

11. Gas Exchange in Humans

(Past Year Topical Questions 2010-2015)

May/June 2010 (11)

18 The diagram shows someone blowing up a balloon.



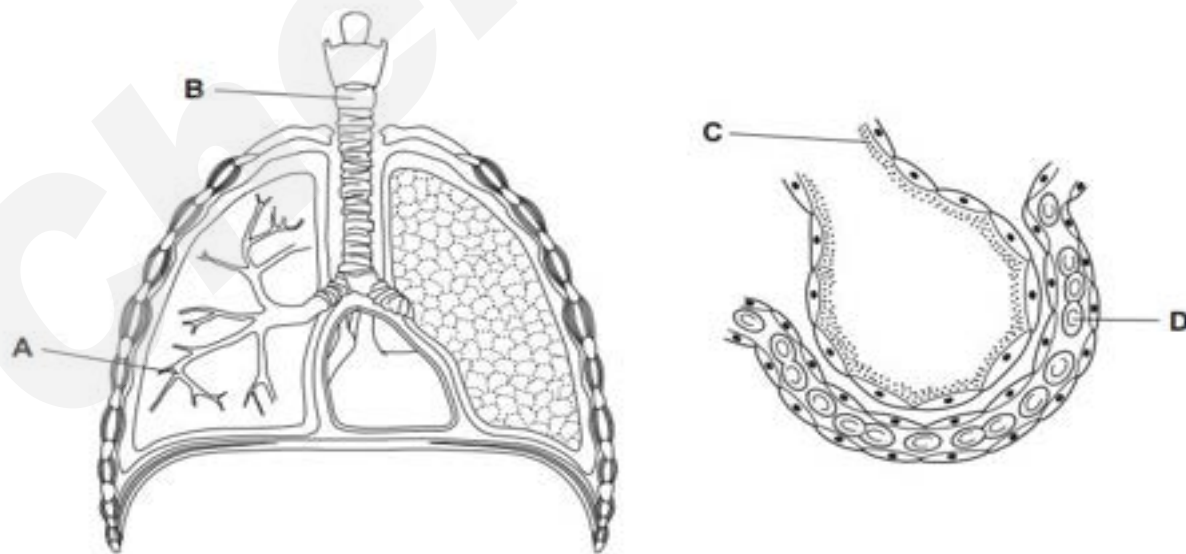
What percentage of the gas in the balloon is carbon dioxide?

- A 0.04% B 0.4% C 4.0% D 40%

Oct/Nov 2010 (11)

6 The diagram shows the breathing system and a section of an alveolus surrounded by a capillary.

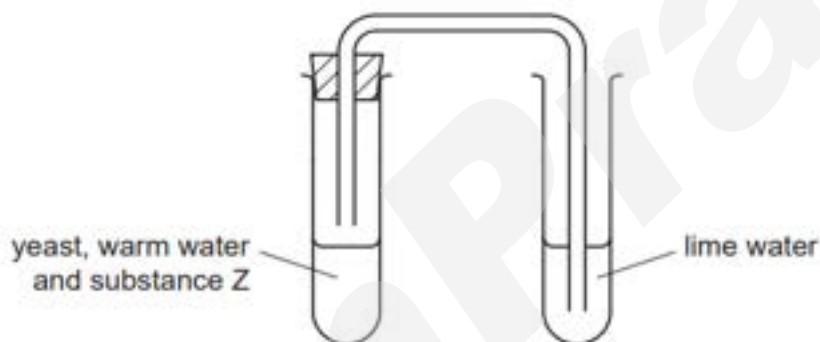
Which label shows a cell?



20 What are the properties of an efficient gas exchange system, assuming it has a good blood supply?

- A large surface and thick walls
- B large surface and thin walls
- C small surface and thick walls
- D small surface and thin walls

21 Yeast, warm water and substance Z were put into a test-tube. The apparatus was then set up as shown. After a while, the lime water began to go cloudy.

