A	1	2
B	1	3
C	2	3
D	3	2

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6. June/2023/Paper_0610/21/No.20

During inspiration, the processes listed take place.

P volume of the thorax increases

Q air rushes into the lungs

R pressure in the thorax decreases

S external intercostal muscles contract

T diaphragm moves down, ribs move upwards and outwards

What is the correct sequence for these processes?

A Q → P → S → R → T

B S → T → P → R → Q

C Q → P → S → T → R

D S → Q → R → P → T

7. June/2023/Paper_0610/22/No.20

Different stages in the process of expiration are listed.

1 Rib cage moves downwards and inwards.

2 Volume of thorax decreases and pressure in lungs increases.

3 Air is pushed out of lungs.

4 Diaphragm and external intercostal muscles relax.

What is the correct order of these stages?

A 1 → 2 → 3 → 4

B 1 → 4 → 2 → 3

C 4 → 3 → 2 → 1

D 4 → 1 → 2 → 3

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8. June/2023/Paper_0610/23/No.20

What happens when a person breathes in?

A The external intercostal muscles and the internal intercostal muscles contract.

B The external intercostal muscles and the internal intercostal muscles relax.

C The external intercostal muscles relax and the internal intercostal muscles contract.

D The external intercostal muscles contract and the internal intercostal muscles relax.

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9. June/2023/Paper_0610/41/No.3

(a) Fig. 3.1 is a photomicrograph of some cells lining the trachea.

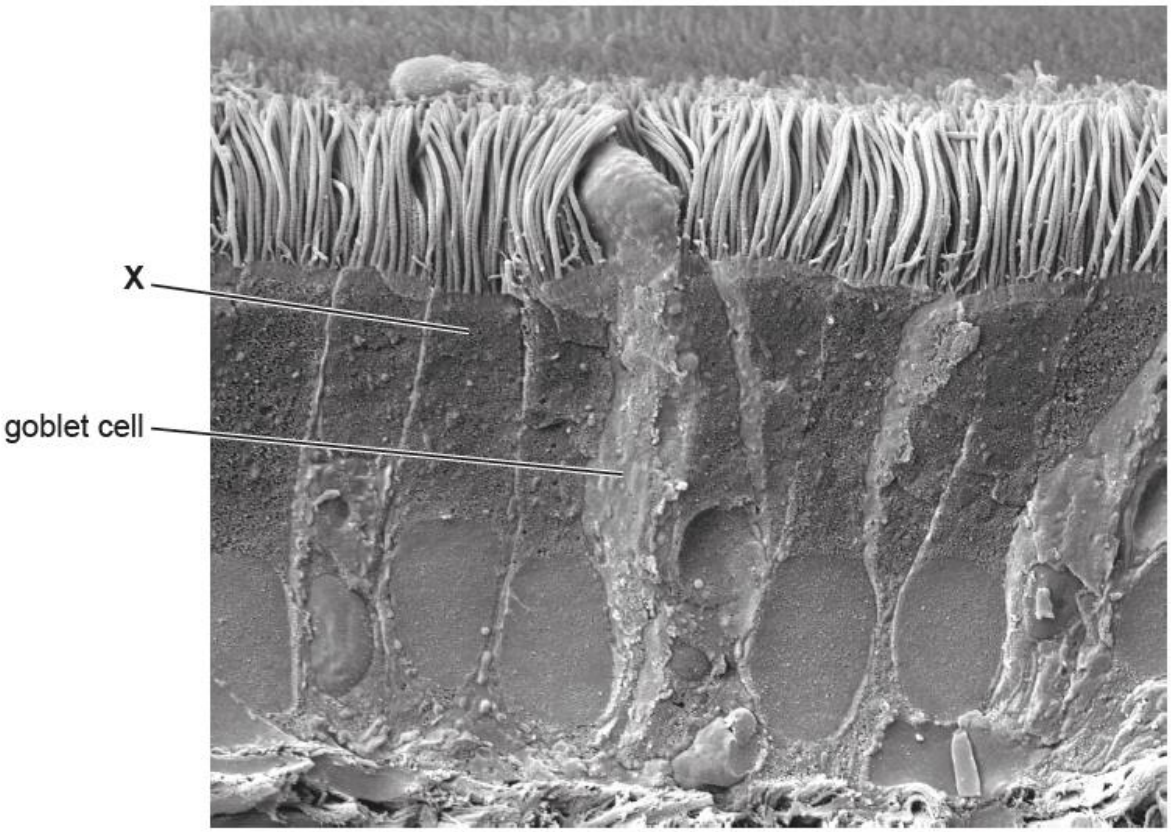


Fig. 3.1

(i) Describe the role of goblet cells.

.....

.....

.....

.....

..... [2]

(ii) Explain how the cell labelled **X** in Fig. 3.1 is adapted for its function.

.....

.....

.....

.....

..... [2]

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(iii) State the name of **one other** part of the body where the type of cell labelled **X** in Fig. 3.1 is found.

..... [1]

(b) Table 3.1 contains some features of the breathing system.

Complete Table 3.1 to show the actions of each feature of the breathing system that occur to cause inspiration.

Table 3.1

feature of the breathing system	action that causes inspiration
diaphragm	.....
external intercostal muscles	.....
pressure in the thorax	.....
ribs	.....
volume of the thorax	.....

[5]

(c) State the name of the gas that is excreted by the breathing system.

..... [1]

(d) Good ventilation is one feature of gas exchange surfaces.

State **two other** features.

1 .....

2 .....

[2]

(e) State the name of the gas exchange surface in humans.

..... [1]

[Total: 14]

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10. March/2023/Paper_ 0610/22/No.20

Which molecule crosses a partially permeable membrane during osmosis?

A carbon dioxide

B oxygen

C urea

D water

11. March/2023/Paper_ 0610/32/No.5

Fig. 5.1 is a diagram of the breathing system in humans.

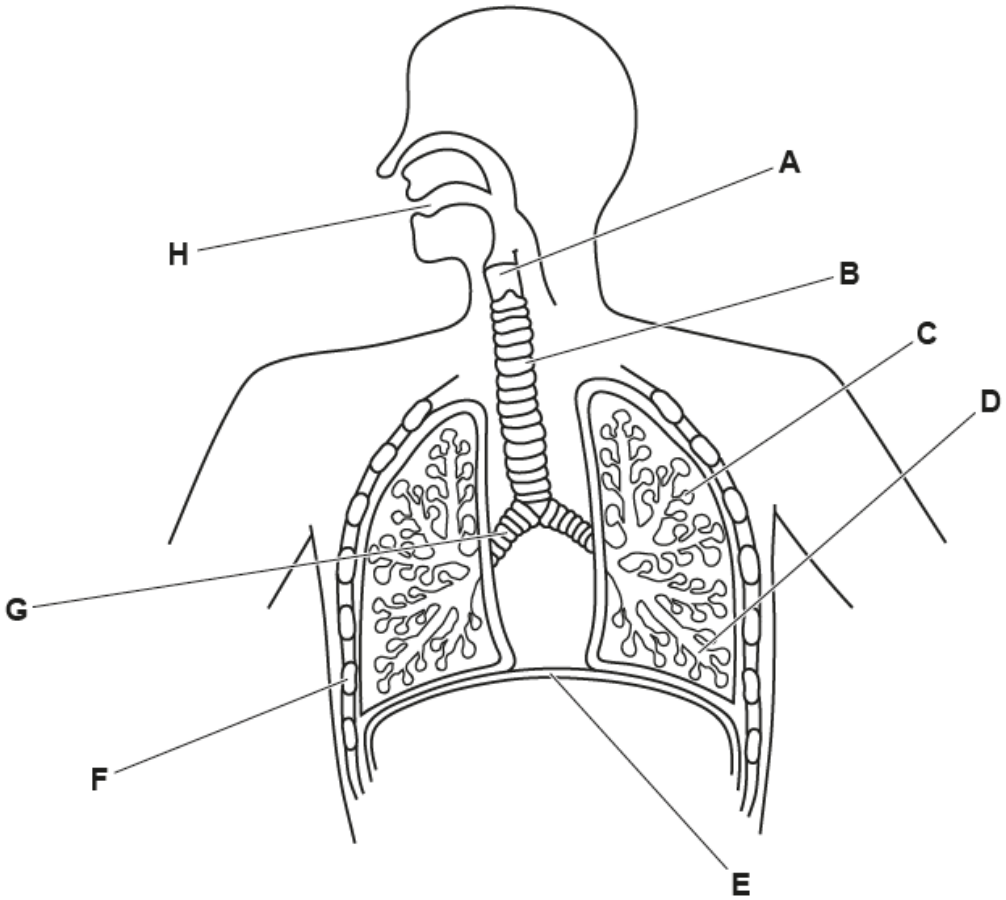


Fig. 5.1

(a) State the names of the parts labelled **A**, **D** and **E** in Fig. 5.1.

A .....

D .....

E .....

[3]

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(b) Part **B** in Fig. 5.1 contains specialised cells that move mucus.

State the name of these specialised cells.

..... [1]

(c) State the letter of a part shown in Fig. 5.1 that also has a role in digestion and name **one** type of digestion that occurs here.

letter .....

type of digestion .....
[2]

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(d) The alveoli are the gas exchange surface.

Scientists estimated the total alveolar surface area in seven different species.

The results are shown in Fig. 5.2.

Species **A** to **G** are placed in order of body size from smallest (**A**) to largest (**G**).

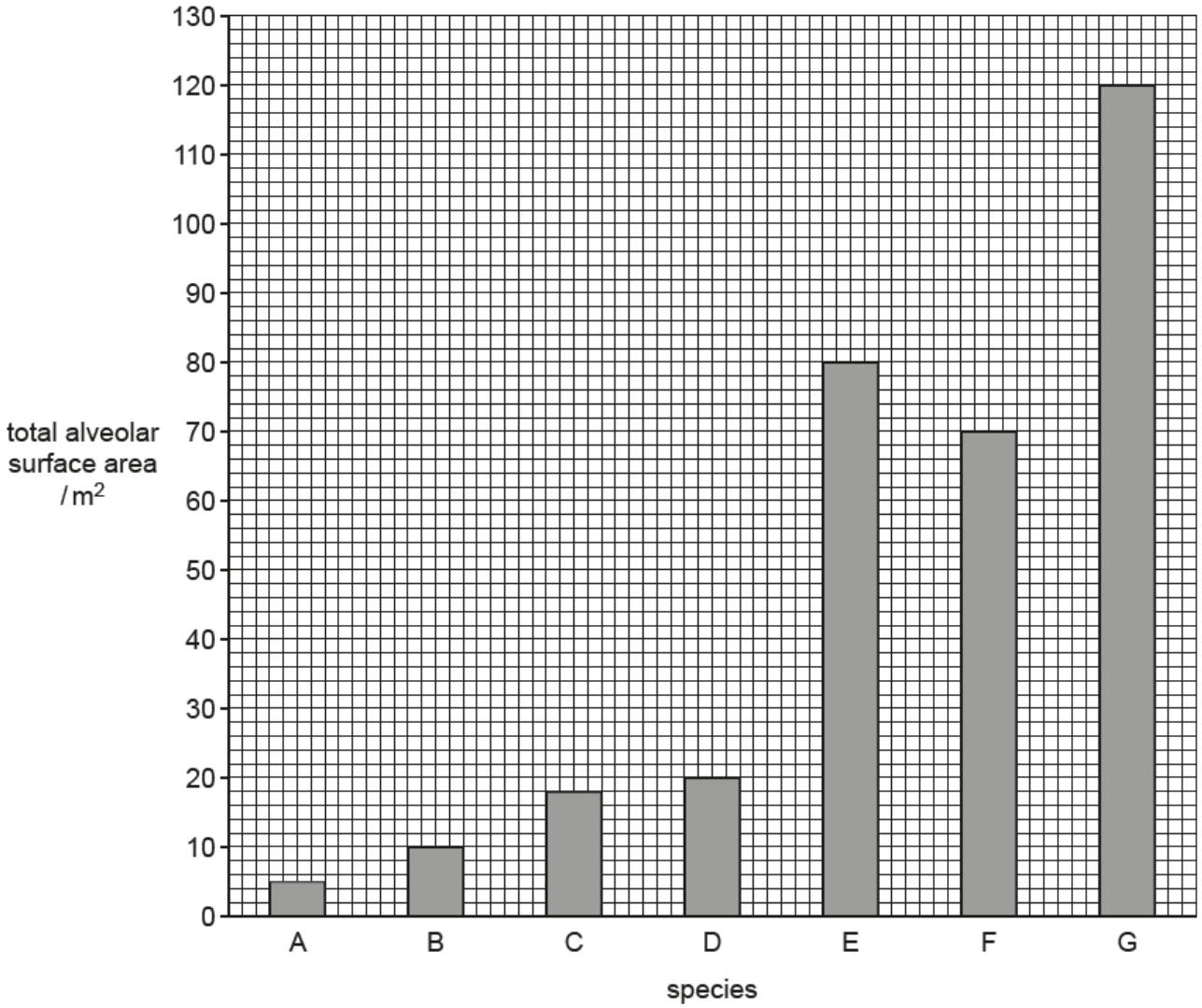


Fig. 5.2

A student made this statement:

'The larger the species, the larger the total alveolar surface area.'

