1. Mark the true statement among the following with reference to normal breathing -

(a) Inspiration is a passive process where expiration is active process
(b) Inspiration is an active process where expiration is passive process
(c) Inspiration and expiration are active processes
(d) Inspiration and expiration are passive processes

2. The organ in reptiles, which can be considered as analogous to the gills of fishes is/are
(a) spiracles (b) dry skin
(c) lungs (d) trachea

3. Correct sequence of the air passage in humans is
(a) Nose→ Larynx→ Pharynx→ Bronchioles→ Alveoli
(b) Nose→ Pharynx→ Larynx→ Bronchioles→ Bronchi
(c) Nose→ Pharynx→ Larynx→ Bronchioles→ Trachea
(d) External nostril→ Nasal passage→ Internal nostril→Pharynx→ Larynx→ Trachea→ Bronchi→ Bronchiole→ Alveoli

4. Which portion of the human respiratory system is called sound box?
(a) Larynx (b) Trachea
(c) Nasopharynx (d) Glottis

5. A thin, elastic cartilaginous flap which prevents the entry of food into larynx during swalloing is
(a) epiglottis (b) glottis
(c) bronchi (d) prethoracic

6. Alveoli in human lungs are
(a) thick-walled, terminal ends of bronchioles
(b) polygonal, thin, non-vascularised bag-like structure
(c) not supplied by blood and are non-functional
(d) thin-walled, vascularised irregular walled structures

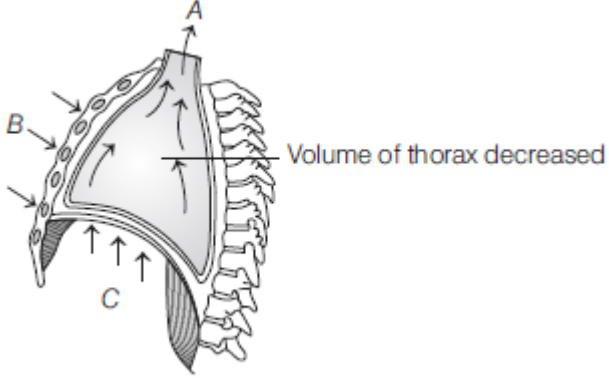
7. In humans, which of the following is not a step in respiration?
(a) Alveolar diffusion of O_2 and CO_2
(b) Transport of gases by blood
(c) Diffusion of O_2 and CO_2 between blood and tissues
(d) Utilisation of CO_2 by cells for catabolic reactions

8. Inspiration is initiated by
(a) the extension of diaphragm
(b) the contraction of diaphragm
(c) decrease in volume of thoracic chamber
(d) the contraction of lungs

9. Expiration occurs when
(a) intrapulmonary pressure is less than the atmospheric pressure
(b) intrapulmonary pressure is greater than the atmospheric pressure
(c) intrapulmonary pressure is equal to the atmospheric pressure
(d) intrapleural pressure becomes more than the intra-alveolar pressure

10. During expiration,
(a) thoracic volume increases and diaphragm contracts
(b) intrapulmonary pressure increases above atmospheric pressure
(c) sternum is present at normal position
(d) Both (b) and (c)

11. In the given diagram of mechanism of breathing, what does *A*, *B* and *C* depict?



(a) A–Air goes inside to lungs, B–Ribs and sternum returned to original position, C– Diaphragm contracted

(b) A–Air expelled from lungs, B–Ribs and sternum returned to original position, C–Diaphragm relaxed and arched upward
(c) A–Air expelled from lungs, B–Ribs and sternum go upward, C–Diaphragm relaxed and arched upward
(d) A–Air goes inside to lungs, B–Ribs and sternum go upward, C–Diaphragm relaxed and arched upward

12. Approximate volume of air, a healthy man can inspire or expire per minute is
(a) 5000 to 6000 mL (b) 6000 to 7000 mL
(c) 6000 to 8000 mL (d) 7000 to 9000 mL

13. The maximum volume of air, a person can breathe in after a forced expiration is known as ***NEET (Odisha) 2019***
(a) expiratory capacity (b) vital capacity
(c) inspiratory capacity (d) total lung capacity

14. In humans, exchange of gases occurs
(a) by diffusion
(b) between blood and tissue
(c) between alveoli and pulmonary blood capillary
(d) All of the above