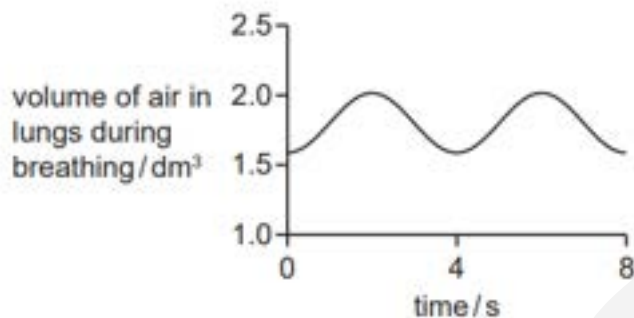


What is substance Z?

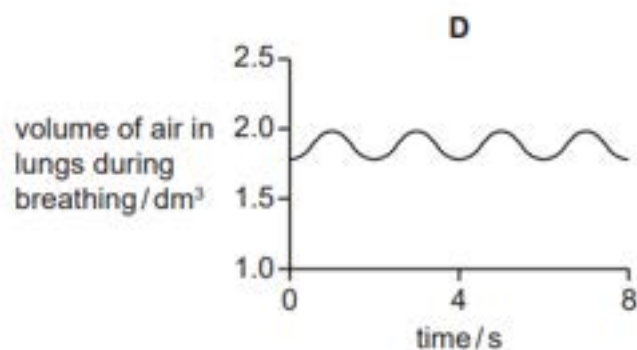
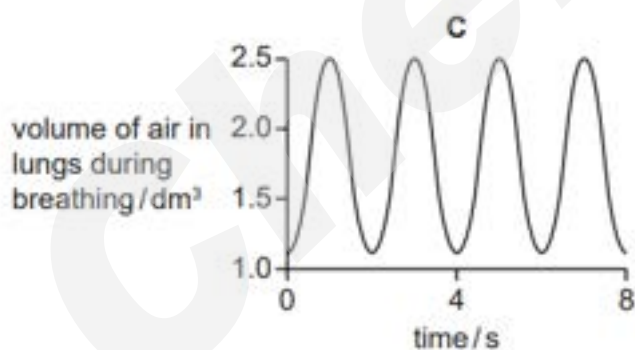
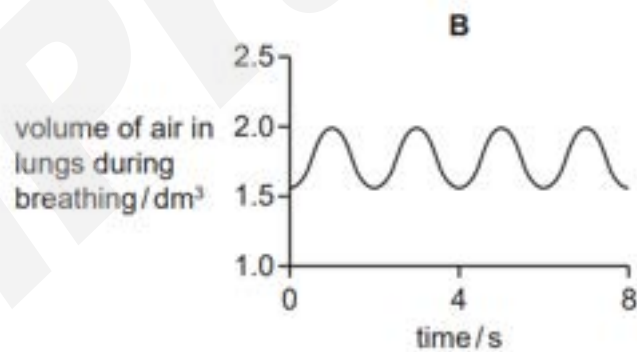
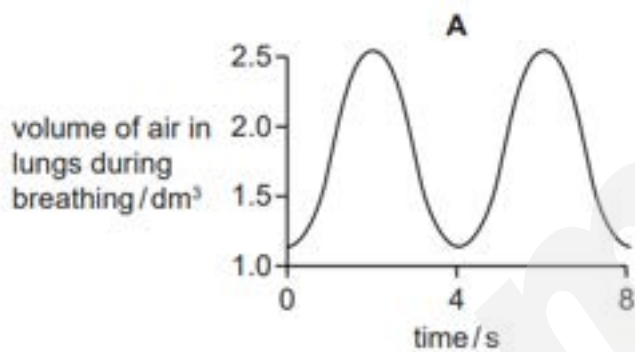
- A alcohol
- B carbon dioxide
- C glucose
- D oxygen

May/June 2011 (11)