(i) State **one** piece of evidence from Fig. 5.2 that supports this statement **and one** piece of evidence that does **not** support this statement.

supports .....

.....

does **not** support .....

.....

[2]

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(ii) Calculate the difference in total alveolar surface area between species **D** and **G** shown in Fig. 5.2.

..... m^2 [1]

(e) A large surface area is one feature of gas exchange surfaces in humans.

State **two** other features.

1 .....

2 .....
[2]

[Total: 11]

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Gas exchange in humans – 2022 November IGCSE 0610 Biology

1. Nov/2022/Paper_11/No.22

2. Nov/2022/Paper_12/No.22

What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

3. Nov/2022/Paper_12/No.27

Which hormone causes an increase in breathing rate, an increase in heart rate and the widening of pupils?

A insulin

B adrenaline

C oestrogen

D testosterone

4. Nov/2022/Paper_13/No.22

What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

5. Nov/2022/Paper_21/No.20

What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

6. Nov/2022/Paper_22/No.20

What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

7. Nov/2022/Paper_23/No.20

What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

8. Nov/2022/Paper_31/No.5(b_ c)

(b) A student breathed into a machine while they were at rest.

The machine recorded the volume of air as they breathed in and out.

The results are shown in Fig. 5.1.

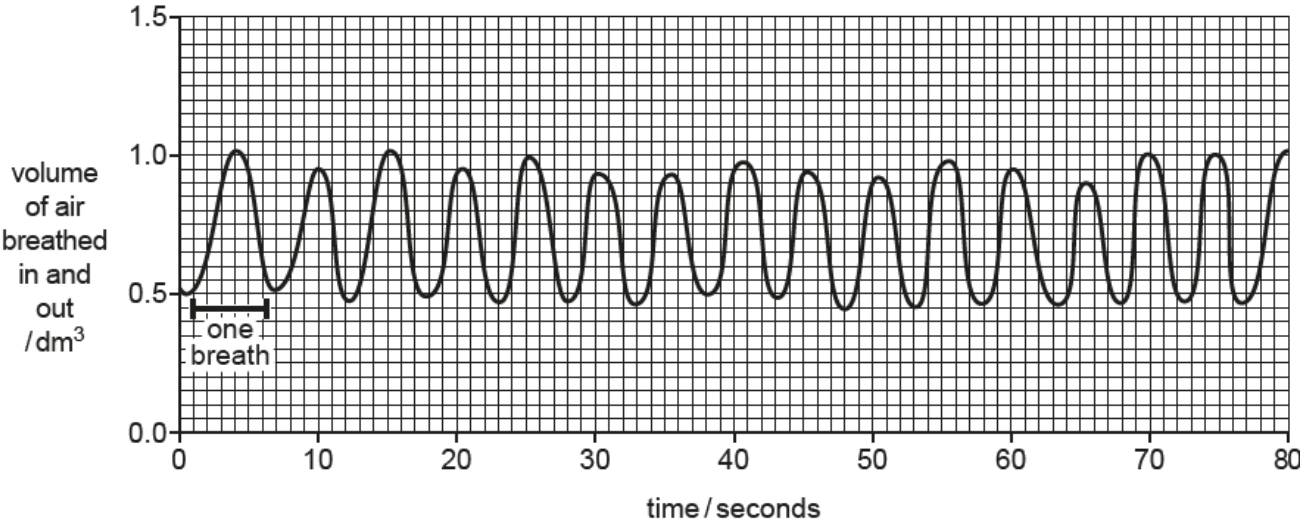


Fig. 5.1

(i) Estimate the number of breaths per minute the student took at rest.

..... breaths per minute [1]

(ii) State the volume of air breathed in during the first breath shown in Fig. 5.1.

..... dm^3 [1]

(iii) The rate and depth of breathing increases during physical activity.

Sketch another line **on Fig. 5.1** between 60 and 80 seconds to show this. [2]

(c) Some drugs can decrease the breathing rate.

Define what is meant by the term drug.

.....

.....

.....

.....

..... [2]

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9. Nov/2022/Paper_41/No.6

(a) Fig. 6.1 shows part of the human gas exchange system.

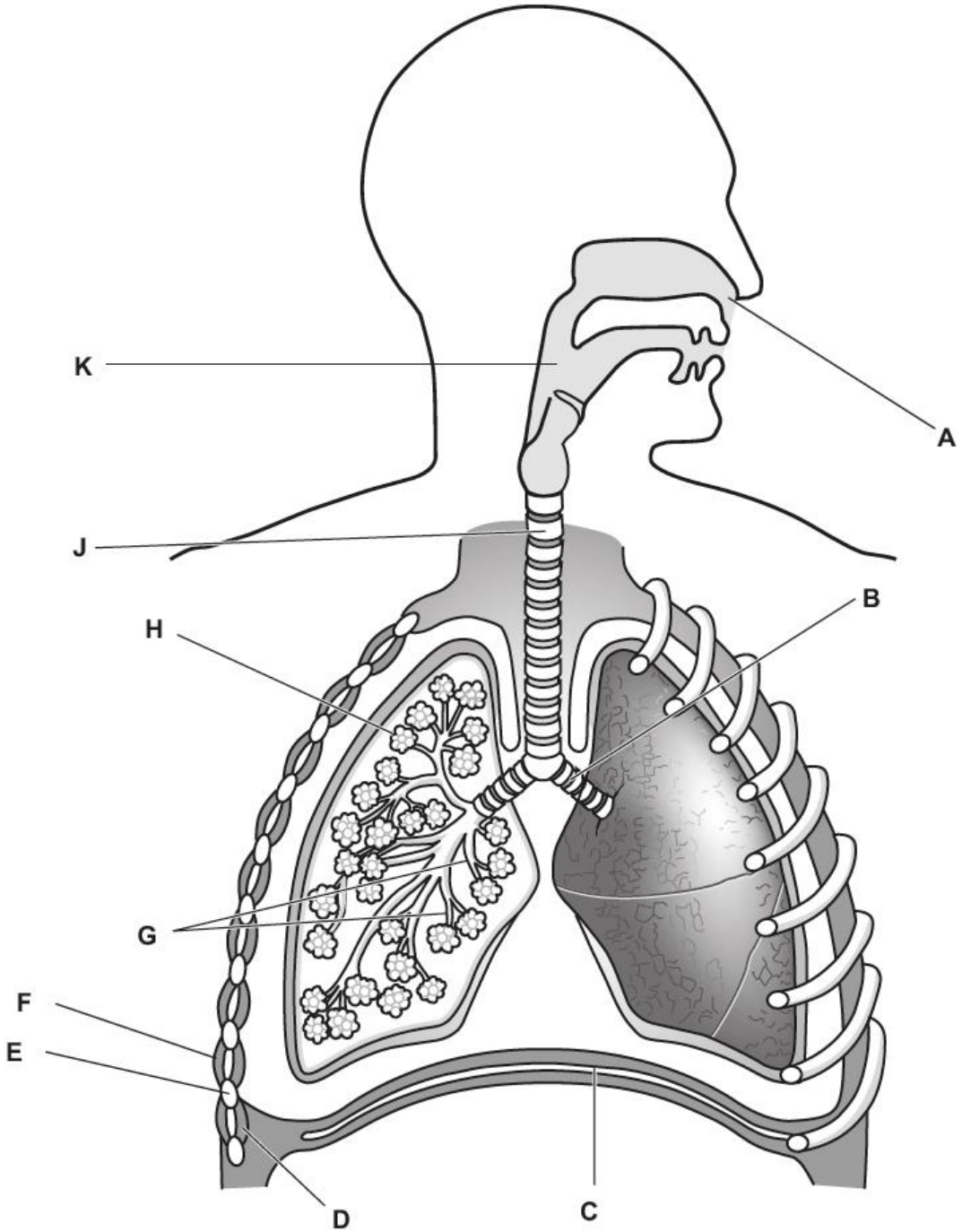


Fig. 6.1

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(i) Table 6.1 shows the names of some parts of the human gas exchange system, their functions and the letters in Fig. 6.1 that identify the parts.

Complete Table 6.1.

Table 6.1

function	name of the structure	letter in Fig. 6.1
	hairs in the nose	**A**
prevents collapse of the airway		
contracts to decrease the pressure in the thorax		**F**
	diaphragm	
protects the lungs from mechanical damage		
contains cilia to move mucus out of the airway		
site of gas exchange	alveoli	

[7]

(ii) Describe and explain how the alveoli are adapted for gas exchange.

.....

.....

.....

.....

.....

.....

..... [3]

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(b) **(i)** Explain the differences in composition between inspired and expired air.

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Physical activity changes the concentration of carbon dioxide in the body.

State where this change is detected **and** how the body responds to the change.

.....

.....

.....

.....

..... [2]

(iii) State the name of a solution that can be used to test for the presence of carbon dioxide gas.

..... [1]

[Total: 16]

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Gas exchange in humans – 2022 June IGCSE 0610

1. June/2022/Paper_ 11/No.22

A person lives in a climate where the air is very dry.

Which row correctly compares inspired air with expired air for this person?

	inspired air	expired air
A	higher carbon dioxide concentration	higher oxygen concentration
B	lower water vapour concentration	higher carbon dioxide concentration
C	lower oxygen concentration	higher water vapour concentration
D	lower carbon dioxide concentration	lower water vapour concentration

2. June/2022/Paper_ 11/No.23

Substances involved in aerobic respiration are listed.

1 carbon dioxide

2 glucose

3 oxygen

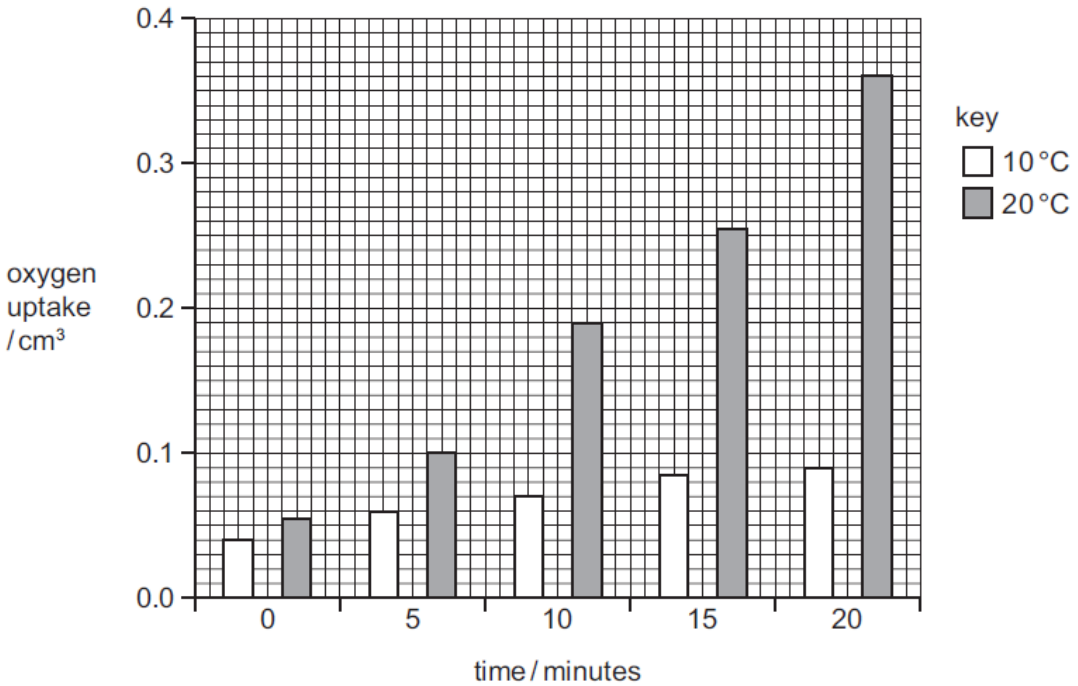
4 water

Which substances are used during aerobic respiration?

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

3. June/2022/Paper_ 11/No.24

The diagram shows the oxygen uptake by germinating seeds at two different temperatures.