15. Partial pressure of O_2 and CO_2 in atmospheric air as compared to that in alveolar air is

	pO_2	pCO_2
(a)	Higher	Lower
(b)	Higher	Higher
(c)	Lower	Lower
(d)	Lower	Higher

16. Almost same pO_2 in humans is found in
(a) alveoli and tissues
(b) oxygenated blood and deoxygenated blood
(c) alveoli and oxygenated blood
(d) tissues and deoxygenated blood

17. The solubility of CO_2 in the blood is
(a) 10-15 times higher than that of O_2
(b) 20-25 times higher than that of O_2
(c) slightly higher than that of O_2
(d) slightly lower than that of O_2

18. How many layers are present in the diffusion membrane of alveolus capillary?
(a) 5 (b) 3
(c) 2 (d) 4

19. After its uptake by the body tissues, a large proportion of oxygen still remain unused. This oxygen is used for/as
(a) raising the pCO_2 of alveoli to 40 mm Hg
(b) reserve to compensate O_2 during heavy exercise
(c) releasing O_2 to body tissues
(d) maintaining oxyhaemoglobin saturation

20. What percentage of O_2 is transported by RBCs and plasma, respectively in human body?
(a) 50, 50 (b) 97, 3
(c) 90, 10 (d) 80, 20

21. Approximately 70% of carbon dioxide absorbed by the blood will be transported to the lungs ***CBSE-AIPMT 2014***
(a) as bicarbonate ions
(b) in the form of dissolved gas molecules
(c) by binding to RBC
(d) as carbaminohaemoglobin

22. Each haemoglobin molecule can carry
(a) two molecules of O_2
(b) three molecules of O_2
(c) four molecules of O_2
(d) one molecule of O_2

23. Under normal conditions, what amount of O_2 is delivered by 100 mL of the oxygenated blood?
(a) 5 mL (b) 4 mL
(c) 3 mL (d) 2 mL

24.

$$CO_2 + H_2O \overset{A}{\rightleftharpoons} H_2CO_3 \overset{B}{\rightleftharpoons} HCO_3^- + H^+$$

Name the enzymes *A* and *B* in the above equation.

(a) A–Carbonic anhydrase; B–Carbonic hydratase
(b) A–Carbonic hydratase; B–Carbonic anhydrase
(c) A–Carbonic anhydrase; B–Carbonic anhydrase
(d) A–Carbonic hydratase; B–Carbonic hydratase

25. Which of the following equations is correct?

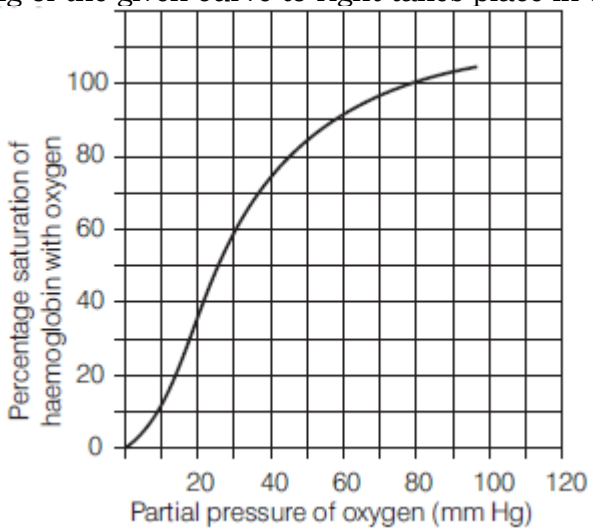
(a) $KHbO_2 + H^+ \underset{RBC}{\rightleftharpoons} Hb + K + H_2O$

(b) $Hb + O_2 \underset{\text{Dissociation in lungs}}{\overset{\text{Association in tissues}}{\rightleftharpoons}} HbO_2$

(c) $Na^+ + HCO_3^- \underset{\text{Erythrocyte}}{\rightleftharpoons} NaHCO_3$

(d) $HbO_2 \underset{\text{Association in lungs}}{\overset{\text{Dissociation in tissues}}{\rightleftharpoons}} Hb + O_2$

26. Shifting of the given curve to right takes place in the case of



(a) raise in pCO_2 (b) fall in pH
(c) raise in temperature (d) All of these

27. Blood does not become acidic although it carries CO_2 because
(a) CO_2 is continuously diffused through tissues
(b) CO_2 combines with H_2O to form H_2CO_3
(c) in CO_2 transport, buffer plays an important role
(d) CO_2 is absorbed by WBC