20 The graph shows the rate and depth of a person's breathing before exercise.

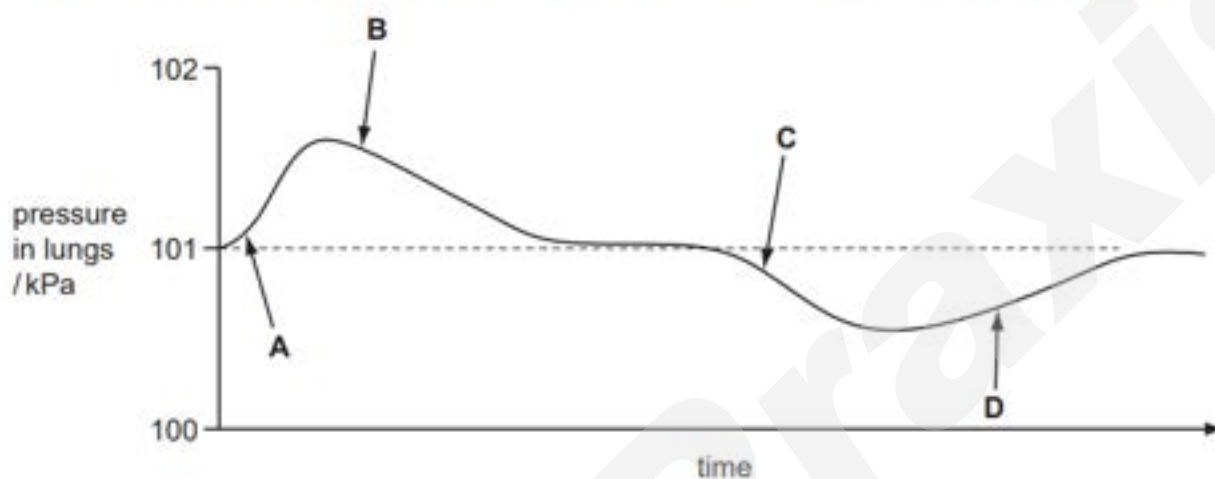


Which graph shows the rate and depth of breathing of the same person immediately after a period of exercise?



21 The diagram shows changes in air pressure inside the lungs during a complete cycle of breathing. Atmospheric pressure is 101 kPa.

Which position on the graph marks the point at which the ribs are beginning to be raised?



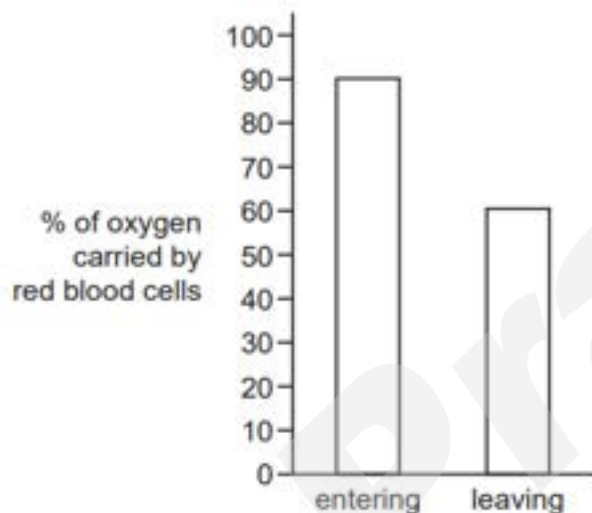
Oct/Nov 2011 (11)

21 Which process does **not** release carbon dioxide to the atmosphere?

- A decomposition of animals
- B photosynthesis of plants
- C respiration of animals
- D respiration of plants

May/June 2012 (12)

- 8** The bar chart compares the percentage of oxygen carried by red blood cells entering and leaving a relaxed muscle. On the bar chart, 100% is the amount of oxygen carried by red blood cells as they leave the lungs.



How much oxygen would red blood cells be likely to carry when leaving the same muscle after contraction?

- A** 40% **B** 60% **C** 90% **D** 100%

Oct/Nov 2012 (11)

- 20** The table shows the percentage composition of three gases in atmospheric air.

