

MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 3 - TEST 5

INFECTION AND RESPONSE

Advanced

Mark schemes

- 1.** (a) 18.06 / 18 / 18.1
correct answer gains 2 marks
if answer incorrect evidence of
 $(4131 - 3499) \div 3499 \times 100$
or $632 \div 3499 \times 100$
or $((4131 \div 3499) \times 100) - 100$
or 0.18
gains 1 mark 2
- (b) antibiotics kill non-resistant strain
or resistant strain bacteria survive
accept resistant strain the successful competitor
*do **not** accept intentional adaptation*
ignore strongest / fittest survive
ignore mutation
ignore people do not finish antibiotic course 1
- resistant strain bacteria reproduce
or resistant strain bacteria pass on genes 1
- population of resistant strain increases **or** proportion of resistant bacteria increases
allow high numbers of resistant bacteria
- or**
people more likely to be infected by resistant strain (than non-resistant strain) 1
- [5]**
- 2.** mutation or description of mutation (gives resistance to penicillin) 1
- some survive (penicillin) 1
- (survivors) reproduce **or** multiply 1
- asexual reproduction **or** binary fission **or** cloning
accept mitosis 1
- gene for resistance **or** the mutation is passed on (to offspring)
allow reference to bacteria being immune
ignore reference to survival of fittest 1

[5]

3.

(a) any **three** from:

- vaccine is inactive / dead form of (pathogen)
allow antigens
- stimulates antibody production
- stimulates antitoxin production
- by white cells
- antibodies kill (pathogen)
- antitoxins neutralise poisons
- antibodies quickly produced on reinfection
ignore antibodies remain in blood
- reference to ingestion by white cells

3

(b) (i) (no)

any **two** from

- sample size small / only 12
- conclusion based on hearsay from parents
- only 8 parents linked autism to MMR
- no control used

2

(ii) (yes)

being paid by parents / lawyers

1

[6]

4.

(a) engulf bacteria
produce antibodies
produce antitoxins
effect of antibodies/antitoxins
for 1 mark each

4

(b) method must be related to disease
dead/weakened microbes (as appropriate)
stimulate antibody production
antibody production rapid if microbe enters again
for 1 mark each

3

[7]

5.

(a) (bacteria and viruses produce) toxins

allow poisons
allow damage body cells

1

(b) (i) body mass

allow weight
allow ethnicity
ignore height / size

1

(ii) placebo / fake drug

allow sugar pill
allow no treatment

1

(iii) any **one** from:

- as a control group
- for comparison
- to see if the drugs worked
- to take account of psychological effect

accept placebo effect
allow to avoid bias

1

(c) (i) 1.2 (°C)

1

(ii) 3 (hours)

1

(d) (i) (Paracetamol)

any **two** from:

- ibuprofen reduces body temperature faster
- ibuprofen reduces temperature more
- ibuprofen doesn't need to be taken as often
- ibuprofen keeps body temperature lower / normal / 37 °C for longer

allow works faster

2

(ii) (Paracetamol + ibuprofen)

any **two** from:

- body temperature decreases at a similar rate
allow ibuprofen works (almost) as fast
- ibuprofen maintained body temperature close to normal / 37 °C
allow ibuprofen maintained normal body temperature almost as long
allow doesn't make temperature drop below normal as long
- (better to) take fewer drugs
allow less chance of overdose / giving too much
allow (better to) take drugs less frequently
- easier to administer
allow less chance of missing doses / taking at the wrong time

2

[10]

6.

(a) (i) 5 (years)

1

(ii) lab tests on cells / tissues / animals **and** clinical trials in humans

*allow 1 block of lab tests **and** 3 blocks of clinical trials*

or

number of phases

1

(b) (i) (healthy volunteers)

any **one** from:

- too great a risk for ill person / patient
- patient might be taking another drug
- side effects easier to see
ignore references to the immune system

1

(low dose)

any **one** from:

- to reduce any risk
- to look for side effects
allow to avoid harm

1

(ii) placebo and drug tested

allow fake drugs / sugar pills

1

neither patients nor doctors know (who has taken placebo or drug)
this full statement would gain 2 marks

1

(so) avoids bias

or

(therefore) controls for psychological effects

or

(so) can tell if drug works rather than placebo effect

1

[7]

7.

- (a) (i) dead / inactive / weakened
allow antigen / protein
ignore ref to other components
ignore small amount

1

pathogen / bacterium / virus / microorganism
ignore germs / disease

1

- (ii) *antigen / antibiotic instead of antibody = max 2*

white blood cells produce / release antibodies
accept lymphocytes / leucocytes / memory cells produce antibodies
*do **not** accept phagocytes*

1

antibodies produced quickly

1

(these) antibodies destroy the pathogen
allow kill
*do **not** accept antibodies engulf pathogens*

1

- (b) (i) (live) bacteria still in body
ignore numbers

1

would reproduce
ignore mutation / growth

1

- (ii) antibiotics / treatment ineffective **or** resistant pathogens survive
accept resistant out compete non-resistant

1

these reproduce

1

population of resistant pathogens increases

allow (resistant pathogens reproduce) rapidly

1

[10]

8.