28. Human beings have a significant ability to maintain and moderate the respiratory rhythm to suit the demands of the body tissues. This is achieved by
(a) arterial system (b) systemic vein system
(c) neural system (d) cardiac system

29. Which part of the brain is called respiratory rhythm centre?
(a) Cerebellum region (b) Brain stem region
(c) Medulla region (d) Temporal region

30. Mark the incorrect statement in context to O_2 binding to Hb.
(a) Higher pH (b) Lower temperature
(c) Lower pCO_2 (d) Higher pO_2

1. (b)
2. (c)
3. (*d*) The correct sequence of air passage in humans is represented by option (d). The passage can be explained by the figure given below.

4. (*a*) Larynx is the portion of human respiratory system called as sound box. It is a cartilaginous box present in the neck region which helps in sound production in mammals.

5. (a)
6. (*d*) Alveoli in human lungs are thin-walled, vascularised irregular walled bag-like structure at the terminal ends of bronchioles. These are the functional unit of lungs and are supplied with blood.
7. (*d*) Option (d) is not a step of respiration. In humans, respiration involves following steps

l Breathing or pulmonary ventilation by which atmospheric air is drawn in and CO2 rich alveolar air is released out.
l Diffusion of gases (O2 and CO2) acrosses alveolar membrane.
l Transport of gases by the blood.
l Diffusion of O2 and CO2 between blood and tissue.
l Utilisation of O2 by the cells for catabolic reactions and release of CO2.

8. (b)
9. **(***b*) Expiration takes place when the intrapulmonary pressure is higher than the atmospheric pressure, i.e. there is positive pressure in the lungs with respect to the atmospheric pressure.

10. (*d*) During expiration, decreased volume of thoracic capacity and pulmonary capacity increases the intrapulmonary pressure above atmospheric pressure. The sternum and diaphragm which were elevated during inspiration acquire their normal position, causing the air to be expelled from the lungs.

11. (b)
12. (c)
13. (b)
14. (d)
15. (*a*) Partial pressure of O2 in the atmosphere is 159 mm Hg and in the alveolar air is 104 mm Hg. Also, the partial pressure of CO2 in the atmosphere is 0.3 mm Hg and in the alveolar air is 40 mm Hg. Thus, we can say that *p*O2 is higher in the atmosphere as compared to alveoli and *p*CO2 is lower in the atmosphere as compared to alveoli.

16. (*d*) *p*O2 is same in between tissues and deoxygenated blood, i.e. 40 mm Hg.

17. (*b*) The solubility of CO2 is 20-25 times higher than that of O2. Therefore, the amount of CO2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher as compared to that of O2.
18. (*b*) The diffusion membrane is made up of three major layers, namely the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and the basement substance (composed of a thin basement membrane supporting the squamous epithelium and basement membrane surrounding the single layer endothelial cells of capillaries) in between them.
19. (b)
20. (*b*) About 97% of O2 is transported by RBCs in the blood. The remaining 3% of O2 is carried in a dissolved state through the plasma.

21. (a)

22. (*c*) Each haemoglobin (Hb) molecule can carry a maximum of four molecules of O2. Hb 4O Hb O 4 2 4 8 + ® Haemoglobin is a red coloured iron containing pigment in the RBCs. Oxygen can bind with haemoglobin in a reversible manner to form oxyhaemoglobin (Hb O2).

23. (a)

24. (c)

25. (*d*) Option (d) with equation is correct as Oxyhaemoglobin (HbO2) dissociates in the tissue to provide oxygen in the tissues. And HbO2 formation or association occurs in lungs (alveoli) when oxygen is inspired through breathing.

26. (d)

27. (c)

28. (*c*) Neural system in humans regulates and moderate the respiratory rhythm. A specialised respiratory centre is located in the medulla oblongata and another in pons Varoli. These centres regulate the rate and the depth of breathing by controlling the contraction of diaphragm and other respiratory muscles.

29. (c)

30. (*a*) O2 binding affinity with Hb is more when there is high *p*O2, low *p*CO2, low temperature and low pH. Thus, option (a) was incorrect in context to O 2 binding to Hb.