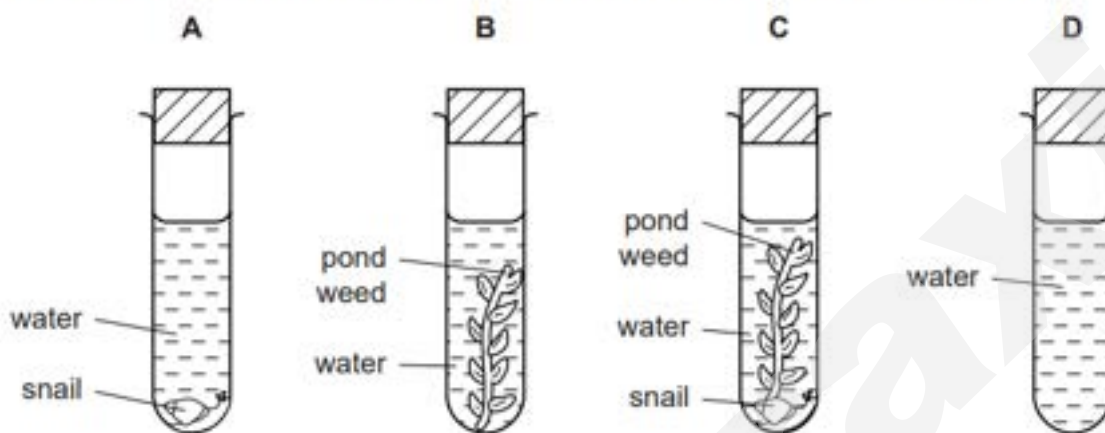
oxygen	carbon dioxide	nitrogen
21	0.04	78

What is the composition of the air breathed out by a person?

	oxygen / %	carbon dioxide / %	nitrogen / %
A	5	73	20
B	16	4	78
C	21	0.04	78
D	78	2	20

21 Four test-tubes were set up as shown in the diagram and left in full sunlight.

After several hours, which test-tube would contain the most dissolved carbon dioxide?



Oct/Nov 2013 (11)

20 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.

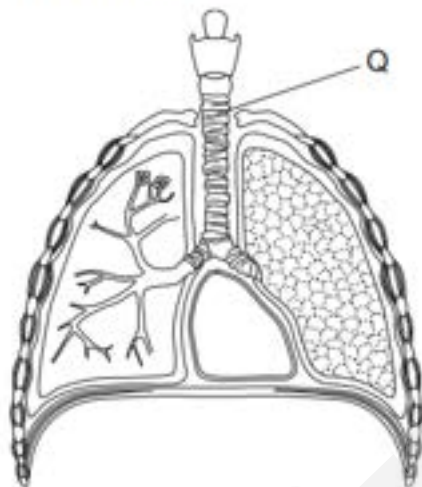
21 The table shows the approximate composition of air breathed out by a mammal.

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

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

- A** It was a product of proteins broken down in the mammal.
- B** It was a product of respiration.
- C** It was in the air that was breathed in.
- D** It was exchanged for oxygen which was taken into the blood.

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



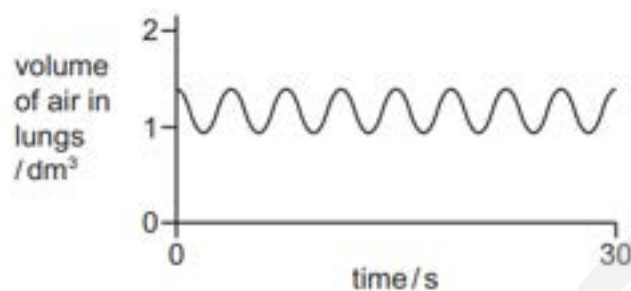
The lining of tube Q has cilia.

