

3.1.1 Exchange surfaces

- (a) the need for specialised exchange surfaces To include surface area to volume ratio (SA:V), metabolic activity, single-celled and multicellular organisms.
M0.1, M0.3, M0.4, M1.1, M2.1, M4.1 HSW1, HSW3, HSW5, HSW8
- (b) the features of an efficient exchange surface To include,
 - increased surface area – root hair cells
 - thin layer – alveoli
 - good blood supply/ventilation to maintain gradient – gills/alveolus.
- (c) the structures and functions of the components of the mammalian gaseous exchange system To include the distribution and functions of cartilage, ciliated epithelium, goblet cells, smooth muscle and elastic fibres in the trachea, bronchi, bronchioles and alveoli.
PAG1 HSW8
- (d) the mechanism of ventilation in mammals To include the function of the rib cage, intercostal muscles (internal and external) and diaphragm.

HSW8
- (e) the relationship between vital capacity, tidal volume, breathing rate and oxygen uptake To include analysis and interpretation of primary and secondary data e.g. from a data logger or spirometer.

M0.1, M0.2, M0.4, M1.3 **PAG10** HSW2, HSW3, HSW4, HSW 5, HSW6
- (f) the mechanisms of ventilation and gas exchange in bony fish and insects To include,
 - bony fish – changes in volume of the buccal cavity and the functions of the operculum, gill filaments and gill lamellae (gill plates); countercurrent flow
 - insects – spiracles, trachea, thoracic and abdominal movement to change body volume, exchange with tracheal fluid.
HSW8
- (g) the dissection, examination and drawing of the gaseous exchange system of a bony fish and/or insect trachea **PAG2**
- (h) the examination of microscope slides to show the histology of exchange surfaces. **PAG1**