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Level: HL IB in Biology
Subject: Biology
Topic: IB HL Biology
Type: Mark Scheme

All International Baccalaureate IB Topic Questions HL Biology

BIOLOGY

HL - IB

Key skills

Answer 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.

Answer 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.

Answer 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.

Answer 4

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.

Answer 5

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.

Answer 6

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.

Answer 7

The correct answer is B because higher humidity levels, lower temperatures, less air movement and lower light intensities all result in lower transpiration rates.

- Low humidity means the air surrounding the leaf surface is not saturated with water vapour, which makes water more likely to evaporate out of the leaf (due to the concentration gradient between the inside of the leaf and the outside)
- Higher temperatures result in more evaporation from the leaf. However, don't forget that very high temperatures can actually reduce transpiration rates, as the stomata close to prevent excess water loss
- Wind carries water molecules away from the leaf surface, increasing the concentration gradient and causing more water vapour to diffuse out
- At high light intensity the plant is carrying out more photosynthesis, resulting in more opening of the stomata to provide the space for gas exchange to occur through the leaf. The open stomata also provides an avenue for water to move out of the leaf, increasing the rate of transpiration

Answer 8

The correct answer is B.

Although potometers can be used to estimate transpiration rates in plants, they technically measure the rate of water uptake rather than the rate of transpiration, as a small amount of the water taken up by a plant will be used in photosynthesis.

Answer 9

The correct answer is A because an increase in temperature increases the rate of transpiration as water molecules evaporate out of the leaf at a faster rate. However, if the temperature gets too high the stomata close to prevent excess water loss, which dramatically reduces the rate of transpiration.

- B is incorrect, as transpiration rates decrease with increasing humidity
- C is incorrect, as transpiration rates increase with increasing air movement (wind speed) but then level off (at which point other factors are limiting the rate of transpiration)
- D is incorrect for the same reason - transpiration rates increase with increasing light intensity but then level off once a certain intensity of light is reached