

QB365

Important Questions - Breathing and Exchange of Gases

11th Standard CBSE

Biology

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

Section-A

- 1) Why do cells need a constant supply of oxygen? 1
- 2) What is a dead air space? 1
- 3) How is clinical assessment of pulmonary function done? 1
- 4) Give the name of the site of actual diffusion of O₂ and CO₂ 1
- 5) Cigarette smoking causes emphysema. Give reason 1
- 6) How is respiration carried out in earthworm? 1
- 7) Name the double-walled sac, which covers the lung in animals. 1
- 8) How does haemoglobin help in the transport of oxygen from lung to tissues? 1
- 9) State the factors affecting the oxygen haemoglobin binding 1
- 10) What does the oxygen haemoglobin dissociation curve indicate? 1

Section-B

- 11) Arrange the following terms based on their volumes in an ascending order. 2
 - (i) Tidal Volume (TV)
 - (ii) Residual Volume (RV)
 - (iii) Inspiratory Reserve Volume (IRV)
 - (iv) Expiratory Capacity (EC)
- 12) How is CO₂ transported in human body 2
- 13) What is the role of carbonic anhydrase in humans? 2
- 14) Define vital capacity. What is its significance? 2
- 15) Write about Haldane effect. How does Haldane effect and Bohr effect complement each other? 2
- 16) What happens to the respiratory process in a man going up a hill? 2
- 17) A person dies in an accident in which his chest cavity was punctured, but no lung damage was there. Point out the cause of death. 2
- 18) For completion of respiration process, write the given steps in sequential manner 2
 - (i) Diffusion of gases (O₂ and CO₂) acrosses alveolar membrane.
 - (ii) Transport of gases by blood.
 - (iii) Utilisation of O₂ by the cells for catabolic reactions and resultant release of CO₂.
 - (iv) Pulmonary ventilation by which atmospheric air is drawn in and CO₂ rich alveolar air is released out.
 - (v) Diffusion of O₂ and CO₂ between blood and tissues.
- 19) Diffusion of gases occurs in the alveolar region only and not in the other part of respiratory system. Why? 2

20) Why is breathing of women regarded as thoracic, while that of male as abdominal? Also state who among the two has higher vital capacity. 2

Section-C

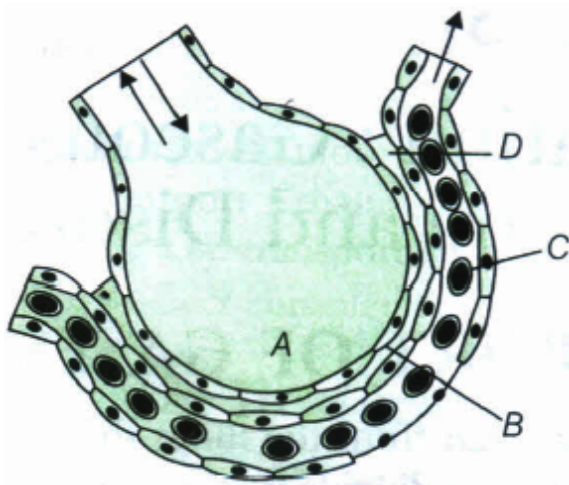
21) State the route of foul air from the lungs to outside. Also state whether TV increases or decreases during excitement and activity. 5

22) Why is it not advisable to sleep in closed rooms warmed with burning of coals continuously? 5

23) Which of the regulatory centre of respiration can reduce the inspiratory duration when it is stimulated? 5

24) What is tidal volume? Find out the tidal volume for a healthy human in an hour time? 5

Also, label the parts A, B, C and D in the given, figure of alveolus.



Section-A

1) 1

Cells continuously need oxygen for the metabolic reactions that releases energy from the molecules. This energy is used by cells for various functions of body

2) 1

The conducting portion of the human respiratory system is called dead air space. It starts with the external nostrils upto the terminal bronchioles.

