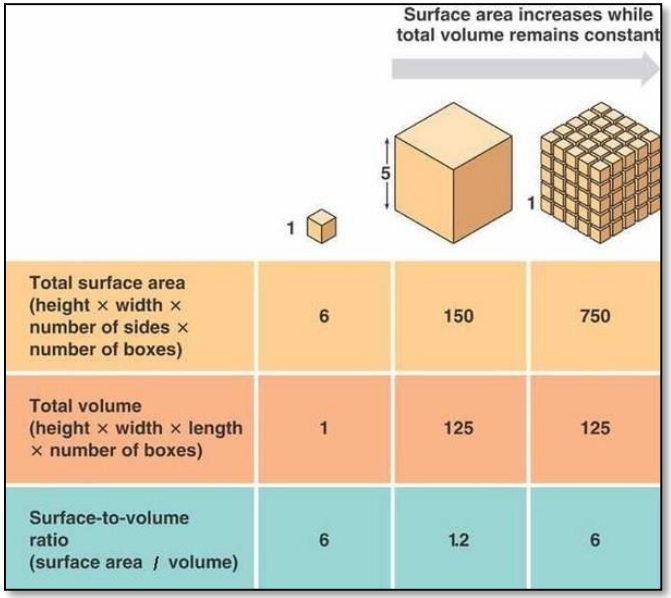
AQA B1b Transport in cells
Combined Higher

Required practical for this topic:
Osmosis



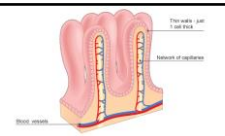
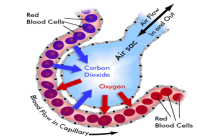
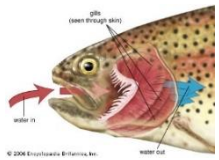
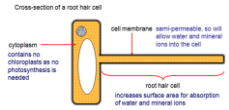
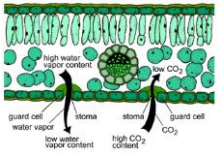
Total surface area (height × width × number of sides × number of boxes)	6	150	750
Total volume (height × width × length × number of boxes)	1	125	125
Surface-to-volume ratio (surface area / volume)	6	1.2	6

A single-celled organism has a relatively large surface area to volume ratio. This allows sufficient transport of molecules into and out of the cell to meet the needs of the organism.

Amoeba

Multicellular organisms have a small surface area to volume ratio and so have surfaces and organ systems that are specialised for exchanging materials. This is to allow sufficient molecules to be transported into and out of cells for the organism's needs.

Transport mechanism	definition	Details and examples
diffusion	The spreading out of particles in a solution or gas, resulting in a net movement from an area of higher concentration to an area of lower concentration	Substances may move into and out of cells across the cell membranes via diffusion. e.g. O_2 and CO_2 in gas exchange, the waste product urea from cells into the blood plasma for excretion in the kidneys. Factors that affect the rate of diffusion are concentration, temperature and surface area of the membrane.
osmosis	The diffusion of <u>water</u> from a dilute solution to a concentrated solution through a partially permeable membrane.	Water can move across cell membranes via osmosis. e.g. Plants absorb water from the soil by osmosis through their root hair cells.
active transport	Movement of substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration.	e.g. allows mineral ions to be absorbed into plant root hairs from very dilute solutions in the soil. Plants require ions for healthy growth. e.g. allows glucose molecules to be absorbed from lower concentrations in the gut into the blood which has a higher sugar concentration. Glucose molecules are used for respiration.

small intestines		•Large surface area – **villi increase surface area in the small intestine** •A membrane that is thin, to provide a short diffusion path – **villi have a thin membrane** •Efficient blood supply in animals – **each villus (one) has a good blood supply**
lungs		•Large surface area – **Alveoli– increase surface area in the lungs** •A membrane that is thin, to provide a short diffusion path – **alveoli have a very thin membrane** •Efficient blood supply in animals – **each alveolus (one) has a good blood supply** •Good ventilation in animals for gas exchange
gills in fish		• Large surface area – **gill filaments increase surface area in the gills** • A membrane that is thin, to provide a short diffusion path – **gills have a thin membrane** • Efficient blood supply in animals – **each gill has a good blood supply** • Good ventilation in animals for gas exchange – there is a flow of oxygen rich water through the mouth and out of the gills
roots		• Large surface area – **root hair cells increase surface area in the roots** • A membrane that is thin, to provide a short diffusion path – **root hair cells have a thin membrane**
leaves		• Large surface area – **leaves have a large surface area** • A membrane that is thin, to provide a short diffusion path – **leaves are very thin for a short diffusion pathway** • **Ventilation - stomata on the lower surface to let gases in and out**