

Gas exchange in humans: practice questions

8 questions • 25 marks • mark scheme at the back

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Name

Total / 25

1 **Supplement** [1 mark]

Which statement explains why expired air contains less oxygen than inspired air?

- A. ☐ Oxygen is converted into carbon dioxide in the trachea.
- B. ☐ Oxygen diffuses into the blood and is used in respiration.
- C. ☐ Oxygen is stored in the alveoli.
- D. ☐ Oxygen is trapped by the mucus.

2 [5 marks]

A student investigates inspired and expired air using two tubes of limewater. (a) State what happens to limewater when carbon dioxide is bubbled through it. [1] (b) State which tube of limewater, the one for inspired air or the one for expired air, turns cloudy faster, and what this shows. [2] (c) Name two other differences in composition between inspired air and expired air, apart from carbon dioxide. [2]

- 3** A student counts her breathing rate at rest and after exercise. The results are shown in the table. Calculate the percentage increase in her breathing rate after exercise. Show your working. **[3 marks]**

Breathing rate	
condition	breathing rate / breaths per minute
at rest	18
after exercise	36

Answer =

- 4** Supplement **[4 marks]**
- Explain how the muscles and the diaphragm cause air to move into the lungs when a person breathes in.

- 5** Supplement **[4 marks]**
- Explain why a person's rate and depth of breathing increase during physical activity.

6

Supplement

[3 marks]

(a) State the function of the cartilage in the trachea. [1] (b) Describe how goblet cells and ciliated cells protect the lungs from pathogens. [2]

7

(a) Name the structures in the breathing system where gas exchange takes place. [1] (b) Describe three features of the structures named in (a) that make them efficient gas exchange surfaces. [3]

[4 marks]

8

Supplement

[1 mark]

Which row describes the internal intercostal muscles during forced breathing out?

- A. ☐ On the outside of the ribs; they contract
- B. ☐ On the inside of the ribs; they contract
- C. ☐ On the inside of the ribs; they relax
- D. ☐ On the outside of the ribs; they relax

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1] Supplement

B B: oxygen diffuses into the blood and is used in respiration (1)

2. [5]

- (a) it turns cloudy / milky (1)
- (b) the tube for expired air (1)
- expired air contains more carbon dioxide than inspired air (1)
- (c) expired air has less oxygen (1)
- expired air has more water vapour (1) ignore nitrogen / temperature

3. [3]

- increase = $36 - 18 = 18$ breaths per minute (1)
- $18 \div 18 \times 100$ (1)
- 100% (1)

4. [4] Supplement

- external intercostal muscles contract (1)
- internal intercostal muscles relax (1)
- ribs move up and out (1)
- diaphragm contracts and flattens (1) allow: moves down
- volume of thorax increases (1)
- pressure in thorax decreases / lower than atmospheric pressure (1)
- air moves in from higher pressure outside (1) reject lungs expand and suck air in
- Max 4

5. [4] Supplement

- muscles respire faster / more respiration (1)
- more carbon dioxide produced / carbon dioxide concentration in blood increases (1)
- this is detected by the brain (1) reject brain detects lack of oxygen
- brain sends signals to the breathing muscles / increases the rate and depth of breathing (1)
- more carbon dioxide removed / more oxygen supplied (1)
- Max 4

6. [3] Supplement

- (a) supports the trachea / keeps the trachea open (1)
- (b) goblet cells make mucus (1)
- which traps pathogens / particles (1) allow: ref. to dust
- ciliated cells (cilia) move the mucus away from the lungs / up to the throat (1)
- Max 2 for (b)

7. [4]

- (a) alveoli (1)
- (b) large surface area (1)
- thin / walls one cell thick / short diffusion distance (1)
- good blood supply / network of capillaries (1)
- good ventilation with air / breathing (1)
- Max 3 for (b)

8. [1] Supplement

B B (1)