

- M1.(a)**
1. (Releases) toxins;
  2. Kills cells / tissues.  
*2. Accept any reference to cell / tissue damage  
Ignore infecting / invading cells*
- 2

- (b)
1. Water potential in (bacterial) cells higher (than in honey) / water potential in honey lower (than in bacterial cells);  
*Q candidates must express themselves clearly  
1. Must be comparative e.g. high WP in cell and low WP in honey*
  2. Water leaves bacteria / cells by osmosis;
  3. (Loss of water) stops (metabolic) reactions.  
*3. Needs a reason why lack of water kills the cell*
- 3

[5]

- M2.(a)** Regulator protein.
- Accept regulator protein antigen  
Reject regulator protein receptor  
Ignore regular protein*
- 1

- (b)
1. Lipid soluble / hydrophobic
  2. Enters through (phospholipid) bilayer
- OR**
3. (Protein part of) LDL attaches to receptor
  4. Goes through carrier / channel protein.  
*4. Accept by facilitated diffusion or active transport  
4. Reject active transport through channel protein*
- 2

- (c) Any **two** from:
1. (Monoclonal antibody) has a specific tertiary structure / variable region / is complementary to regulator protein

*Do not award MP1 if reference to active site.*

2. Binds to / forms complex with (regulator protein)  
*"It" refers to monoclonal antibody in MP1 and MP2*
3. (So regulator protein) would not fit / bind to the receptor / is not complementary to receptor  
*3. Reject receptor on LDL*

2 max

- (d) 1. Injection with salt solution  
*1. Accept inject placebo in salt solution*
2. Otherwise treated the same.

2

[7]

- M3.(a)** 1. (No grease)  
means stomata are open  
OR  
allows normal CO<sub>2</sub> uptake;  
*Allow 'gas exchange' for CO<sub>2</sub> uptake.*  
*'As a control' is insufficient on its own.*
2. (Grease on lower surface)  
seals stomata  
OR  
stops CO<sub>2</sub> uptake through stomata  
OR  
to find CO<sub>2</sub> uptake through stomata  
OR  
shows CO<sub>2</sub> uptake through cuticle / upper surface;
3. (Grease on both surfaces) shows sealing is effective  
OR  
stops all CO<sub>2</sub> uptake.

3

- (b) (i) 1. (Mean rate of) carbon dioxide uptake was constant *and* fell after the light turned off;  
*Ignore absence of arbitrary units in both marking points.*

*Both ideas needed for mark.*

*Accept 'stayed at 4.5' as equivalent to 'was constant'.*

2. Uptake fell from 4.5 to 0 / uptake started to fall at 60 minutes and reached lowest at 80 minutes / uptake fell over period of 20 minutes;

*One correct use of figures required.*

*Accept fell to nothing / no uptake for 0.*

2

- (ii) 1. (Because) water is lost through stomata;  
2. (Closure) prevents / reduces water loss;  
3. Maintain water content of cells.

*This marking point rewards an understanding of reducing water loss e.g. reduce wilting, maintain turgor, and is not related to photosynthesis.*

2 max

- (c) (i) (Carbon dioxide uptake) through the upper surface of the leaf / through cuticle.

1

- (ii) 1. No use of carbon dioxide in photosynthesis (in the dark);  
2. No diffusion gradient (maintained) for carbon dioxide into leaf / there is now a diffusion gradient for carbon dioxide out of leaf (due to respiration).

2

[10]

- M4.(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]

- M5.(a)**
1. Dissolve in alcohol, then add water;
  2. White emulsion shows presence of lipid.

2

(b) Glycerol.

1

(c) Ester.

1

(d) **Y** (no mark)  
Contains double bond between (adjacent) carbon atoms in hydrocarbon chain.

1

- (e)
1. Divide mass of each lipid by total mass of all lipids (in that type of cell);
  2. Multiply answer by 100.

2

(f) Red blood cells free in blood / not supported by other cells so cholesterol helps to maintain shape;

*Allow converse for cell from ileum – cell supported by others in endothelium so cholesterol has less effect on maintaining shape.*

1

- (g) 1. Cell unable to change shape;  
2. (Because) cell has a cell wall;  
3. (Wall is) rigid / made of peptidoglycan / murein.

2 max

[10]

**M6.(a)** Calculations made (from raw data) / raw data would have recorded initial and final masses.

1

- (b) Add 4.5 cm<sup>3</sup> of (1.0 mol dm<sup>-3</sup>) solution to 25.5 cm<sup>3</sup> (distilled) water.  
*If incorrect, allow 1 mark for solution to water in a proportion of 0.15:0.85*

2

- (c) 1. Water potential of solution is less than / more negative than that of potato tissue;  
*Allow  $\Psi$  as equivalent to water potential*

2. Tissue loses water by osmosis.

2

- (d) 1. Plot a graph with concentration on the x-axis and percentage change in mass on the y-axis;  
2. Find concentration where curve crosses the x-axis / where percentage change is zero;  
3. Use (another) resource to find water potential of sucrose concentration (where curve crosses x-axis).

3

[8]