

- 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)** Any **two** from:
1. (Decrease linked to) few(er) cases of whooping cough;
  2. (Decrease linked to) risk of / fear of side effects;
  3. Insufficient vaccine available / too expensive to produce / distribute.  
*3. Too expensive unqualified is insufficient for mark*

2 max

- (b)
1. Vaccination rate increases;
  2. Fewer people to spread the disease / whooping cough / more people immune / fewer susceptible.  
*2. Neutral – greater herd effect  
2. Allow description of immune  
Q Reject 'resistant'.*

2

- (c)
1. More people are immune / fewer people carry the pathogen;  
*If neither point 1 or 2 awarded  
Herd immunity = 1 mark*

*Unvaccinated does not mean infected*

1. **Q** *Do not accept disease for pathogen*

2. So susceptible / unvaccinated people less likely to contact infected people.

2

[6]

**M3.(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

- M4.(a)** (i) 1. (Tumour suppressor) gene inactivated / not able to control / slow down cell division;

*Ignore: references to growth*

2. Rate of cell division too fast / out of control.

*1 and 2 Accept: mitosis*

*1 and 2 Reject: meiosis*

2

- (ii) 1. (Genetic) code degenerate;

*Accept: codon for triplet*

*Accept description of degenerate code, e.g. another triplet codes for the same amino acid*

2. Mutation in intron.

*Accept: mutation in non-coding DNA*

1 max

- (b) 1. Antibody has specific tertiary structure / binding site / variable region;

*Do not accept explanations involving undefined antigen*

2. Complementary (shape / fit) to receptor protein / GF / binds to receptor protein / to GF;

*Ignore: same shape as receptor protein / GF*

3. Prevents GF binding (to receptor).

3

[6]

- M5.(a)** 1. Outside of virus has antigens / proteins;  
2. With complementary shape to receptor / protein in membrane of cells;  
3. (Receptor / protein) found only on membrane of nerve cells.

*Accept converse argument*

3

- (b) 1. No more (nerve) cells infected / no more cold sores form;  
2. (Because) virus is not replicating.

2

- (c) Prevents replication of virus.

1

- (d) MicroRNA binds to cell's mRNA (no mark)  
1. (Binds) by specific base pairing;  
2. (So) prevents mRNA being read by ribosomes;  
3. (So) prevents translation / production of proteins;  
4. (Proteins) that cause cell death.

4

[10]

- M6.(a)** 1. Antibody has tertiary structure;  
2. Complementary to binding site on protein.

2

- (b) 1. Prevents false negative results;  
2. (Since) shows antibody **A** has moved up strip / has not bound to any *Plasmodium* protein.

2

- (c) 1. Person is infected with *Plasmodium* / has malaria;  
2. Infected with (*Plasmodium*) *vivax*;  
3. Coloured dye where antibody **C** present;  
4. That only binds to protein from *vivax* / no reaction with antibody for *falciparum*.

*Person is infected with P. vivax / Plasmodium vivax = 2 marks (MP1 and MP2)*

4

[8]