At which time is the oxygen uptake at 20 °C four times greater than at 10 °C?

A 5 minutes

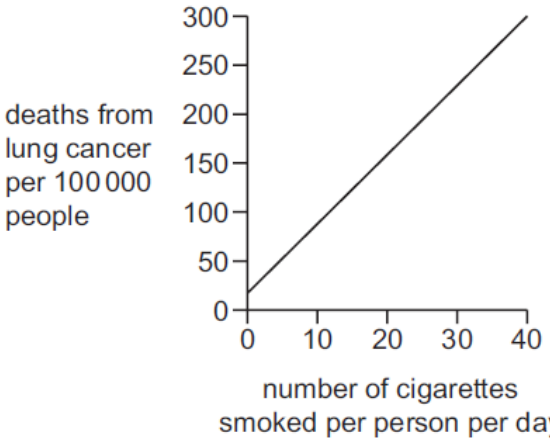
B 10 minutes

C 15 minutes

D 20 minutes

4. June/2022/Paper_ 12/No.29

The graph shows the relationship between deaths from lung cancer and the number of cigarettes smoked per day. Cigarettes contain tobacco.



Which statement is a possible conclusion for the data shown in the graph?

A A person will die of lung cancer only if they smoke.

B A person's health is only affected if they smoke more than 10 cigarettes per day.

C A person will have less chance of dying of lung cancer if they smoke fewer cigarettes.

D If a person smokes more than 40 cigarettes per day, their risk of dying from lung cancer is the same as a person who smokes 40 cigarettes per day.

5. June/2022/Paper_ 13/No.19

A student runs 400 metres.

Which effects will this have?

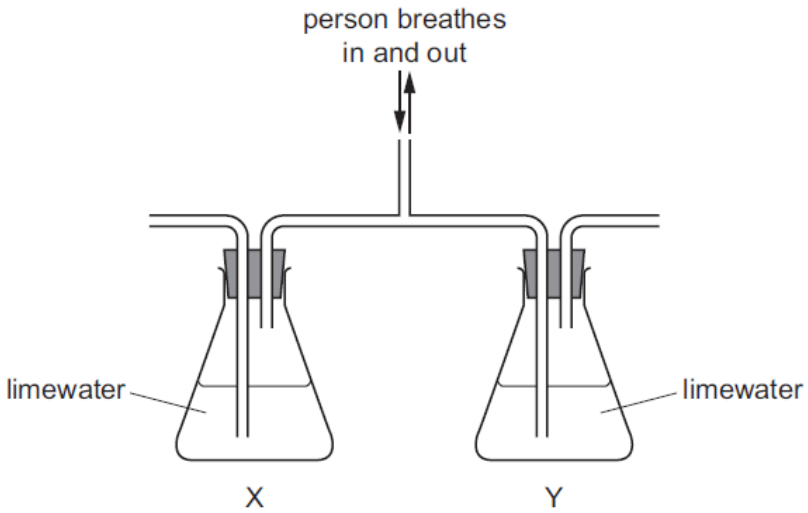
	depth of breathing	rate of breathing	pulse rate
A	decreases	increases	decreases
B	increases	decreases	increases
C	decreases	decreases	decreases
D	increases	increases	increases

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6. June/2022/Paper_ 13/No.22

The diagram shows the apparatus used in an investigation of gas exchange in humans.

The person breathes through the central tube five times.



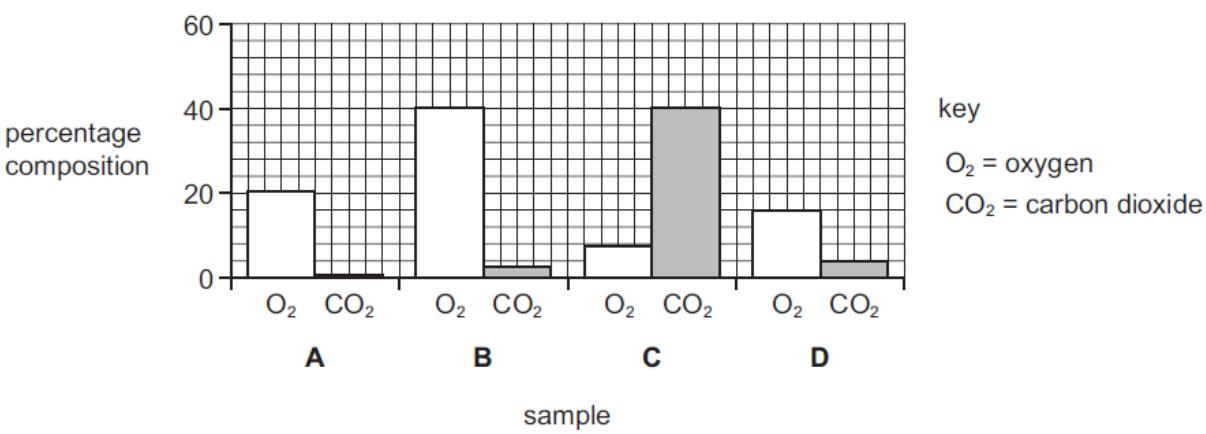
What are the expected results in flasks X and Y?

	X	Y
A	clear	clear
B	clear	cloudy
C	cloudy	clear
D	cloudy	cloudy

7. June/2022/Paper_ 13/No.24

The bar chart shows the percentage composition of two gases in four samples of air.

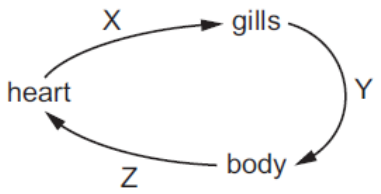
Which sample is expired air?



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8. June/2022/Paper_ 21/No.17

The diagram shows the circulatory system of a fish.



Where in the circulatory system is the oxygen concentration lowest?

A X only **B** X and Y **C** Y only **D** Y and Z

9. June/2022/Paper_ 21/No.21

Which row shows a change that occurs during ventilation?

	process	thorax pressure	thorax volume	air movement
A	expiration	decreases	increases	in
B	expiration	increases	decreases	out
C	inspiration	decreases	increases	out
D	inspiration	increases	decreases	in

10. June/2022/Paper_ 23/No.22

Which statements describe how an oxygen debt is removed after vigorous exercise?

1 Lactic acid is transported to the liver.

2 Lactic acid is respired aerobically.

3 Heart rate stays high to remove lactic acid from the muscles.

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

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11. June/2022/Paper_ 32/No.5(a_ b)

(a) Blood group is inherited. There are four human blood groups: A, B, AB and O.

Surveys were carried out in two different countries to find out the percentage of the population in each blood group.

The results are shown in Fig. 5.1.

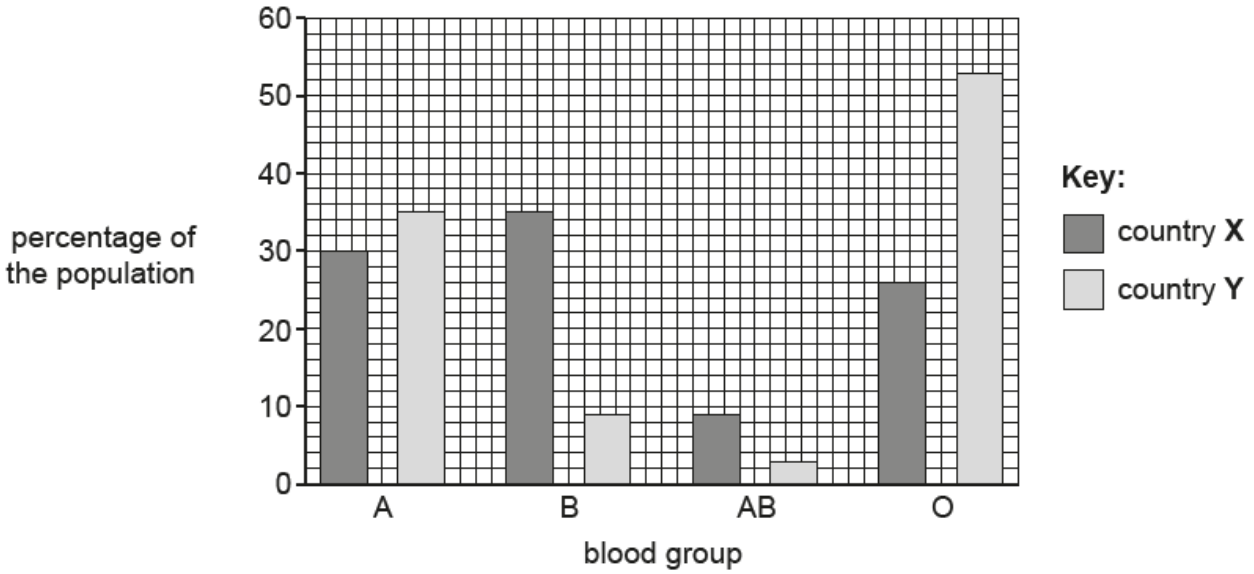


Fig. 5.1

(i) Complete the sentences that describe the data shown in Fig. 5.1.

The rarest blood group in both countries is ..... .

In country **X** blood group ..... is the most common but in country **Y** it is blood group ..... .

The percentage of the population of country **X** that has blood group **A** is .....%.

[4]

(ii) Suggest the type of variation shown in Fig. 5.1 and give a reason for your choice.

type of variation .....

reason .....

.....

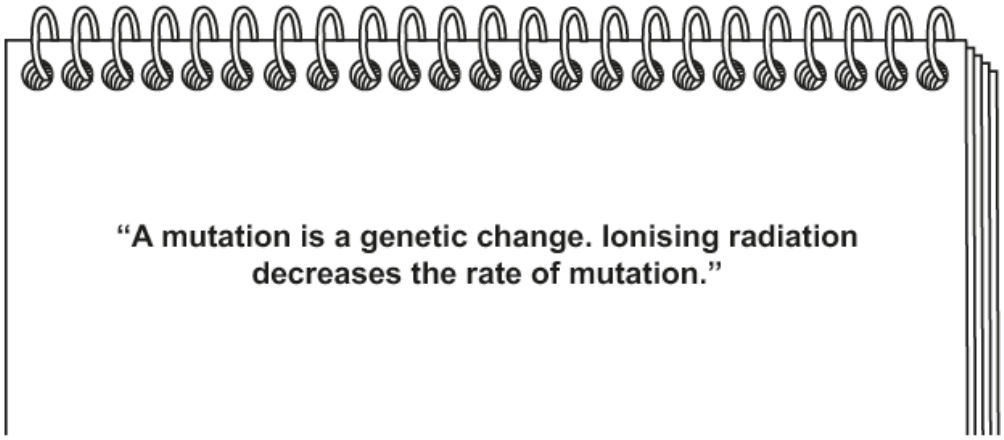
.....

[2]

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(b) Mutations can create variation.

A student made some statements about mutations in their notebook.



Identify **one** incorrect word in the sentences.

..... [1]

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12. June/2022/Paper_ 33/No.5(a_ b)

(a) Complete the sentences about the features of the human gas exchange system.

Gas exchange surfaces have a ..... surface area.

The distance across the gas exchange surfaces is very ..... .

The gas exchange system has a ..... blood supply and good

..... with air.

[4]

(b) Fig. 5.1 shows part of the gas exchange system in the lungs of a human.

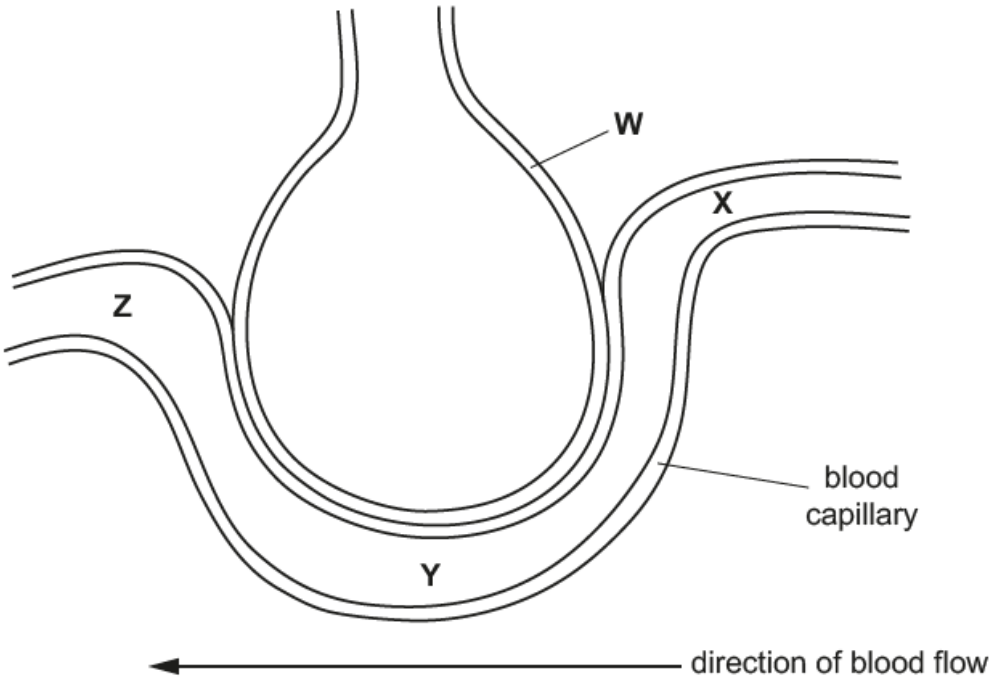


Fig. 5.1

(i) State the name of structure **W** in Fig. 5.1.