3) It is done with the special instrument called spirometer. 1

4) Alveoli and their ducts 1

5) 1

Cigarette smoking causes damages to the alveolar walls and reduces elasticity of the lungs, which leads to decreased respiratory surface for exchange of gases. Thus, causing emphysema

6) Earthworm respire through moist skin. It is called cutaneous respiration. 1

7) It is called pleural cavity. 1

8) 1
Haemoglobin combines with O_2 in a reversible manner to form oxyhaemoglobin. This oxygenated blood circulates in the body. When it reaches the tissues having low pO_2 , the oxygen is released into the tissues. ₂

9) Factors that affect the oxygen haemoglobin binding are 1
(i) Partial pressure of oxygen
(ii) Partial pressure of carbon dioxide
(iii) Hydrogen ion concentration
(iv) Temperature

10) 1
The lower part of the curve indicates dissociation of oxygen from haemoglobin while, the upper part of the curve indicate acceptance of oxygen by Hb

Section-B

11) 2

12) CO_2 is transported in the human body in the following ways 2
(i) In dissolved form about 7%
(ii) As bicarbonate ions about 70%
(iii) As carbaminohaemoglobin about 20-25%

13) 2
Nearly 70% of CO_2 enters the RBCs and reacts with water to form carbonic acid in the presence of enzyme carbonic anhydrase. This dissociates to form bicarbonate ions, which are circulated by plasma

14) 2
Vital capacity is the maximum amount of air a person can breathe in after a forced expiration or breathe out after a forced inspiration. It represents the maximum amount of air one can renew in the respiratory system during a single respiration. Thus, the greater the VC, more is the energy available to the body.

15) 2
Haldane effect states that binding of oxygen with haemoglobin tends to displace CO_2 from the blood. It is quantitatively more important in promoting CO_2 transport than the Bohr effect in O_2 transport. Thus, Haldane effect and Bohr effect complement each other.

16) 2
At hills, the pressure of air falls and the person cannot get enough oxygen in the lungs for diffusion in blood. Due to deficiency of oxygen, the person feels breathlessness, headache, dizziness, nausea, mental fatigue and a bluish colour on the skin, nails and lips

17) 2
The movement of air into and out of the lungs is carried out by creating a pressure gradient between the lungs and the atmosphere. The pressure within the lungs is less than the atmospheric pressure so, there is a negative pressure in the lungs with respect to atmospheric pressure. The puncture in the chest affects this pressure gradient maintained by the lungs and thus, may cause cessation of breathing

- 18) (i) Pulmonary ventilation by which atmospheric air is drawn in and CO₂ rich alveolar air is released out. 2
(ii) Diffusion of gases (O₂ and CO₂) acrosses alveolar membrane.
(iii) Transport of gases by blood to the farthest tissues in body.
(iv) Diffusion of O₂ and CO₂ between blood and tissues.
(v) Utilisation of O₂ by the cells for catabolic reactions and resultant release of CO₂ and energy.

- 19) For efficient exchange of gases, respiratory surface must have certain characteristics such as 2
(i) it must be thin, moist and permeable to respiratory gases.
(ii) it must be large.
(iii) it must be highly vascular.
Only alveolar region has these characteristics. Thus, diffusion of gases occurs in this region only.

- 20) 2
In male, the lateral movements of thorax constitutes 25% of breathing, while the abdominal movement accounts for 75% breathing. Thus, it regarded as abdominal breathing.
In women, particular in pregnant women, the entire breathing is through lateral movements of the thorax. thus, breathing in women is regarded as thoracic.
The VC is higher in men than in women and in the young ones than in the old persons.

Section-C

- 21) 5
The foul air follows the route given below
Alveoli → Alveolar ducts → Bronchioles → Bronchi →
Trachea → Larynx → Glottis → Pharynx → Internal nares →
Nasal chambers → External nares → Atmosphere.
The tidal volume increases 4-10 times during excitement and activity.

- 22) 5
A person sleeping in such room gets carbon monoxide poisoning. CO combines with Hb more readily than oxygen forming carboxyhaemoglobin. This reduce the amount of free Hb available for carrying O₂. Thus, the tissue is starved of O₂. This is the reason why it is not advisable to sleep in closed rooms warmed with coals

- 23) 5
The respiratory process is regulated by certainly specialised centres present in hindbrain. Amongst them, pneumotaxis centre is located in the dorsal part of pons varoli of the brain, can reduce the duration of inspiration and thus, alter the respiratory rate.

24)

5

Tidal volume is the volume of air inspired or expired during normal breathing in relaxed or resting position. Its volume is about 500 mL.

Amount of Tidal Volume (TV) in an hour

= Respiratory rate \times TV \times 60 min

= (12 -16 breaths per minute) \times 500 mL \times 60

= 6- 8 L \times 60

TV = 360 -480 L

A - Alveolar cavity,

B - Alveolar wall,

C - Red blood cells,

D - Basement substance.