

## Definitions and Concepts for Edexcel Biology GCSE

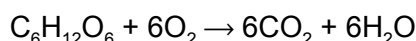
### Topic 8: Exchange and Transport in Animals

---

Definitions in **bold** are for higher tier only

Definitions marked by '\*' are for separate sciences only

**Aerobic respiration** - Respiration in the presence of oxygen that releases energy from the breakdown of glucose. Overall:



**Alveoli** - Tiny air sacs in the lungs that serve as the gaseous exchange surface. They are adapted for exchange by having a large surface area, good blood supply, thin walls and a moist lining.

**Anaerobic respiration** - Respiration that takes place without oxygen and forms energy from the breakdown of glucose. In animals, lactic acid is produced. In plants, ethanol and carbon dioxide are produced. Less energy is formed than in aerobic respiration.

**Aorta** - The artery that takes oxygenated blood away from the heart to the body.

**Artery** - A type of blood vessel that carries blood away from the heart to the tissues, under high pressure. The walls of the arteries contain thick layers of smooth muscle and elastic fibres.

**Bicuspid valves** - The valves found between the left atrium and left ventricle.

**Blood** - A tissue containing red blood cells, white blood cells, platelets and plasma.

**Capillaries** - Thin, narrow blood vessels that connect the arteries and veins. They are the site of exchange of substances between the blood and the tissues.

**Cardiac output** - The volume of blood pumped out of a ventricle in one minute. It is calculated using:

$$\text{cardiac output} = \text{heart rate} \times \text{stroke volume}$$

**Cellular respiration** - An exothermic reaction that releases energy from the breakdown of organic compounds such as glucose. There are two types, aerobic and anaerobic.

**Circulatory system** - The transport system in animals.

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



**\*Concentration gradient** - The difference in concentration between two areas. The greater the concentration gradient, the faster the rate of diffusion.

**Diffusion** - The net spreading out of particles from a high concentration to a lower concentration (down their concentration gradient).

**\*Diffusion distance** - The distance that substances must diffuse. The smaller the diffusion distance, the faster the rate of diffusion.

**Double circulatory system** - A circulatory system found in mammals in which the blood flows through the heart twice in two circuits. Blood is pumped from the heart to the lungs before returning to the heart. It is then pumped around the body, after which it returns to the heart again.

**Erythrocyte** - A type of blood cell that is anucleate and biconcave. It contains haemoglobin which enables the transport of oxygen and carbon dioxide to and from the tissues.

**Exchange surface** - A surface over which materials are exchanged.

**\*Fick's law** - States that the rate of diffusion is proportional to the surface area and difference in concentration, but is inversely proportional to the thickness of the membrane:

$$\text{rate of diffusion} \propto \frac{\text{surface area} \times \text{concentration difference}}{\text{thickness of membrane}}$$

**Heart rate** - The number of times the heart contracts in one minute.

**Lactic acid** - The product of anaerobic respiration in animal cells. Lactic acid build-up inhibits anaerobic respiration and results in cramp and fatigue.

**Lymphocyte** - A type of white blood cell that produces antibodies (specific to a particular antigen) and antitoxins.

**Multicellular organism** - An organism that consists of more than one cell. It has a small surface area to volume ratio, so diffusion is insufficient to provide all cells with the required oxygen and nutrients, and to remove all waste products. Multicellular organisms require an exchange surface and a mass transport system.

**Phagocyte** - A type of white blood cell that engulfs pathogens and digests them in a process known as phagocytosis.

**Plasma** - The main component of the blood that carries red blood cells. It is a yellow liquid that contains proteins, nutrients, mineral ions, hormones, antibodies, antitoxins, dissolved gases and waste.

**Platelets** - Small fragments of cells that are involved in blood clotting.

**Pulmonary arteries** - The arteries that carry deoxygenated blood away from the heart to the lungs.



**Pulmonary veins** - The veins that carry oxygenated blood from the lungs to the heart.

**Respirometer** - A device used to measure respiration rate in living organisms.

**Semilunar valves** - A pair of valves found between the ventricles and arteries. They prevent the backflow of blood from the arteries into the ventricles.

**Single-celled organism** - An organism that consists of a single cell. It has a large surface area to volume ratio so can rely on simple diffusion alone for the exchange of substances.

**Stroke volume** - The volume of blood pumped out of a ventricle in one contraction.

**Surface area to volume ratio** - The surface area of an object divided by its volume. The larger the surface area to volume ratio, the smaller the object.

**Tricuspid valves** - The valves found between the right atrium and right ventricle.

**Urea** - A waste produced from the breakdown of excess amino acids in the liver. It diffuses from cells into the blood plasma and is removed from the body by the kidneys.

**Valves** - Structures in the heart that prevent the backflow of blood.

**Vein** - A type of blood vessel that carries blood towards the heart under low pressure. It has a wide lumen, a smooth inner lining and valves. The walls of the veins contain some smooth muscle and little elastic fibre.

**Vena cava:** The vein that returns deoxygenated blood to the heart from the body.

**White blood cells** - Cells of the immune system that protect the body from invading pathogens. There are two types: phagocytes and lymphocytes.