..... [1]

(ii) State the letter in Fig. 5.1 that shows where the concentration of:

- carbon dioxide in the blood is highest .....
- oxygen in the blood is highest .....

[2]

(iii) State the name of the process where molecules move down a concentration gradient.

..... [1]

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13. June/2022/Paper_ 33/No.6(a_ b)

(a) Scientists surveyed a group of adults. Some of the adults had chronic bronchitis, which is a lung disease. The adults were asked their age and whether they smoked tobacco.

The results of the study are shown in Fig. 6.1.

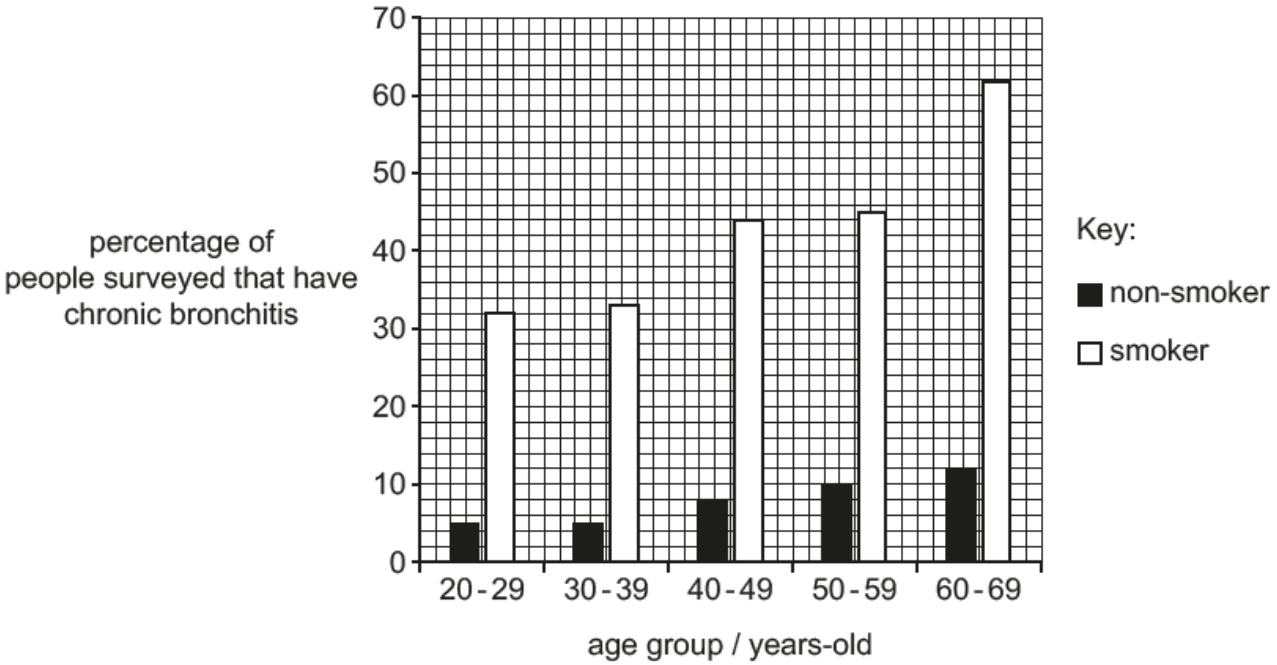


Fig. 6.1

Describe the data shown in Fig. 6.1.

.....

.....

.....

.....

.....

.....

..... [3]

(b) **(i)** State **two** diseases other than chronic bronchitis that tobacco smoking can cause.

1 .....

2 .....

[2]

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(ii) List **three** major toxic components of tobacco smoke.

1 .....

2 .....

3 .....

[3]

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14. June/2022/Paper_ 42/No.5(a_ c)

Fig. 5.1 is a diagram of the human gas exchange system.

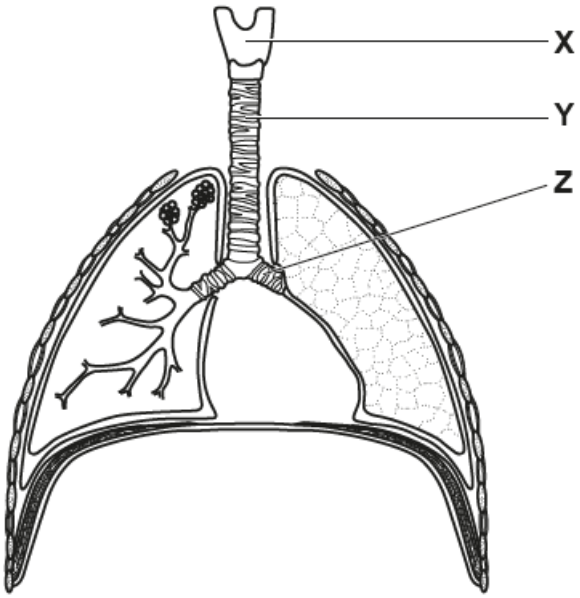


Fig. 5.1

(a) (i) Identify the parts of the gas exchange system labelled **X**, **Y** and **Z** in Fig. 5.1.

X .....

Y .....

Z .....

[3]

(ii) State the name of the tissue that prevents the collapse of **Y** and **Z** during breathing.

..... [1]

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(b) Breathing involves the movement of the ribs and the diaphragm.

Describe the process of **inspiration**.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) State the name of the gas exchange surface in the lungs.

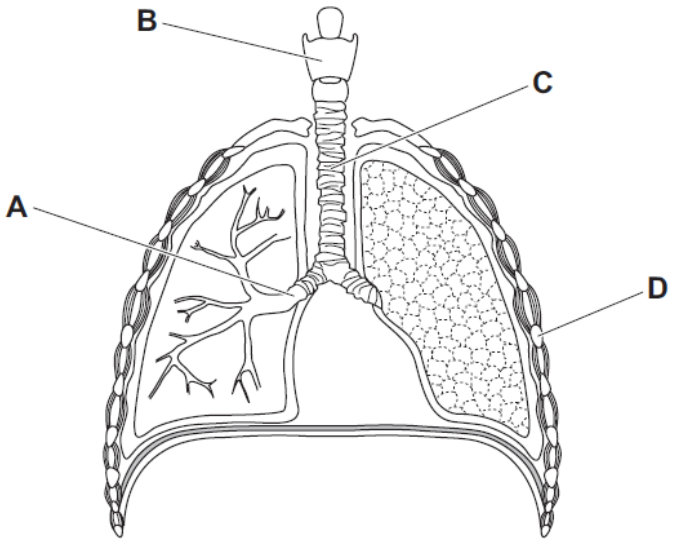
..... [1]

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Gas exchange in humans – 2021 IGCSE 0610

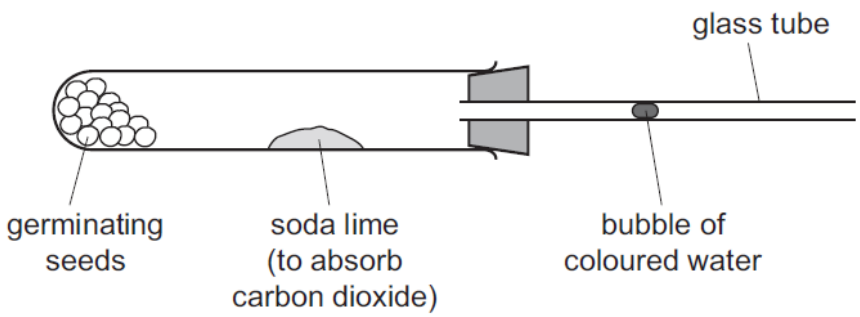
1. Nov/2021/Paper_11/No.22

Which structure is a bronchus?



2. Nov/2021/Paper_12/No.22

The diagram shows the apparatus used to measure the rate of respiration in germinating seeds. As the seeds respire, the bubble of coloured water moves along the glass tube.



The temperature is increased from 20 °C to 40 °C.

What happens to the movement of the bubble as the temperature increases?

A The bubble moves more quickly towards the seeds at 40 °C than at 20 °C.

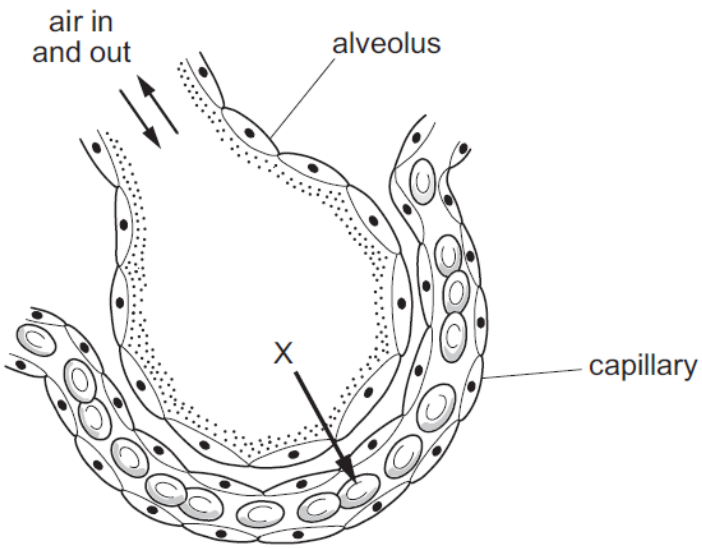
B The bubble moves more quickly away from the seeds at 40 °C than at 20 °C.

C The bubble moves more quickly towards the seeds at 20 °C than at 40 °C.

D The bubble moves more quickly away from the seeds at 20 °C than at 40 °C.

3. Nov/2021/Paper_13/No.22

The diagram shows an alveolus.



Which gas is represented by the pathway shown by arrow X?

A air

B carbon dioxide

C oxygen

D water vapour

4. Nov/2021/Paper_21/No.20

What causes the air pressure in the lungs to decrease during breathing in?

A contraction of the external intercostal muscles and diaphragm

B expansion of the lungs causing a decrease in the volume of the alveoli

C outward movement of the ribs and upward movement of the diaphragm

D higher pressure in the atmosphere than in the lungs causing the alveoli to expand

5. Nov/2021/Paper_22/No.20

6. Nov/2021/Paper_23/No.20

Which row shows what happens at the start of inspiration?

	external intercostal muscles contract	internal intercostal muscles contract	diaphragm contracts	volume of thorax increases	air pressure in thorax increases
A	✓	✗	✓	✓	✗
B	✓	✗	✓	✗	✓
C	✗	✓	✗	✓	✗
D	✗	✓	✗	✗	✓

key

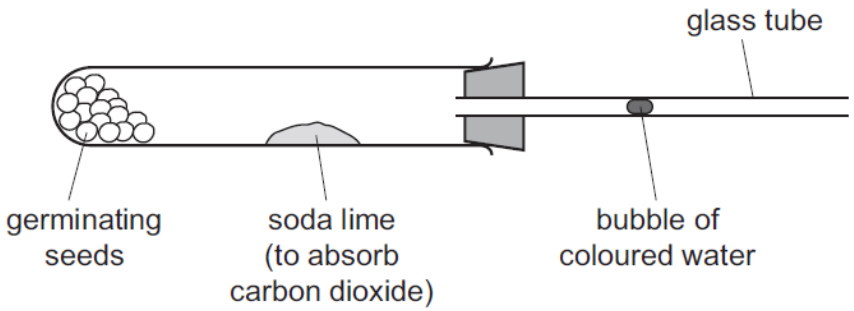
✓ = yes

✗ = no

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7. Nov/2021/Paper_23/No.22

The diagram shows the apparatus used to measure the rate of respiration in germinating seeds. As the seeds respire, the bubble of coloured water moves along the glass tube.



The temperature is increased from 20 °C to 40 °C.

What happens to the movement of the bubble as the temperature increases?