(a) any **one** from:

- not everyone would go to the doctor
allow not all cases recorded
allow only medically confirmed cases recorded
ignore some cases are unknown
- sample will not always be sent for analysis
- some cases not tested / diagnosed / confirmed
allow idea that doctor may make a judgemental error or mis-diagnosis

1

(b) $\frac{1939}{2030} \times 100$

allow for 1 mark:

$$\left(\frac{91}{2030} \times 100 = \right) 4.5\%$$

1

96 / 95.5

allow 2 marks for correct rounding of 95.51724138

*allow 1 mark for correct calculation using incorrect subtraction **only** if working shown*

1

an answer of 96 / 95.5 scores 2 marks

allow 1 mark only for 95 or other incorrect rounding

(c) most people are **immune** so do **not become ill** (from infection)

allow herd / community immunity so do not become ill (from infection)

allow most people are immune so do not become infected

ignore most people are immune so don't get / catch it

1

less chance of **non-immune** / **unvaccinated** individuals being exposed to pathogen / measles / virus

reference to an organism is needed

allow "it" for the measles virus

allow fewer people to pass it on to non-immune people

1

(d) **Level 3:** Relevant points (comparisons / reasons) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (comparisons / reasons) are identified and there are attempts at logical linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

differences (after exposure to measles virus):

- greater number / higher concentration of antibodies produced
- quantitative statement, e.g. 9 times higher **or** 0.8 to 7.2
- antibodies produced sooner – idea of immediate response
- antibodies produced quicker
- antibodies stay (in higher concentration) for longer

explanation

- white blood cells / leucocytes / lymphocytes / B cells
ignore phagocytes / macrophages
- reference to previous exposure (of white blood cells) to pathogen / virus
- (white blood cells) recognise pathogen / virus / antigen
- memory cells
- production of specific / correct antibodies

[11]

9.

(a) any **one** from:

- not all deaths recorded
- not all causes of deaths recorded
allow cause may not be known

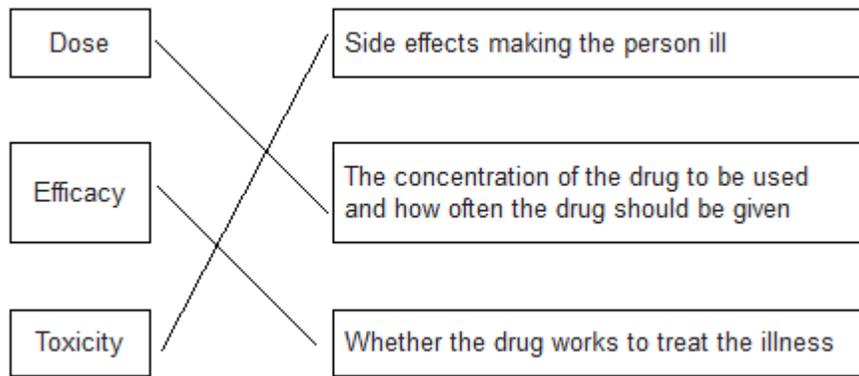
1

(b) antibiotics do not kill viruses

allow antibiotics only kill bacteria

1

(c)



all correct for 2 marks

1 or 2 correct for 1 mark

2

(d) any **one** from:

- to prevent false claims
- to make sure the conclusions are correct / valid
- to avoid bias

1

(e) some people would be immune to EVD

allow those vaccinated would not contract the disease

1

if less people (in a population) have EVD less chance of it being passed on

1

(f) **Level 3 (5–6 marks):**

A detailed and coherent evaluation is provided which considers a range of arguments for and against the use of unlicensed drugs and comes to a conclusion consistent with the reasoning.

Level 2 (3–4 marks):

An attempt to give arguments for and against the use of unlicensed drugs is made. The logic may be inconsistent at times but builds towards a coherent argument.

Level 1 (1–2 marks):

Discrete relevant points made. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.

0 marks:

No relevant content

Indicative content

pros

- might save some lives
- vaccine could reduce chance of future outbreaks
- patient made aware of risk and agreed to use of drug
- sharing of results could speed up development of effective vaccines / drugs
- used mainly for health workers who were risking their lives to help

cons

- could be dangerous
- or**
- vaccine could harm a healthy person
 - goes against legislation / laws governing drug development
 - might set a precedent for other drugs not to be fully tested
 - unfair as not available to the African people

a justified conclusion

6

[13]