### 6.4 Gas exchange – summary of mark schemes

#### 6.4.1 Distinguish between ventilation, gas exchange and cell respiration.

**Mark Scheme**

**Ventilation (is):**
- A. movement of air;
- B. movement in and out of the lungs;
- C. caused by muscles;
- D. an active process;
- E. involves mass flow / involves flow along air passages;

**Gas exchange (is):**
- F. movement of carbon dioxide and oxygen;
- G. (occurs when) oxygen moves from lungs / alveoli to red blood cells / carbon dioxide moves to lungs / alveoli from red blood cells;
- H. (occurs when) oxygen moves from red blood cells to tissues / carbon dioxide moves to red blood cells from tissues;
- I. a passive process / diffusion;
- J. takes place across a surface;

#### 6.4.2 Explain the need for a ventilation system.

**Mark Scheme**

- A. draws fresh air / oxygen into the lungs;
- B. removal / excretion of CO\(_2\);
- C. maintains concentration gradient of O\(_2\) / CO\(_2\) / respiratory gases

#### 6.4.3 Describe the features of alveoli that adapt them to gas exchange.

**Mark Scheme**

- A. large total surface area;
- B. wall of single layer of flattened cells;
- C. moist lining;
- D. walls elastic;
- E. dense network of capillaries;
- F. capillary walls are thin / one cell thick;
- G. short distance (for gases to travel);

#### 6.4.4 Draw and label a diagram of the ventilation system, including trachea, lungs, bronchi, bronchioles and alveoli.

**Mark Scheme**

- A. mouth / nose;
- B. trachea;
- C. bronchi;
- D. bronchioles;
- E. lungs;
- F. alveoli;
- G. diaphragm;
- H. ribs / rib eye / intercostal muscles;

#### 6.4.5 Explain the mechanism of ventilation of the lungs in terms of volume and pressure changes caused by the internal and external intercostal muscles, the diaphragm and abdominal muscles.

**Mark Scheme**

- A. consists of inhaling and exhaling air / exchanging stale air with fresh air (with the environment);
- B. inhalation means air entering;
- C. external intercostal muscles contract;
- D. diaphragm contracts / flattens / moves downwards;
- E. thorax volume increases;
- F. creates pressure difference / lower pressure in lungs / correct reference to Boyles Law;
- G. air enters lungs / inhales air by nose and mouth;
- H. air rushes in down air pressure gradient;
I. converse of the above causes exhalation;
J. diaphragm relaxes;
K. internal intercostal muscles contract moving the rib cage down / in;
L. abdominal muscles contract during active exhalation;
M. force air out / decreases volume of thorax / raise lung pressure relative to air pressure;
N. elastic recoil of lungs helps exhalation;