A The bubble moves more quickly towards the seeds at 40 °C than at 20 °C.

B The bubble moves more quickly away from the seeds at 40 °C than at 20 °C.

C The bubble moves more quickly towards the seeds at 20 °C than at 40 °C.

D The bubble moves more quickly away from the seeds at 20 °C than at 40 °C.

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8. Nov/2021/Paper_32/No.2

(a) Table 2.1 shows the breathing rate of different organisms.

Table 2.1

name of organism	breathing rate /average number of breaths per minute
buffalo	17
camel	8
cat	20
chicken	18
elephant	12
goat	21
horse	10
human	16
sheep	20

(i) State the name of the organism with the lowest breathing rate.

..... [1]

(ii) State the name of **two** organisms with the same breathing rate.

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

(iii) State the name of the organism with the most **similar** breathing rate to humans.

..... [1]

(b) A person goes from resting to exercising.

Describe how their breathing changes.

.....

.....

.....

.....

..... [2]

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(c) There is more carbon dioxide in expired air than in inspired air.

(i) State **two other** ways the composition of expired air is different from inspired air.

1 .....

.....

2 .....

.....

[2]

(ii) State the chemical used to test for the presence of carbon dioxide gas and the positive test result.

chemical .....

positive test result .....

[2]

(d) Fig. 2.1 is a diagram of the human gas exchange system.

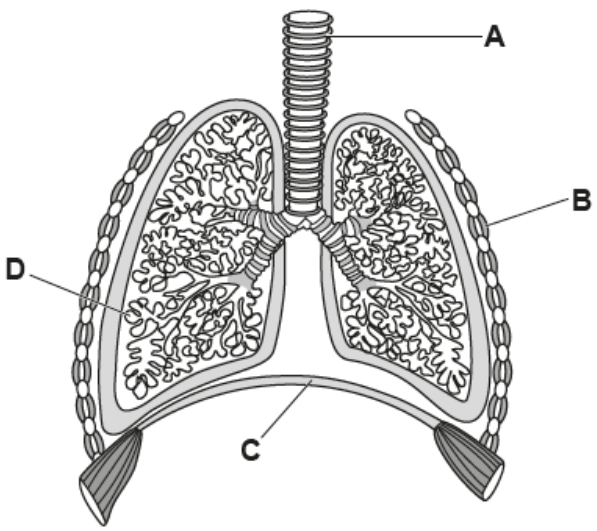


Fig. 2.1

Identify the parts labelled **A**, **B**, **C** and **D** in Fig. 2.1.

A .....

B .....

C .....

D .....

[4]

[Total: 13]

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Gas exchange in humans – 2021 IGCSE 0610

1. March/2021/Paper_12/No.22

Air entering human lungs contains approximately 21% oxygen and 0.04% carbon dioxide.

Which row shows the concentrations of these gases in air leaving the lungs?

	percentage of oxygen in expired air	percentage of carbon dioxide in expired air
A	4	21.0
B	12	4.0
C	16	4.0
D	20	0.4

2. March/2021/Paper_22/No.22

Air entering human lungs contains approximately 21% oxygen and 0.04% carbon dioxide.

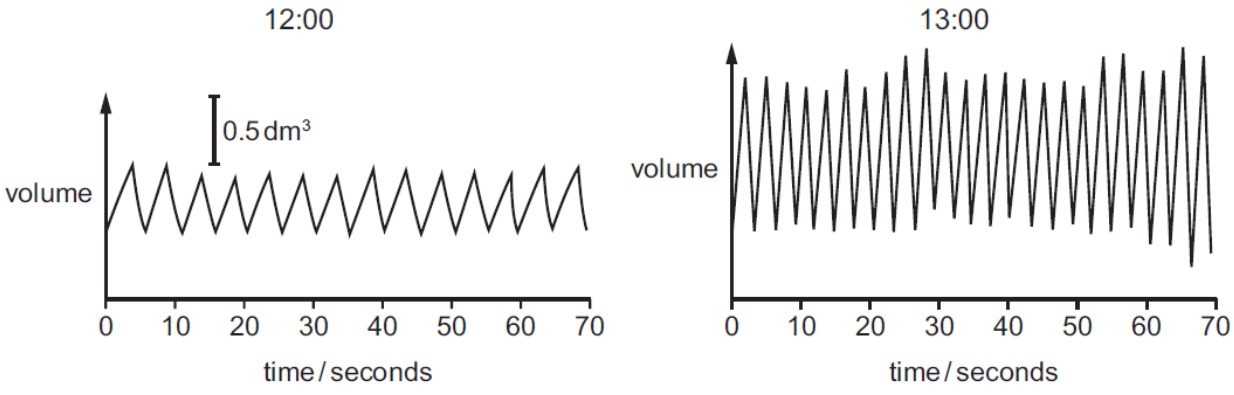
Which row shows the concentrations of these gases in air leaving the lungs?

	percentage of oxygen in expired air	percentage of carbon dioxide in expired air
A	4	21.0
B	12	4.0
C	16	4.0
D	20	0.4

3. June/2021/Paper_11/No.22

4. June/2021/Paper_12/No.22

The diagrams show the depth and rate of breathing in a person at 12:00 and 13:00.



What happens to the person's breathing between 12:00 and 13:00?

	depth of breathing	rate of breathing
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

5. June/2021/Paper_13/No.22

6. June/2021/Paper_21/No.22

Which sequence of changes takes place when we breathe in?

A diaphragm contracts → volume of thorax increases → pressure in lungs decreases

B diaphragm contracts → volume of thorax increases → pressure in lungs increases

C diaphragm relaxes → volume of thorax increases → pressure in lungs decreases

D diaphragm relaxes → volume of thorax increases → pressure in lungs increases

7. June/2021/Paper_22/No.7

By which process do oxygen and carbon dioxide move between cells and capillaries?

A breathing

B diffusion

C excretion

D respiration

8. June/2021/Paper_23/No.22

Which sequence of changes takes place when we breathe in?

A diaphragm contracts → volume of thorax increases → pressure in lungs decreases

B diaphragm contracts → volume of thorax increases → pressure in lungs increases

C diaphragm relaxes → volume of thorax increases → pressure in lungs decreases

D diaphragm relaxes → volume of thorax increases → pressure in lungs increases

9. June/2021/Paper_43/No.5

(a) Table 5.1 shows four functions of the human gas exchange system.

Complete Table 5.1 by identifying the part of the human gas exchange system that carries out each function.

Table 5.1

function	part of the human gas exchange system
contracts to decrease air pressure in the lungs	
allows air to flow between the larynx and the lungs	
contracts to lower the ribs in forced expiration	
site of gas exchange	

[4]

(b) Scientists investigated the effect of increasing carbon dioxide concentration in the air on the rate and depth of breathing. The people who took part in the investigation were healthy volunteers.

The people breathed atmospheric air containing 0.04% carbon dioxide for five minutes. They then breathed air containing 2% carbon dioxide for five minutes and then returned to breathing atmospheric air for a further five minutes.

The results are shown in Fig. 5.1.

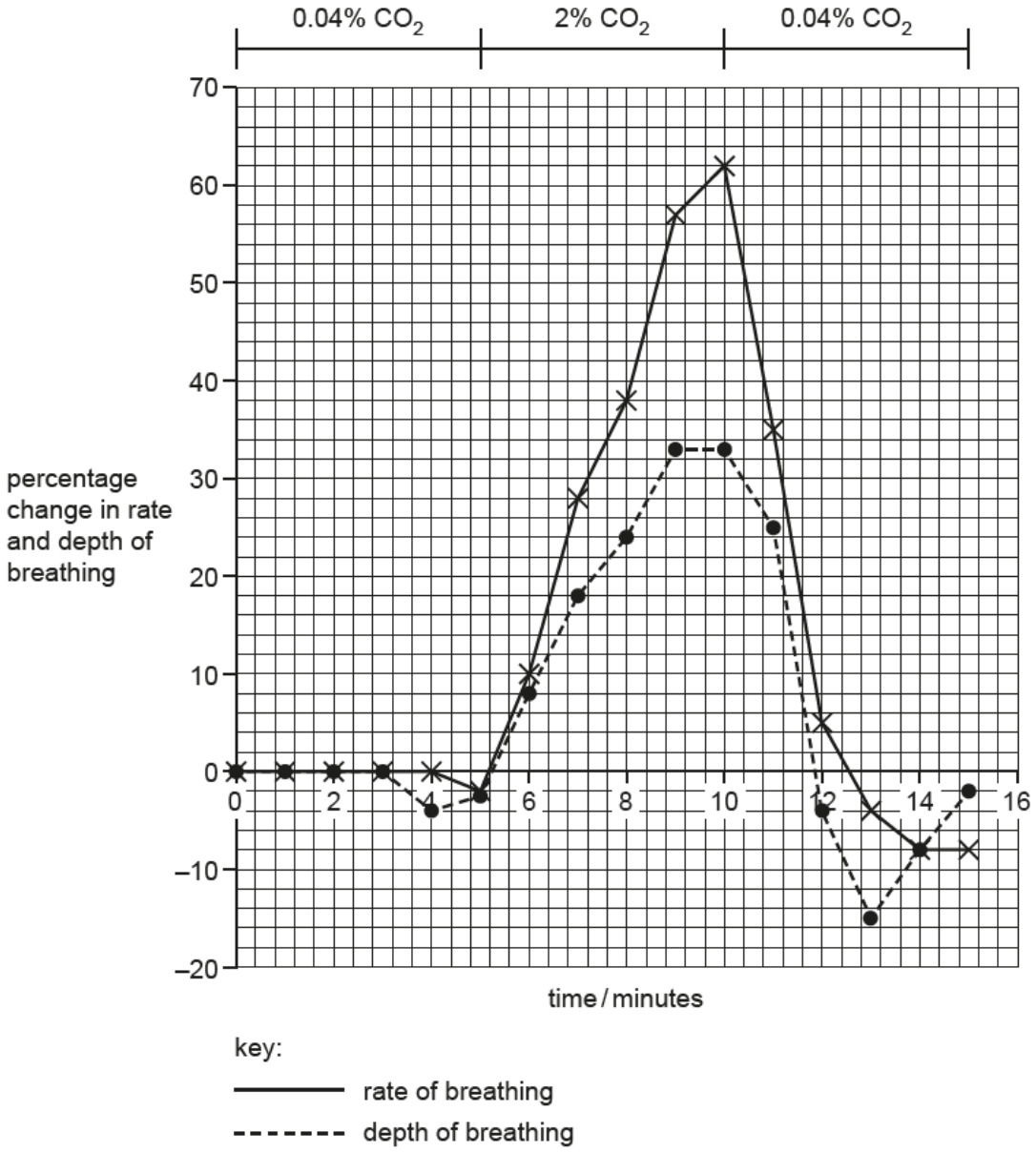


Fig. 5.1

Describe the effects of changing the carbon dioxide concentration of the air on the rate and depth of breathing, as shown in Fig. 5.1.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Complete the sentences by writing the appropriate word or phrase in the spaces provided.

During physical activity the carbon dioxide concentration in the blood increases. The reason for this is an increase in the rate of ..... that occurs in the ..... in muscle cells.

The increase in the concentration of carbon dioxide in the blood is detected by the ..... , which increases the rate and depth of breathing so that carbon dioxide can be ..... from the body. This is important because carbon dioxide is a ..... substance and can cause harm if it accumulates. [5]

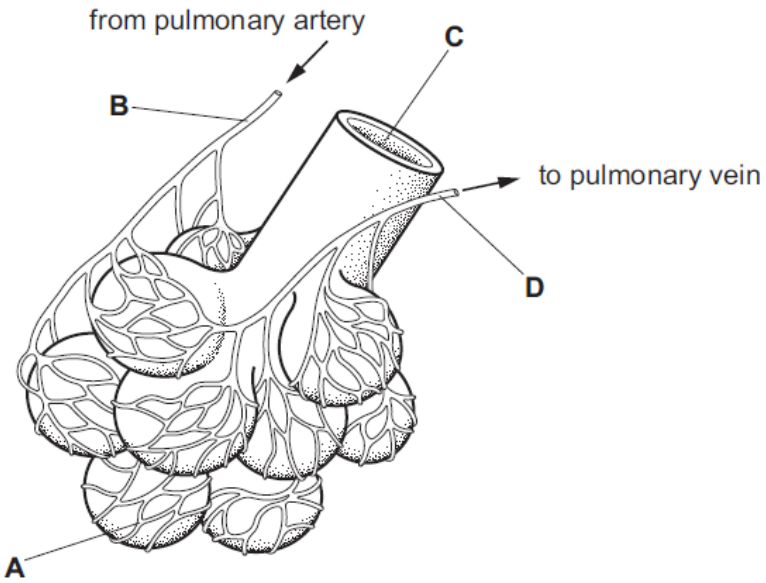
[Total: 13]

Gas exchange in humans – 2020 IGCSE 0610

1. Nov/2020/Paper_11/No.22

The diagram shows some of the structures in a human lung.