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

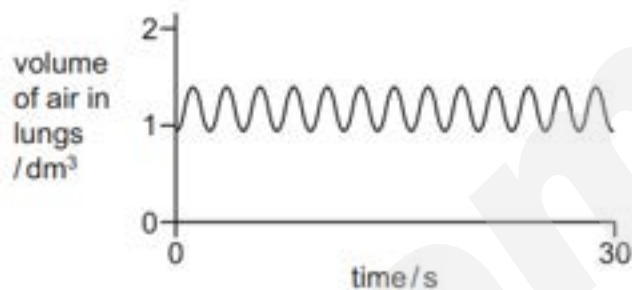
May/June 2014 (11)

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

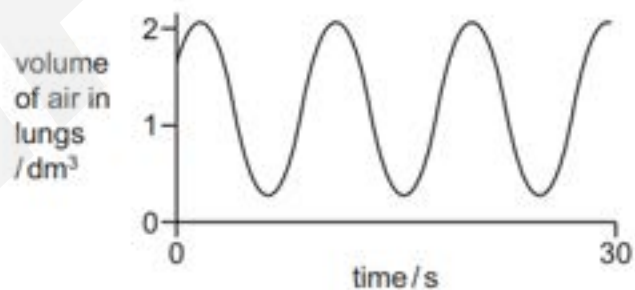


Which graph shows changes in the volume of air in the lungs of the same person immediately after they have done five minutes of vigorous exercise?

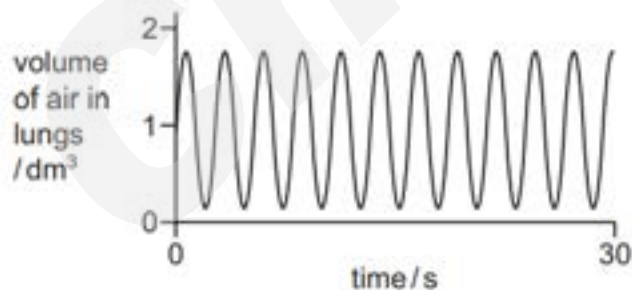
A



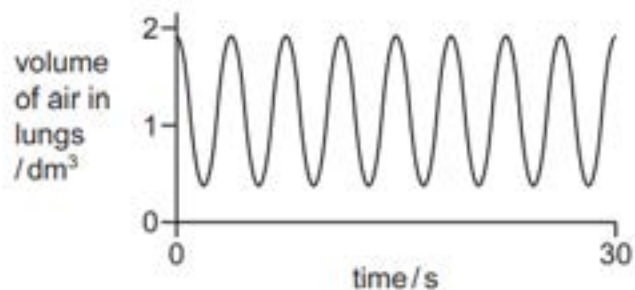
B



C



D



Oct/Nov 2014 (11)

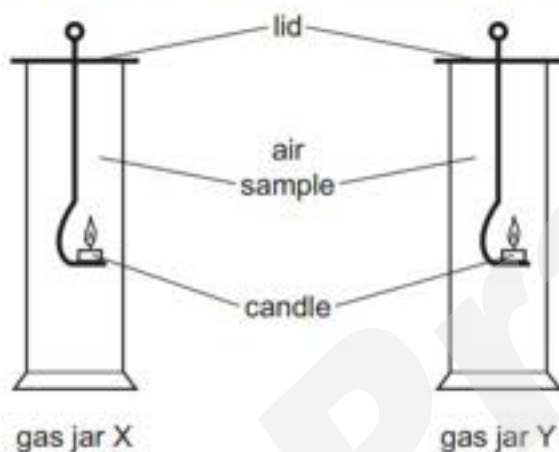
9 Which substance is transported by haemoglobin?

- A** nitrogen
- B** oxygen
- C** urea
- D** water

May/June 2014 (12)

21 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.

May/June 2015 (12)

19 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

May/June 2015 (13)

18 Where does haemoglobin become oxyhaemoglobin?

- A heart
- B kidneys
- C liver
- D lungs

20 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.

