

- M1.(a)**
1. (Overall) outward pressure of 3.2 kPa;
  2. Forces small molecules out of capillary.
- 2
- (b) Loss of water / loss of fluid / friction (against capillary lining).
- 1
- (c)
1. High blood pressure = high hydrostatic pressure;
  2. Increases outward pressure from (arterial) end of capillary / reduces inward pressure at (venule) end of capillary;
  3. (So) more tissue fluid formed / less tissue fluid is reabsorbed.  
*Allow lymph system not able to drain tissues fast enough*
- 3
- (d)
1. Water has left the capillary;
  2. Proteins (in blood) too large to leave capillary;
  3. Increasing / giving higher concentration of blood proteins (and thus wp).
- 3
- [9]**
- M2.(a)**
1. Contraction of internal intercostal muscles;
  2. Relaxation of diaphragm muscles / of external intercostal muscles;
  3. Causes decrease in volume of chest / thoracic cavity;
  4. Air pushed down pressure gradient.
- 4
- (b) 19(%)
- 1
- (c)
1. Muscle walls of bronchi / bronchioles contract;
  2. Walls of bronchi / bronchioles secrete more mucus;
  3. Diameter of airways reduced;
  4. (Therefore) flow of air reduced.
- 4

[9]

- M3.(a)**
1. Water potential becomes lower / becomes more negative (as sugar enters phloem);
  2. Water enters phloem by osmosis;
  3. Increased volume (of water) causes increased pressure.

3

- (b)
1. Rate of photosynthesis related to rate of sucrose production;
  2. Rate of translocation higher when sucrose concentration is higher.

2

- (c)
1. Rate of translocation does not fall to zero / translocation still occurs after 120 minutes;
  2. But sucrose no longer able to enter cytoplasm of phloem cells.

2

[7]

- M4.(a)**
1. Trachea and bronchi and bronchioles;
  2. Down pressure gradient;
  3. Down diffusion gradient;
  4. Across alveolar epithelium.  
*Capillary wall neutral*
  5. Across capillary endothelium / epithelium.

4 max

- (b) (About) 80.0%.

1

- (c)
1. (Group **B** because) breathe out as quickly as healthy / have similar FEV to group **A**;
  2. So bronchioles not affected;
  3. FVC reduced / total volume breathed out reduced.  
*Allow this marking point for group C*

3

[8]

- M5.(a)** 1. Lower affinity for oxygen / releases more oxygen / oxygen is released quicker / oxygen dissociates / unloads more readily;

*Q Neutral: the organism / body has a lower affinity for oxygen / releases more oxygen*

2. (To) muscles / tissues / cells

3. (For) high / rapid respiration;

*Q Reject: 'produces more energy' on its own*

*Neutral: reference to partial pressure*

*Accept: (for) respiration to produce more energy in the form of ATP / release more energy*

3

- (b) (i) 1. Small SA:VOL;  
*Neutral: small limbs / small ears / extremities*  
*Neutral: small SA*  
*Accept: large VOL:SA*  
*Neutral: reference to fat / blubber / insulation*

2. (So) reduces heat loss / (more) heat retained;  
*Note: MP2 is independent of MP1*

2

- (ii) 1. Brain is the same, others fall;  
*Note: 1. might not be given in the same sentence*  
*Assume that 'other organs fall' = all three organ categories fall*  
*Accept: 'blood flow is reduced to all organs except for the brain'*

2. Brain controls other organs / remains active / needs constant supply of oxygen;  
*Accept: 'seal would die' = brain remains active*

3. Lungs not used / are used less / seal is not breathing / heart rate decreases / heart pumps less / blood diverted to muscles;  
*Reject: seal is not respiring*

3

[8]