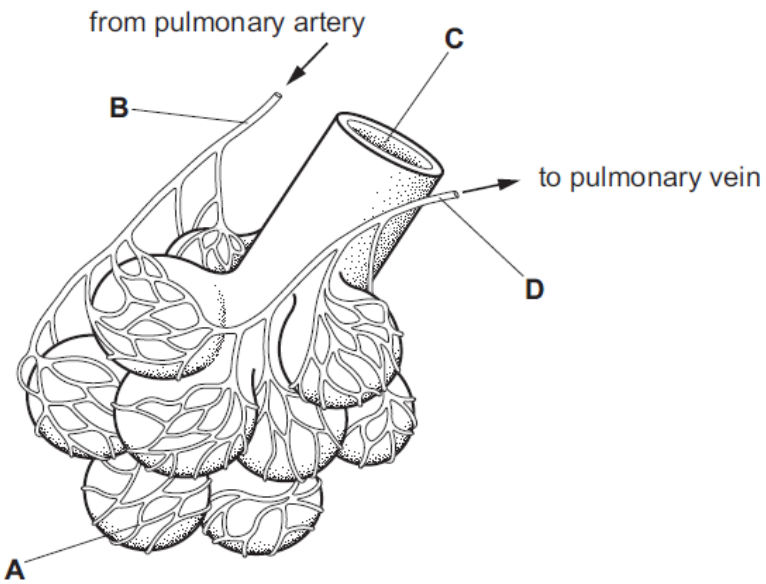
Where is the carbon dioxide concentration highest?



2. Nov/2020/Paper_12/No.22

The diagram shows some of the structures in a human lung.

Where is the carbon dioxide concentration highest?

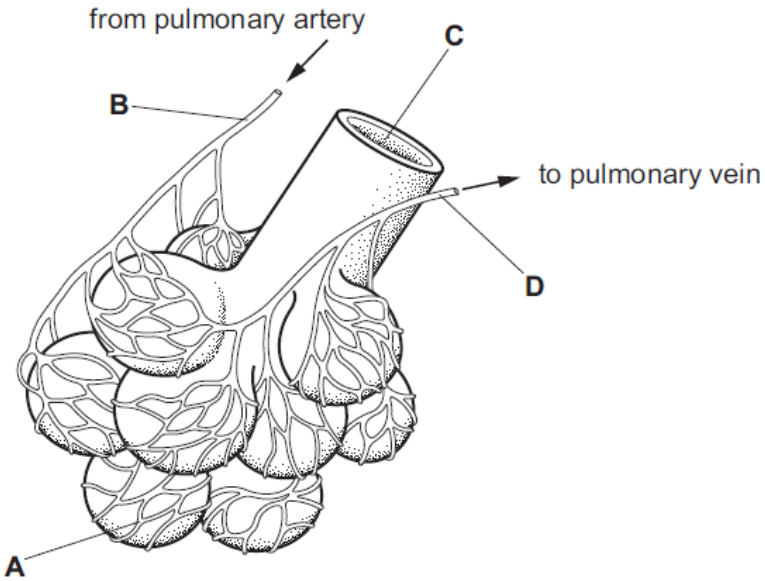


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3. Nov/2020/Paper_13/No.22

The diagram shows some of the structures in a human lung.

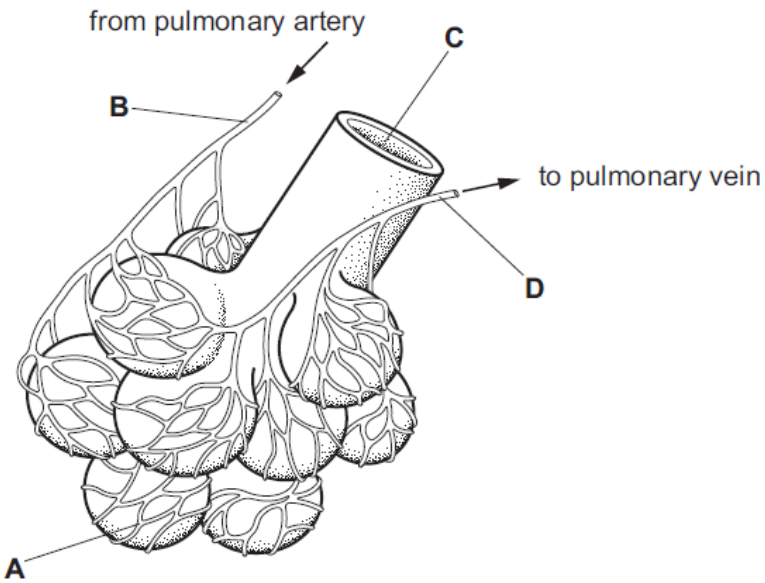
Where is the carbon dioxide concentration highest?



4. Nov/2020/Paper_21/No.20

The diagram shows some of the structures in a human lung.

Where is the carbon dioxide concentration highest?



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5. Nov/2020/Paper_22/No.17

What ensures that blood flows in one direction in the human circulatory system?

A diffusion of carbon dioxide

B diffusion of oxygen

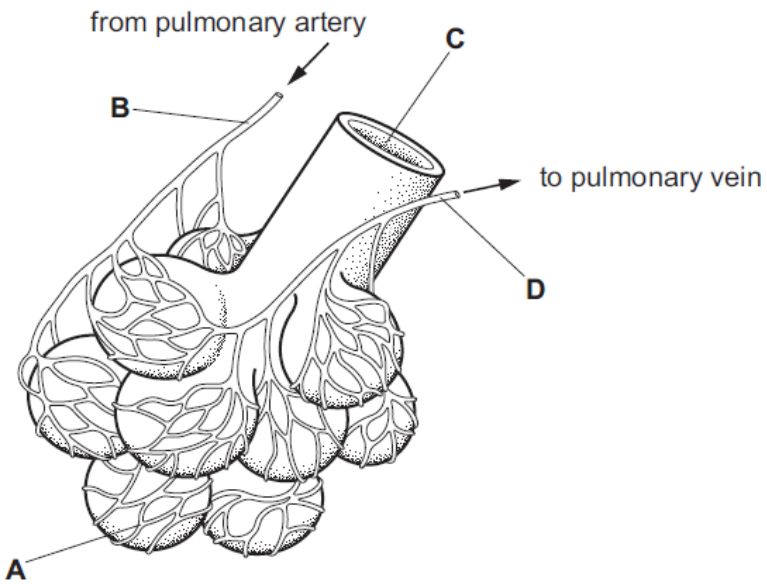
C thick walled arteries

D valves

6. Nov/2020/Paper_22/No.20

The diagram shows some of the structures in a human lung.

Where is the carbon dioxide concentration highest?

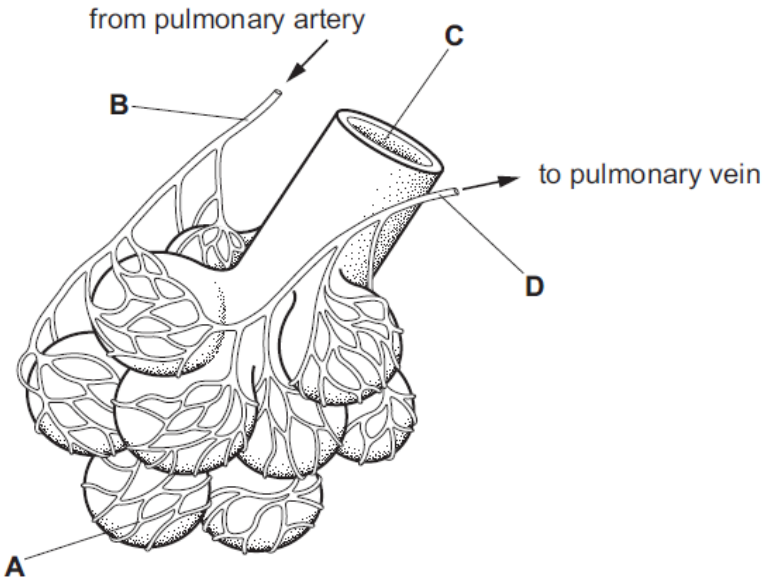


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7. Nov/2020/Paper_23/No.20

The diagram shows some of the structures in a human lung.

Where is the carbon dioxide concentration highest?

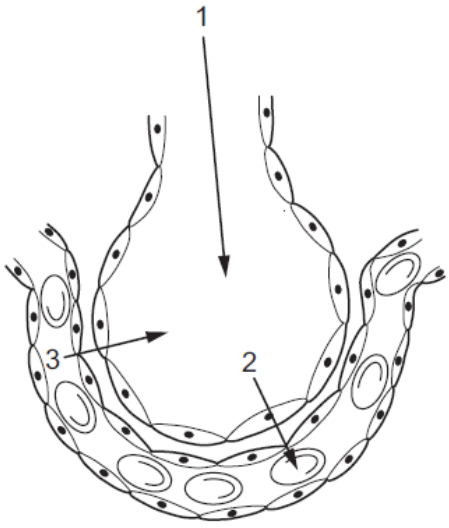


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Gas exchange in humans – 2020 IGCSE 0610

1. March/2020/Paper_12/No.22

The diagram shows an alveolus. The arrows represent the movement of gases.



Which row is correct?

	1	2	3
A	oxygen	carbon dioxide	air
B	air	carbon dioxide	oxygen
C	air	oxygen	carbon dioxide
D	carbon dioxide	oxygen	air

2. March/2020/Paper_22/No.22

During physical activity, what stimulates the brain to increase the breathing rate?

A decreased oxygen concentration in the blood

B decreased oxygen concentration in the lungs

C increased carbon dioxide concentration in the blood

D increased carbon dioxide concentration in the lungs

3. March/2020/Paper_22/No.23

The table shows some of the changes that occur during breathing.

	from contracted to relaxed	from relaxed to contracted
diaphragm	P	X
external intercostal muscles	Q	Y
internal intercostal muscles	R	Z

Which changes occur to cause inspiration?

A P, Q and Z **B** X, Q and R **C** X, Y and R **D** X, Y and Z

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4. March/2020/Paper_32/No.2

(a) A class of students measured their breathing rates during different activities.

Average breathing rates for the class were calculated.

Student **A** compared her own breathing rates to the average breathing rates of the class.

Fig. 2.1 shows the results.

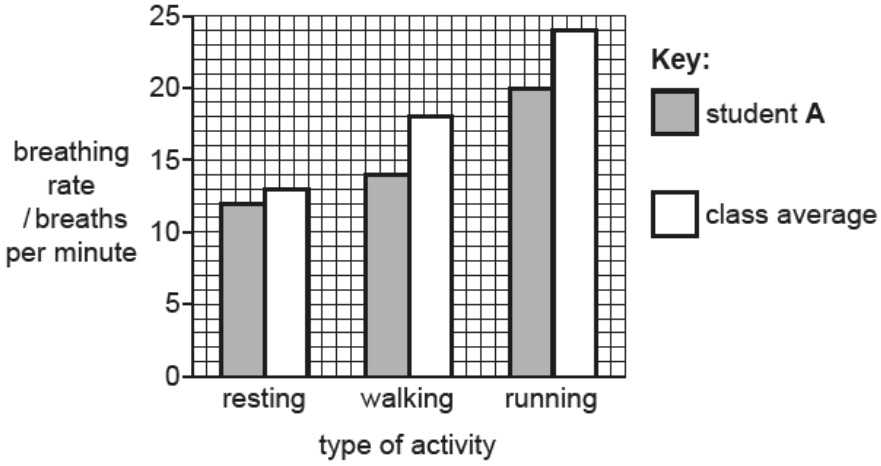


Fig. 2.1

(i) Compare student **A**'s results with the class averages.

.....

.....

.....

.....

..... [2]

(ii) Calculate the percentage increase in breathing rate between resting and running for student **A**.

Give your answer to the nearest whole number.

