



GCSE Biology

Monoclonal Antibodies

Mark Scheme

Time available: 40 minutes

Marks available: 30 marks

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Mark schemes

1.

(a) any **two** from:

- regular hand washing
- or**
- use hand sanitiser / alcohol gel
 - cover nose / mouth when coughing / sneezing
allow wear a face mask
 - put used tissues (straight) in the bin
 - don't kiss uninfected people
allow isolate patient from others
- or**
- don't share cutlery / cups / drinks with uninfected people
 - clean / disinfect / sterilise surfaces regularly
ignore responses referring to infected people

2

(b) any **three** from:

- stimulate (mouse) lymphocytes to produce antibody
for marking points 1 and 2 lymphocyte must be used at least once
 - combine (mouse) lymphocyte with tumour cell
- or**
- (create a) hybridoma
 - clone (hybridoma) cell
 - (hybridoma) divides rapidly **and** produces the antibody

3

(c) any **two** from:

- (monoclonal) antibody binds to virus **or** antibody binds to antigen on surface of virus
- (monoclonal) antibody is complementary (in shape) / specific to antigen (on surface of virus)
- white blood cells / phagocytes kill / engulf the virus(es)

2

(d) as a control

or

to see / compare the effects of the treatment (vs. no treatment)

1

(e) $(4.8 + 10.4) \div 2 \div 100 \times 1500$

or

$(4.8 \div 100 \times 750) + (10.4 \div 100 \times 750)$

1

114

an answer of 114 scores 2 marks

allow 228 for 1 mark

1

- (f) **(supports the conclusion because)**
 over double the number / % of patients (in the trial) were hospitalised with the placebo (compared to MAB)

1

(does not support the conclusion because)

no information on patients not hospitalised / still unwell at home

or

other factors may have affected those admitted to hospital

allow correct named factor e.g. age / gender / other illness

or

don't know if it was a double blind trial

1

[12]

2.

- (a) **A**

1

- (b) any **one** from:

- identify / locate specific molecules / other hormones
- locate blood clots
- diagnose / treat some cancers

1

- (c) (as) urine passes through reaction zone

1

HCG hormone binds to the mobile HCG antibody (in the reaction zone)

1

(passes up the stick) HCG hormone binds to the immobilised HCG antibodies in the results zone

1

(the other) antibodies which do not attach to HCG

1

bind to antibodies in control zone

1

blue dye appears in both control and results zones (to show positive result)

1

[8]

3.

- (a) (mouthpiece) has pierced / entered the phloem

or

(the aphid) has been feeding from the phloem

1

(b) yellow leaves due to lack of chlorophyll

ignore 'chloroplasts'

ignore magnesium is needed to make chlorophyll

1

(therefore) less / no light absorbed (by chlorophyll)

1

(therefore) lower rate of / no photosynthesis

*do **not** allow 'energy is produced by photosynthesis'*

1

(therefore) plant makes less / no sugar / glucose

1

(therefore) plant converts less / no sugar / glucose into protein (for growth, so growth is stunted)

allow less glucose / sugar converted into cellulose (cell wall)

allow less energy for protein synthesis

1

(c) inject the protein / it into a mouse

1

combine lymphocytes with tumour / cancer cells to make hybridoma (cells)

ignore white blood cells

allow T or B lymphocytes

ignore tumour unqualified

1

find a hybridoma which makes a monoclonal antibody specific to PVY

1

(the scientist) clones (the hybridoma) to produce many cells (to make the antibody)

*do **not** allow cloning of original stem cells*

allow many rounds of cloning / mitosis

1

[10]