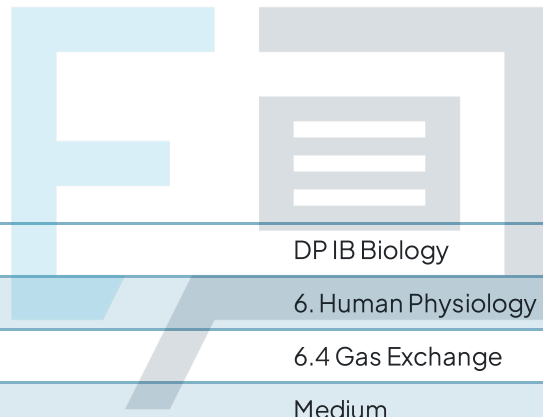




# 6.4 Gas Exchange

## Mark Schemes



Course	DP IB Biology
Section	6. Human Physiology
Topic	6.4 Gas Exchange
Difficulty	Medium

# Exam Papers Practice

To be used by all students preparing for DP IB Biology HL  
Students of other boards may also find this useful

1

The correct answer is **A** because the concentration of oxygen must be higher in the alveoli compared to the capillaries in order for oxygen to diffuse into the capillaries. The capillary wall is one cell thick for a short diffusion distance and a moist layer allows gases to dissolve so they can move through the wall of the alveolus.

Option **B** is incorrect because carbon dioxide needs to be kept at a low level in the alveolar sac to maintain a concentration gradient for carbon dioxide to move out of the capillaries.

Option **C** is incorrect because the concentration gradient needs to be maintained and not reduced.

Option **D** is incorrect because the descriptions are allocated to the wrong features.

2

The correct answer is **C** because the pulmonary surfactant reduces the surface tension of the alveoli and prevents the sacs from sticking together which prevents the walls from collapsing inward.

Option **A** is incorrect because the surfactant decreases surface tension.

Option **B** is incorrect because the pulmonary surfactant increases the diffusion distance, if anything.

Option **D** is incorrect because it is the mucus in the airways which traps microorganisms to prevent them reaching the lungs.



3

The correct answer is **D**, all 3 would be found in the bronchi.

**Smooth muscle** is found in the bronchioles and bronchi, it can contract and relax to alter the diameter of the airways. **Cartilage** prevents collapse from low pressure during inhalation. **Ciliated cells** waft mucus (containing dirt and trapped pathogens) out of the breathing system.

4

The correct answer is **C** as bronchioles have **collagen, elastic fibres** and **cilia** but are not involved in **gas exchange** (gas exchange only occurs in the alveoli). Knowing that narrows the choice down to **C** or **D** and (while you are not expected to know the specific diameters of the different airways), given the overall size of the lungs, it would not be possible for the bronchioles to be 20 mm in diameter (20 mm would be more like the approximate diameter of the trachea), therefore the answer must be **C**.

**Gas exchange** in the **alveoli** is possible due to their thin, **squamous epithelial cell** walls (which create a **short diffusion distance**). They also have a **large surface area** and **extensive blood supply**.

5

The correct answer is **D**; contraction of the diaphragm increases the volume of the thorax which decreases the pressure to be lower than atmospheric pressure. This sucks air into the lungs.

Option **A** is incorrect because pressure decreases due to the increase in volume.

Option **B** is incorrect because the diaphragm contracts to allow inhalation.

Option **C** is incorrect because it describes the conditions required for exhalation.

Exam Papers Practice



6

The correct answer is **B**; the diaphragm contracts whilst the abdominal muscles relax and vice versa to work as an antagonistic pair.

Options **A**, **C** and **D** are all incorrect as they are not muscles that work in pairs with opposing action.

7

The correct answer is **B**; In order to show a link between a risk factor and incidence of a disease, it is important to get a very large study group of people who carry the correct diagnoses and where other confounding factors are limited or controlled. This can be very difficult to achieve, especially in the case of rare diseases.

Option **A** is incorrect because the impact of confounding factors affects validity and not reliability of the results collected.

Option **C** is incorrect because statistical analysis can and is used to demonstrate significance of results from epidemiological studies.

Option **D** is incorrect because data collected is anonymous and any ethical considerations would be dealt with at the design stage of the epidemiological study.

8

The correct answer is **A**.

Damage to cilia cells in the airways leads to increased levels of bacteria entering the lungs. Phagocytes arrive to combat these pathogens but the increased levels of elastase lead to decreased elasticity of the alveoli which results in them joining together and significantly reducing the surface area of the lungs. This then reduces diffusion of oxygen into the blood.

9

The correct answer is **B**

Option **A** is incorrect because we don't have enough information in the graph to show a causal relationship between cigarette smoking and lung cancer.

Option **C** is incorrect because the data suggests that men have a higher risk than women.

Option **D** is incorrect because non-smokers can still develop lung cancer as a result of other mutagens such as radon gas or passive smoking.

10

The correct answer is **B**.

Option **A** is incorrect because it shows the residual volume which is the minimum amount of air required to keep the airways open.

Option **C** is incorrect because it shows the vital capacity (you do not need to know about vital capacity)

Option **D** is incorrect because it represents the total lung capacity.

Exam Papers Practice