.....%
[2]

5. March/2020/Paper_42/No.1

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

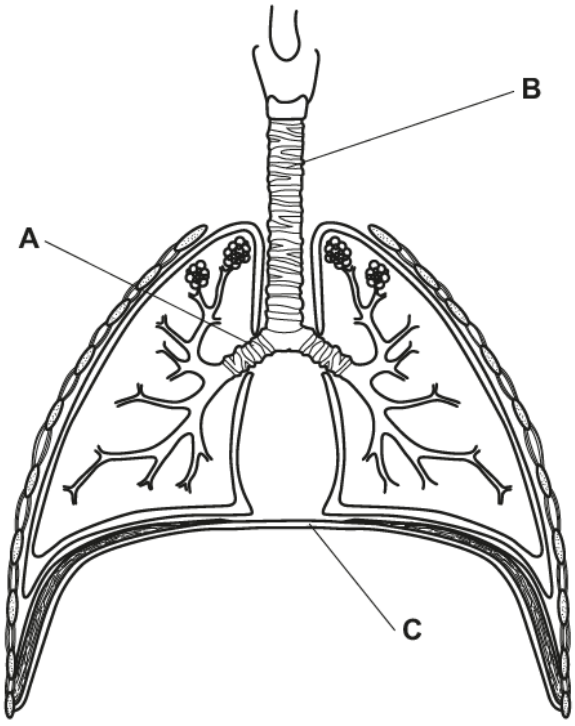


Fig. 1.1

(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]

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(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]

6. June/2020/Paper_11/No.18

What is the approximate percentage of oxygen contained in the air breathed out of the lungs?

A 0% **B** 4% **C** 16% **D** 20%

7. June/2020/Paper_12/No.18

What is the site of gas exchange in humans?

A nose

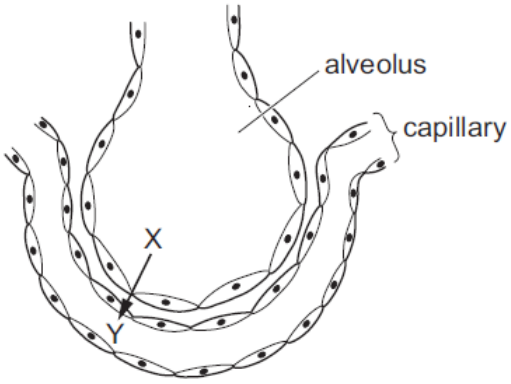
B alveoli

C bronchus

D trachea

8. June/2020/Paper_13/No.18

The diagram shows an alveolus and capillary in a human lung.



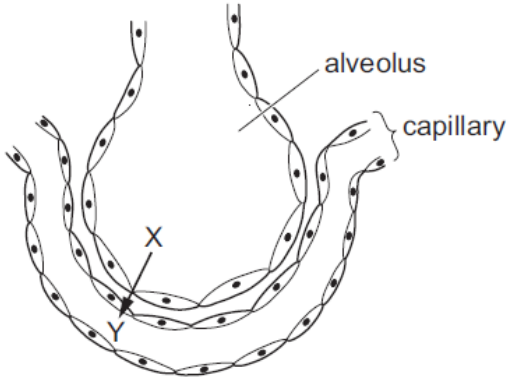
Which row shows the correct gas and concentrations for diffusion from X to Y in normal conditions?

	at point X	at point Y
A	high concentration of carbon dioxide	low concentration of carbon dioxide
B	high concentration of oxygen	low concentration of oxygen
C	low concentration of carbon dioxide	high concentration of carbon dioxide
D	low concentration of oxygen	high concentration of oxygen

9. June/2020/Paper_21/No.20

10. June/2020/Paper_23/No.20

The diagram shows an alveolus and capillary in a human lung.



Which row shows the correct gas and concentrations for diffusion from X to Y in normal conditions?

	at point X	at point Y
A	high concentration of carbon dioxide	low concentration of carbon dioxide
B	high concentration of oxygen	low concentration of oxygen
C	low concentration of carbon dioxide	high concentration of carbon dioxide
D	low concentration of oxygen	high concentration of oxygen

11. June/2020/Paper_41/No.1

The gas exchange system is one of the organ systems of the human body.

Fig. 1.1 shows parts of the gas exchange system during breathing in and breathing out.

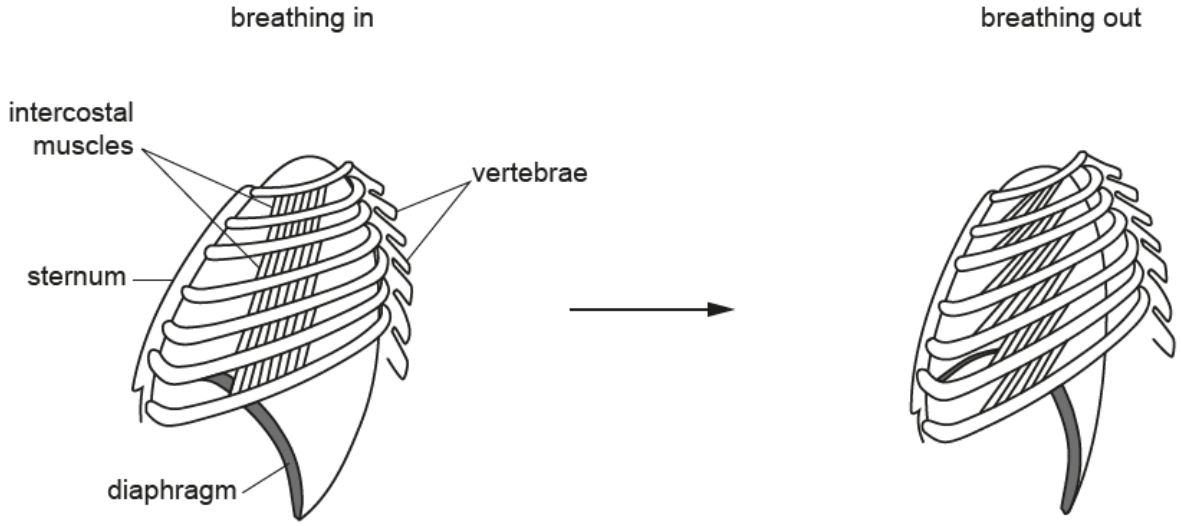


Fig. 1.1

(a) Complete Table 1.1 to show:

- the functions of the diaphragm and the intercostal muscles during breathing in and breathing out
- the pressure changes in the thorax.

Use these words:

contract
relax
increases
decreases.

Table 1.1

	diaphragm	intercostal muscles		pressure change in the thorax
		internal	external	
breathing in				
breathing out				

[4]

Fig. 1.2 shows part of the gas exchange surface of a human.

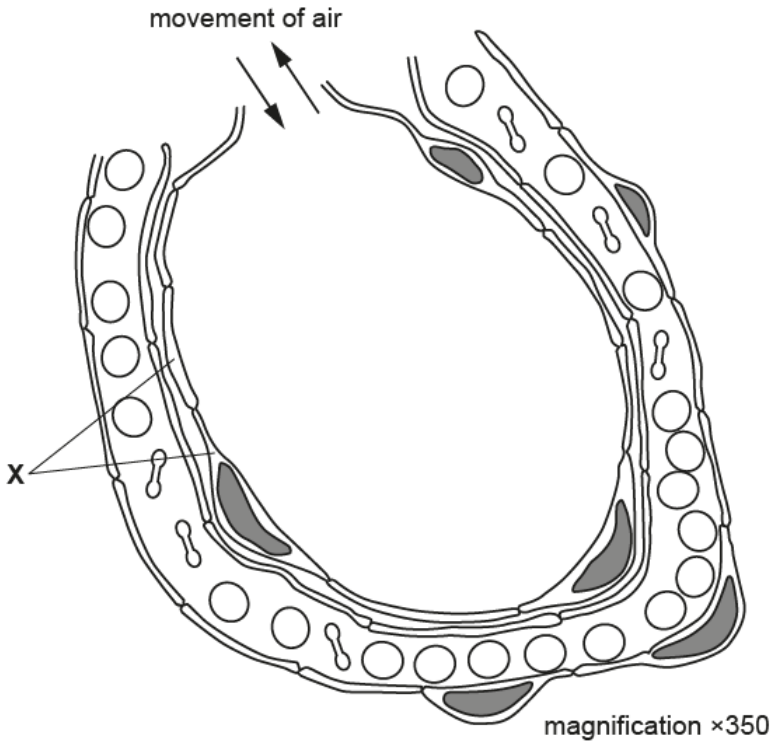


Fig. 1.2

(b) State **two** features of the gas exchange surface that are **visible** in Fig. 1.2.

1 .....

2 .....

[2]

(c) The cells labelled **X** on Fig. 1.2 form a tissue.

(i) Define the term *tissue*.

.....

.....

.....

.....

..... [2]

(ii) Cartilage is another tissue found in the gas exchange system.

State the functions of cartilage in the gas exchange system.

.....

.....

.....

.....

..... [2]

[Total: 10]

1 What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

2 Compared with atmospheric air, air breathed out by a human contains

A less water vapour, less carbon dioxide.

B less water vapour, more carbon dioxide.

C more water vapour, less carbon dioxide.

D more water vapour, more carbon dioxide.

3 What is the path of carbon dioxide as it leaves the lungs?

A alveolus → bronchiole → bronchus → trachea

B alveolus → bronchus → bronchiole → trachea

C trachea → bronchiole → bronchus → alveolus

D trachea → bronchus → bronchiole → alveolus

4 In some amphibians, gas exchange occurs through the whole skin surface.

What are the most likely characteristics of the skin surface?

	surface area	type of skin
A	large	thick
B	large	thin
C	small	thick
D	small	thin

5 What describes the actions of the intercostal muscles and the diaphragm when we breathe out?

	external intercostal muscles	internal intercostal muscles	diaphragm
A	contract	relax	falls
B	contract	relax	rises
C	relax	contract	falls
D	relax	contract	rises

6 What are the approximate percentages of oxygen and carbon dioxide in atmospheric air?

	oxygen / %	carbon dioxide / %
A	16	4.00
B	16	8.00
C	20	0.04
D	20	4.00

7 When the external intercostal muscles contract, how do the pressure and the volume inside the lungs change?

	pressure	volume
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 The table shows the approximate composition of air breathed out by a mammal.

gas	air breathed out / %
nitrogen	80
oxygen	16
carbon dioxide	4

Where does the nitrogen in the air breathed out come from?

A It is a product of proteins broken down in the mammal.

B It is a product of respiration.

C It is exchanged for oxygen which is taken into the blood.

D It is in the air that was breathed in.

9 What helps oxygen to be absorbed rapidly into the blood in the lungs?

A Air breathed in has less oxygen than air breathed out.

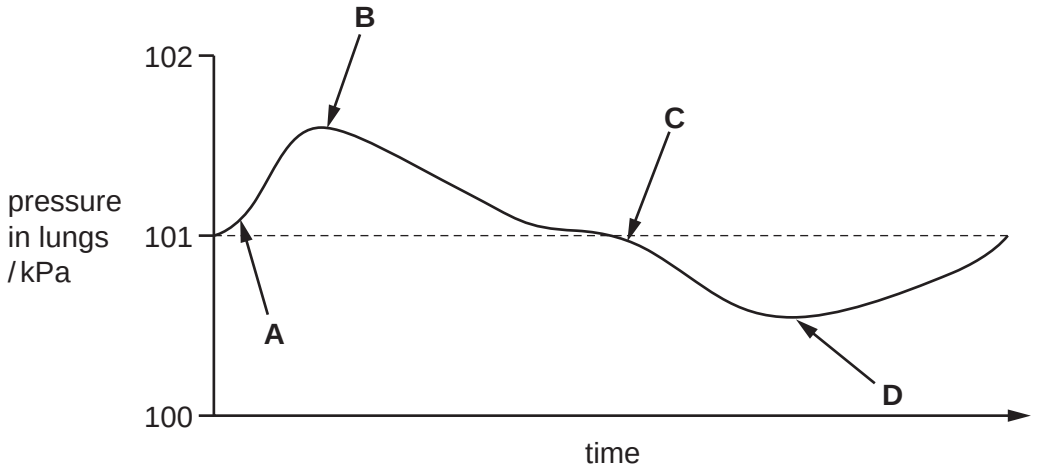
B Alveoli have thick walls and a large surface area.

C Alveoli have thin walls and a large surface area.

