8. What is the effect of pCO_2 on oxygen transport?
Solution: Increase in pCO_2 tension in blood brings rightward shift of the oxygen dissociation curve of haemoglobin thereby decreasing the affinity of haemoglobin for oxygen. This effect is called Bohr's effect. It plays an important role in the release of oxygen in the tissues.

9. What happens to the respiratory process in a man going up a hill?
Solution: Rate of breathing will increase in order to supply sufficient oxygen to blood because air in mountainous region is deficient in oxygen.

10. What is the site of gaseous exchange in an insect?
Solution: Tracheae (Tracheal respiration) is the site of gaseous exchange in an insect. .

11. Define oxygen dissociation curve. Can you suggest any reason for its sigmoidal pattern?
Solution: The relationship between the partial pressure of oxygen (pO_2) and percentage saturation of the haemoglobin with oxygen (O_2) is graphically illustrated by a curve called oxygen haemoglobin dissociation curve (also called oxygen dissociation curve).
The sigmoidal pattern of oxygen haemoglobin dissociation curve is the result of two properties which play significant role in the transport of oxygen. These two properties are:
(i) Minimal loss of oxygen from haemoglobin occurs above p02 of 70-80 mm Hg despite significant changes in tension of oxygen beyond this. This is depicted by relatively flat portion of the curve.
(ii) Any further decline in pO2 from 40 mm Hg causes a disproportionately greater release of oxygen from the haemoglobin. It results in the steeper portion of the curve and causes the curve to be sigmoid.

12. Have you heard about hypoxia? Try to gather information about it, and discuss with your friends.
Solution: Hypoxia is a condition of oxygen shortage in the tissues. It is of two types:
(i) Artificial hypoxia: It results from shortage of oxygen in the air as at high altitude. It causes mountain sickness characterised by breathelessnes, headache, dizziness and bluish tinge on skin.
(ii) Anaemic hypoxia: It results from the reduced oxygen carrying capacity of the blood due to anaemia or carbon monoxide poisoning. In both cases, less haemoglobin is available for carrying O_2.

13. Distinguish between
(a) IRV and ERV
(b) Inspiratory capacity and expiratory capacity.
(c) Vital capacity and total lung capacity.
Solution:
(a) Differences between IRV and ERV are as follows:

	IRV	ERV
(i)	It is the extra amount of air that can be inspired forcibly after a normal inspiration. Thus it is forced inspiration.	It is the extra amount of air that can be expired forcibly after a normal expiration. Thus it is forced expiration.
(ii)	It is about 2500 to 3000 mL of air.	It is about 1000 ml to 1100 mL of air.

(b)Differences between inspiratory capacity and expiratory capacity are as follows:

	Inspiratory capacity	Expiratory capacity
(i)	It is the total volume of air that can be inhaled after a normal expiration.	It is the total volume of air a person can expire after a normal inspiration.
(ii)	It includes tidal volume and the inspiratory reserve volume (IC = TV + IRV).	It includes tidal volume and expiratory reserve volume (EC = TV + ERV).
(iii)	It is about 3000 to 3500 mL of air.	It is about 1500 to 1600 mL of air.

(c) Differences between vital capacity and total lung capacity are as follows:

	Vital capacity	Total lung capacity
(i)	It is the amount of air which one can inhale and exhale with maximum effort.	It is the total amount of air present in the lungs and the respiratory passage after a maximum inspiration.
(ii)	It is the sum of tidal volume, inspiratory reserve volume and expiratory reserve volume (VC = TV + IRV + ERV). It varies from 4 – 4.6 litres in a normal adult person.	It is the sum of the vital capacity and the residual volume (TLC = VC + RV). It is 5100 to 5800 mL.

14. What is tidal volume? Find out the tidal volume (approximate value) for a healthy human in an hour.
Solution: Tidal volume is the volume of air inspired or expired with each normal breath. This is about 500 mL in an adult person. It is composed of about 350 mL of alveolar volume and about 150 mL of dead space volume. The alveolar volume consists of air that reaches the respiratory surfaces of the alveoli and engages in gas exchange. The dead space volume consists of air that does not reach the respiratory surfaces. A healthy man can inspire or expire approximately 6000 to 8000 mL of air per minute. Therefore, tidal volume for a healthy human in an hour is 360 - 480 mL of air.

********** END **********