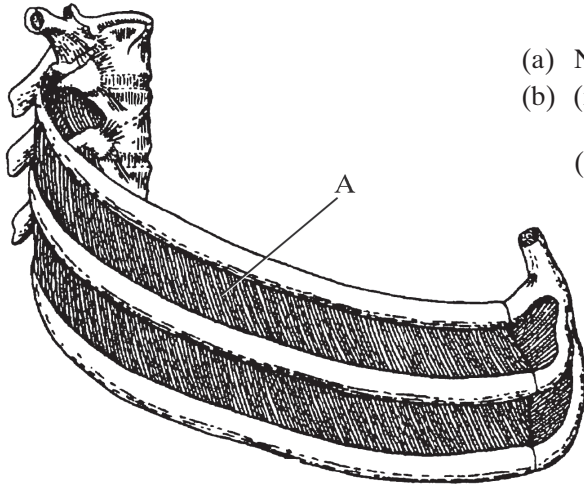


1 Figure 1 shows some of the structures involved in ventilating human lungs.



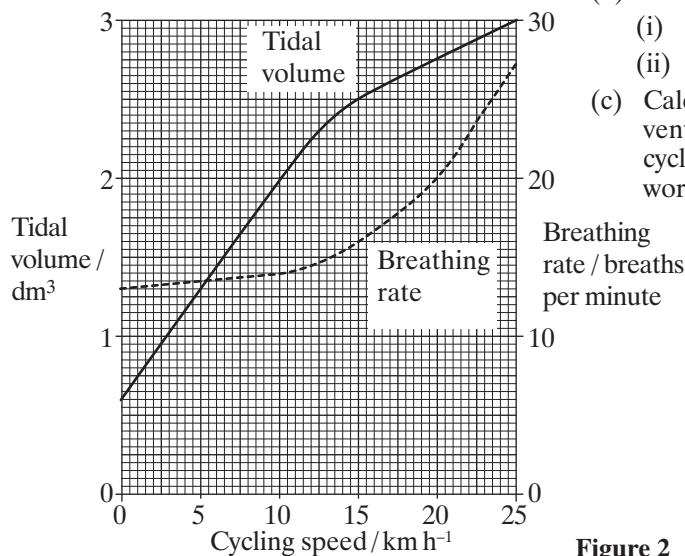
- (a) Name structure A. (1 mark)
- (b) (i) Describe the role of structure A in inspiration.
(ii) Explain how ventilation increases the rate of gas exchange in the alveoli. (5 marks)

AQA, 2003

Figure 1

2 (a) Describe how air is taken into the lungs. (4 marks)

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedalling at different speeds. Figure 2 shows the results.



- (b) Describe the **two** curves:
(i) Tidal volume
(ii) Breathing rate (2 marks)
- (c) Calculate the pulmonary ventilation when the cyclist is cycling at 20 km h⁻¹. Show your working. (2 marks)

AQA, 2005

Figure 2

3 A resting person breathed normally. The total volume of air in the lungs during each breath is shown in Figure 3.

- (a) (i) The pulmonary ventilation rate is the volume of air taken into the lungs in one minute. Calculate the pulmonary ventilation rate of the person whose pattern of breathing is shown in the graph.
(ii) Give **two** ways in which a change in the pattern of breathing may increase pulmonary ventilation rate during a period of exercise. (2 marks)
- (b) Describe the part played by the diaphragm in bringing about the movement of air over the part of the graph labelled A. (3 marks)

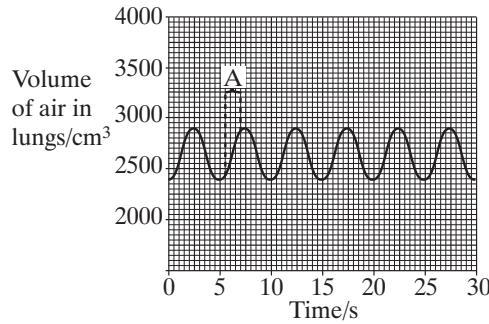


Figure 3

- (c) The table shows the percentage of gases in samples of inhaled and exhaled air.

| Gas | Percentage in | |
|----------------|---------------|-------------|
| | inhaled air | exhaled air |
| Nitrogen | 78.47 | 74.40 |
| Carbon dioxide | 0.04 | 3.95 |
| Oxygen | 20.47 | 16.01 |
| Other gases | 0.38 | 0.36 |
| Water vapour | 0.42 | 4.20 |

Use the information in the table to explain why the percentage of nitrogen is lower in exhaled air than in inhaled air.

(1 mark)

- (d) (i) Name the structures in the lungs which an oxygen molecule will pass through on its way to an alveolus.
 (ii) Describe how **two** features of an alveolus enable efficient exchange of gases in the lungs.

(5 marks)

AQA, 2001

- 4 (a) Explain how emphysema reduces the efficiency of gas exchange in the lungs. (4 marks)
 (b) Give **two** factors which could increase the incidence of emphysema. (2 marks)
 (c) Give **three** differences between emphysema and asthma. (3 marks)
- 5 (a) Describe how pulmonary tuberculosis is transmitted from one person to another. (2 marks)
 (b) Give **two** symptoms of pulmonary tuberculosis. (2 marks)
 (c) The table shows the number of TB cases in the UK from 2000 to 2005.

| Year | Number of TB cases in UK |
|------|--------------------------|
| 2000 | 6 323 |
| 2001 | 6 652 |
| 2002 | 6 861 |
| 2003 | 6 970 |
| 2004 | 7 321 |
| 2005 | 8 113 |

- (i) Suggest **two** reasons for the increase in the number of TB cases in the UK during this period.
 (ii) Calculate the percentage increase in the number of TB cases in the UK between 2002 and 2005.

(4 marks)

- 6 (a) Give **two** symptoms of pulmonary fibrosis. (2 marks)
 (b) Explain how fibrosis affects the function of the lungs. (4 marks)
 (c) Scientists investigated the effect of smoking cigarettes on the incidence of emphysema. The investigation included non-smokers and smokers who smoked 5, 10, 15 or 20 cigarettes per day.
 (i) Give **three** other factors the scientists should take into consideration when choosing their sample for this investigation.
 (ii) The results of the investigation showed a correlation between the number of cigarettes smoked and the incidence of emphysema. Using this example explain the distinction between a correlation and a causal relationship.

(5 marks)