



**Year: 10**

**Topic 1.2 RESPIRATION AND THE RESPIRATORY SYSTEM IN HUMANS**

**Knowledge and Understanding to be developed**

This topic examines the processes of aerobic and anaerobic respiration, along with the respiratory system which enables the oxygen required for respiration to be taken to the tissues and the carbon dioxide produced to be removed. Use models to develop understanding of inspiration and expiration using the bell jar model. Discusses the need for unbiased interpretation of investigations, e.g. smoking, The evaluation of risks can also be developed in relation to how attitudes to smoking have changed over time as evidence about its effects has been validated by scientists. This could include the translation of information between graphical and numerical forms; using data regarding smoking related illnesses, using ratios, fractions and percentages of different gases in inspired and expired air; understand the principles of sampling as related to health data.

**Key Terms to be learned this topic:**

Aerobic respiration    anaerobic respiration

ATP            lactic acid            trachea            bronchi

Bronchioles            alveoli            inspiration

Expiration            cilia

**Learning Objectives and Outcomes:  
Students should be able to :**

- (a) aerobic respiration as a process that occurs in cells when oxygen is available; respiration as a series of enzyme-controlled reactions within the cell, that use glucose and oxygen to release energy and produce carbon dioxide and water; **energy is released in the form of ATP** and be able to state the word equation to describe aerobic respiration
- (b) anaerobic respiration as a process that occurs in the absence of oxygen; glucose being broken down to release energy and lactic acid; oxygen debt as a result of anaerobic respiration; **anaerobic respiration as a less efficient process than aerobic respiration because of the incomplete breakdown of glucose; less ATP is produced per molecule of glucose in anaerobic respiration than in aerobic respiration** and be able to state the word equation for anaerobic respiration in human cells.
- (c) the need for and purpose of the respiratory system and be able to label the following structures on a diagram of a vertical section of the human respiratory system: nasal cavity, trachea, bronchi, bronchioles, alveoli, lungs, diaphragm, ribs and intercostal muscles
- (d) the function of mucus and cilia in the respiratory system
- (e) the mechanisms of inspiration and expiration, in terms of changes in thoracic volume and pressure brought about by movements of the diaphragm and rib cage; movement of air takes place due to differences in pressure between the lungs and outside the body
- (f) the use of a bell jar model to illustrate inspiration and expiration and the limitations of this model
- (g) the structure of an alveolus and its blood supply and be able to label the following structures on a diagram: end of bronchiole, wall of alveolus, moist lining of alveolus, wall of capillary, red blood cells and plasma
- (h) the percentage composition of inspired and expired air and the reasons for the differences; how gases diffuse between alveolar air and capillaries; the adaptations of alveoli for gas exchange; the use of lime water to indicate the presence of carbon dioxide
- (i) the effects of smoking on cilia and mucus in the respiratory system and the consequences for the individual; the link between cigarette smoking and lung cancer and emphysema and the consequences of these conditions