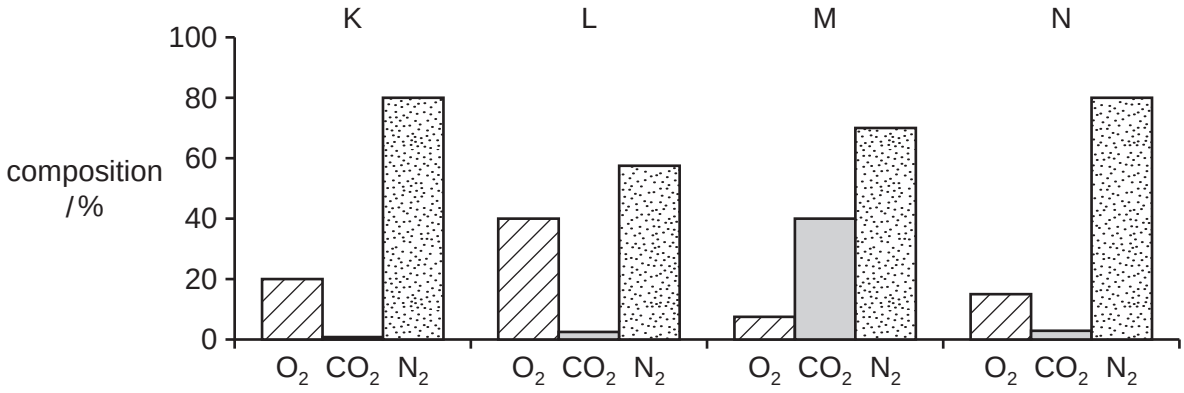
D The concentration of oxygen in the blood is higher than in the alveoli.

10 The diagram illustrates changes in air pressure taking place inside the lungs during a complete cycle of breathing. Atmospheric pressure is 101 kPa.

At which point on the diagram are the ribs beginning to be lowered?



11 The diagram shows the composition of four samples of air (O_2 = oxygen, CO_2 = carbon dioxide, N_2 = nitrogen).

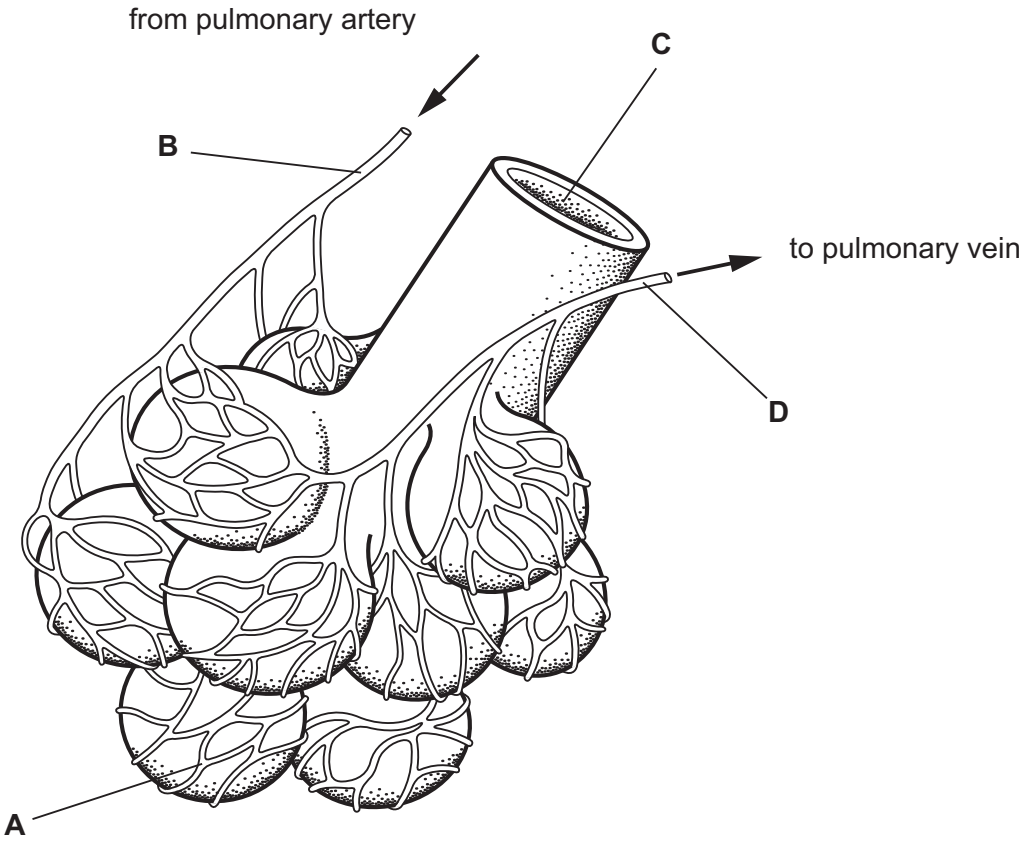


Which sample is inspired air and which sample is expired air?

	inspired air	expired air
A	K	N
B	L	K
C	M	L
D	N	M

12 The diagram shows some of the structures in a human lung.

Where is the carbon dioxide concentration highest?



13 The table shows the composition of four samples of air.

air sample	percentage of oxygen	percentage of carbon dioxide	percentage humidity
P	21	0.04	20
Q	16	4.04	100
R	4	0.40	80
S	20	4.00	60

Which sample is inspired air and which sample is expired air?

	sample breathed in	sample breathed out
A	P	Q
B	P	S
C	Q	R
D	Q	S

14 A girl holds her breath for 30 seconds, breathes out, and then breathes in.

Compared with the air she breathes out, the air she breathes in contains less

A carbon dioxide and water vapour.

B nitrogen and water vapour.

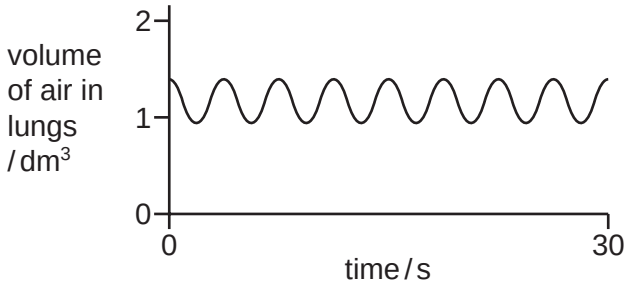
C oxygen and carbon dioxide.

D oxygen and nitrogen.

15 What makes alveoli suitable as a gas exchange surface?

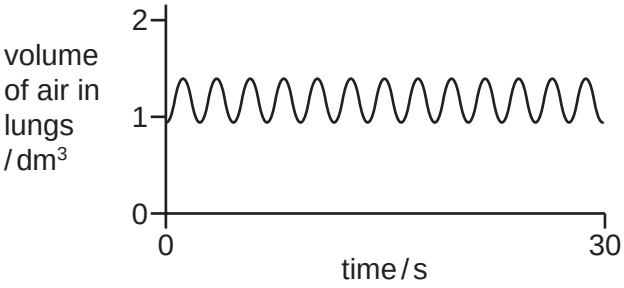
	large total surface area	well-supplied with blood vessels
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

16 The graph shows changes in the volume of air in the lungs of a person at rest, over a period of 30 seconds.

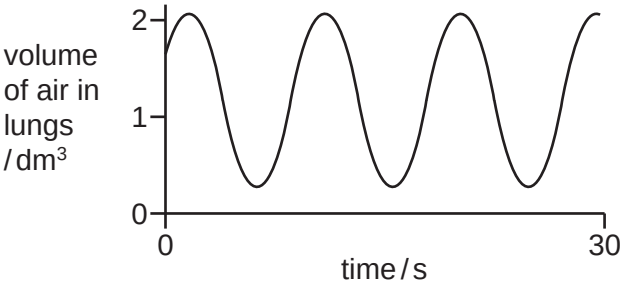


Which graph shows changes in the volume of air in the lungs of the same person immediately after they have done five minutes of vigorous exercise?

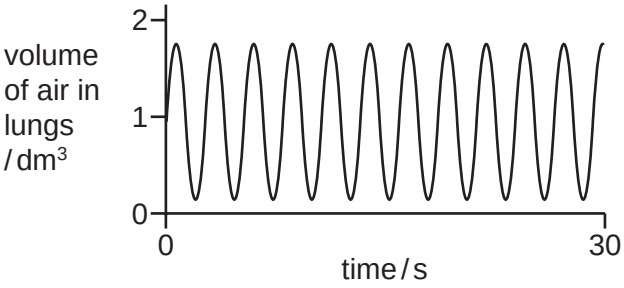
A



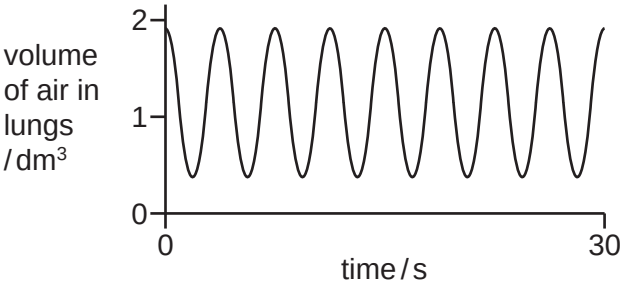
B



C

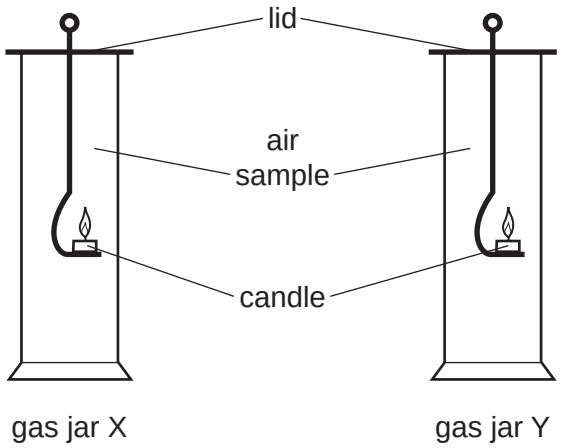


D



17 A sample of expired air is collected in a gas jar. Another gas jar contains normal atmospheric air.

A lighted candle is placed inside each gas jar as shown. The time taken for each flame to go out is measured. As the candles burn they use up the oxygen available in the jar.



The table shows the results of this experiment.

gas jar	time for candle flame to go out / s
X	15
Y	9

What is an explanation of the difference between the results in jars X and Y?

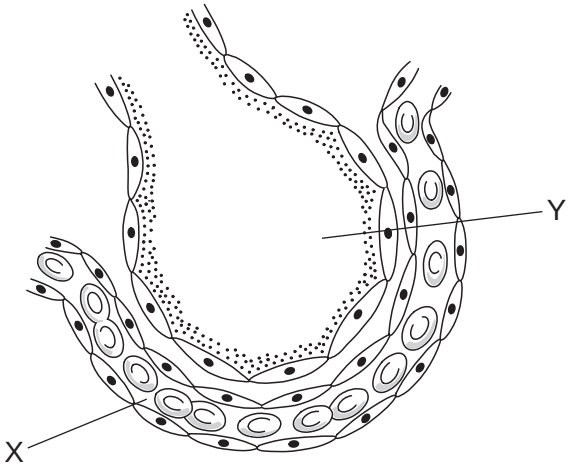
A Jar X contains atmospheric air which has more carbon dioxide.

B Jar X contains expired air which has more carbon dioxide.

C Jar Y contains atmospheric air which has less oxygen.

D Jar Y contains expired air which has less oxygen.

18 The diagram shows a section through an alveolus and a capillary.



Why does carbon dioxide move from X to Y?

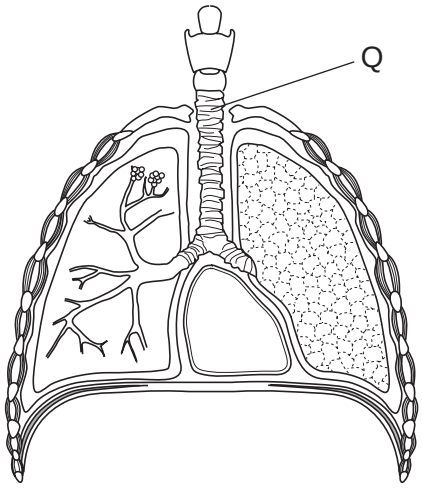
A Air has a lower concentration of carbon dioxide than blood.

B Carbon dioxide moves more freely in air than in blood.

C Carbon dioxide must replace oxygen.

D Diffusion of carbon dioxide can only be out of the blood.

19 The diagram shows some structures in the human neck and thorax.



The lining of tube Q has cilia.

What is an important function of the cilia?

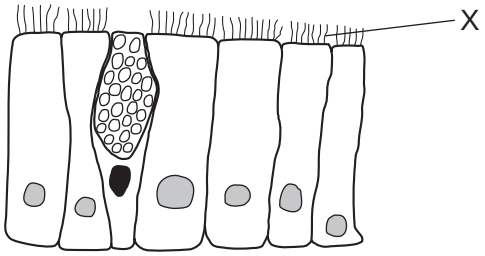
A to help in the exchange of gases

B to increase the internal surface area of tube Q

C to moisten the air entering and leaving the lungs

D to move mucus towards the throat

20 The diagram shows some ciliated cells from the trachea.



What is the function of the parts labelled X?

A detecting stimuli

B exchanging gases

C moving mucus

D trapping bacteria