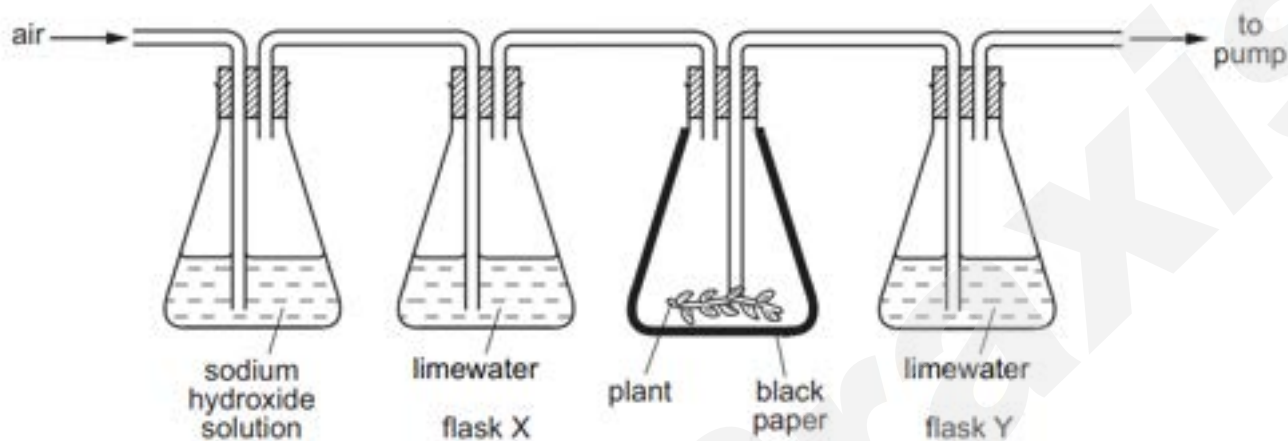
Oct/Nov 2015 (11)

16 Which substance is lost from the body of a healthy person by the kidneys, but **not** by the lungs?

- A carbon dioxide
- B glucose
- C urea
- D water

Oct/Nov 2015 (11)

19 Apparatus was set up as shown.



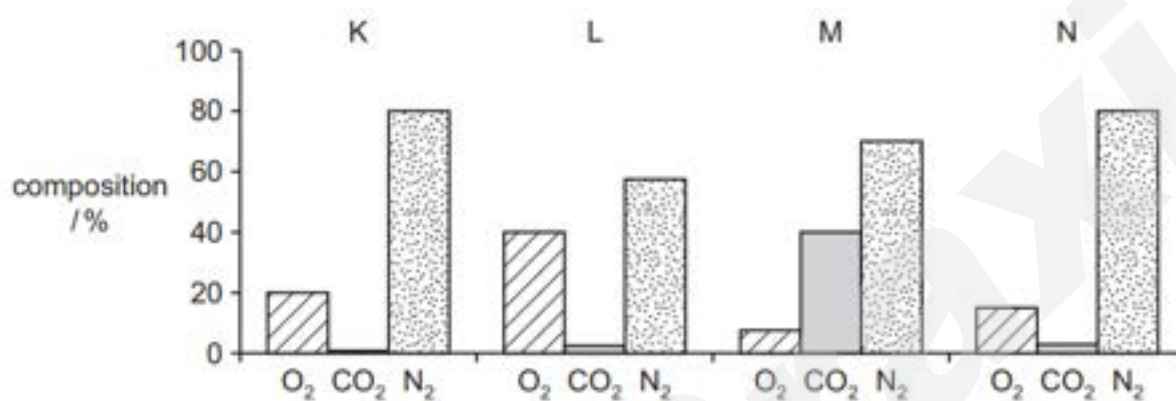
Sodium hydroxide removes carbon dioxide from the air. Limewater goes cloudy if carbon dioxide is bubbled through it.

What happens to the limewater in flasks X and Y when the pump is switched on?

	flask X	flask Y
A	goes cloudy	goes cloudy
B	goes cloudy	stays clear
C	stays clear	goes cloudy
D	stays clear	stays clear

Oct/Nov 2015 (12)

- 19 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

Oct/Nov 2015 (13)

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

Where is the carbon dioxide concentration highest?

