Mark schemes

Q1.

(a) (physical) barrier
or
stops pathogens entering (blood / body)

allow named pathogen throughout
allow produces antimicrobial secretions
allow produces oil / sebum / sweat
ignore reference to scabs / clots

1

(b)
$\frac{63}{210}$

1

$\frac{3}{10}$

allow 0.3
ignore 30%
if neither mark awarded allow $\frac{210}{63} = \frac{10}{3}$ *for **1** mark*

1

(c) *(at pH1)* 187 (killed)

ignore negative symbol throughout

1

(at pH5) 31 (killed)

1

(187 – 31) = 156
(more bacteria killed)

allow correct subtraction using incorrect calculation at pH1 and/or pH5

1

(d) (the student) calculated the midpoint

1

(between) 23 and 63

OR

any **two** from:

- $\frac{63 - 23}{2}$ = 20
- 20 + 23 = 43
- 63 – 20 = 43

allow (between values at) pH1 and pH3

allow $\frac{23 + 63}{2}$ *= 43 for **2** marks*

allow plot data from the table on graph (1) then read off value for pH2 (1)

*allow other correct methods for up to **2** marks*

1

[8]

Q2.

(a) **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

3–4

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1–2

No relevant content

0

Indicative content:

Starch
- iodine (solution) tests for starch
- iodine (solution) turns to blue-black **or** black **or** dark blue (if starch is present)
- iodine (solution) remains unchanged / yellow / orange / brown (if no starch is present)

Sugar
- Benedict's (reagent / solution) tests for sugar
- boil or heat (to at least 60 °C)
- Benedict's (reagent / solution) turns green / yellow / orange / brown / (brick) red (if sugar is present)
- Benedict's (reagent / solution) remains unchanged / blue (if no sugar is present)

For **Level 2**, the response must give details of the tests for starch and sugar.

(b) amylase

must be in this order

1

sugar

1

(c) the type of bread

1

(d) any **two** from:

- white bread tastes sweet in the least time
- wholemeal bread takes most time to taste sweet
- brown bread takes more time than white bread to taste sweet

allow answers in terms of rate, such as fastest / slowest to taste sweet

allow to break down for to taste sweet, throughout

*allow a correct comparison of time to taste sweet for two types of bread, for **1** mark*

*allow any two correct comparisons of time to taste sweet for two types of bread, for **2** marks*

ignore use of figures, unqualified

2

(e) repeated (each type of bread)

1

calculated a mean

1

(f)

$$\frac{58 + 55 + 61}{3}$$

allow $\frac{174}{3}$

1

58 (seconds)

allow student's total correctly divided by 3

*if no answer given in answer space allow answer written in **Table 2***

1

(g) each person's sense of taste is different

1

[14]

Q3.

(a) arteries

1

(b) pushes / moves blood

1

to get <u>oxygen</u> around the body

allow description of getting oxygen around the body, such as through blood vessels

or

to get <u>oxygen</u> to a named organ

*do **not** accept to get oxygen to the lungs*

ignore reference to restarting the heart

ignore reference to the pacemaker

1

(c) provides oxygen (for respiration)

allow idea of carbon dioxide triggering breathing to restart

1

(d) statin(s)

allow named statin

1

(e) (stent) opens / widens (blocked blood) vessel

allow (stent) keeps (blocked blood) vessel open

allow a description of the blood vessel being opened

ignore type of blood vessel

ignore unblocks (blood) vessel

1

to allow (more) blood to flow

or

to allow (more) glucose / oxygen

to the heart (cells / tissue / muscle)

1

(f) any **two** from:

- smoking increases the (%) risk of **all** types of (cardiovascular) disease
- smoking increases the (%) risk of having (disease) **H** more than any other type of (cardiovascular) disease
- smoking increases the (%) risk of having (disease) **E** less than any other type of (cardiovascular) disease

ignore smoking causes (cardiovascular) disease

*allow not smoking decreases the risk of **all** types of (cardiovascular) disease*

*allow if you smoke, you are **most** likely to get (disease) **H***

*allow if you smoke, you are **least** likely to get (disease) **E***

allow a comparison of the effect of smoking on the risk of two (cardiovascular) diseases

*allow two comparisons of the effect of smoking on the risk of two (cardiovascular) diseases for **2** marks*

2

(g) y-axis labelled **'**Percentage / % increase in risk (compared to people who have never smoked)**'**

1

correct scale of 1 cm = 5% on y-axis

1

all bars plotted correctly

allow a tolerance of ±½ small square

ignore bars touching

ignore width of bars

1

all bars correctly labelled

1

(h) any **one** from:

- poor diet

  ignore obesity

  allow descriptions of poor diet eg diet high in (saturated) fat / cholesterol

  ignore diet unqualified

- lack of exercise

  allow descriptions of lack of exercise

  allow high alcohol intake

  allow other correct lifestyle factors such as having a stressful job

1

[14]

Q4.

(a) nucleus

allow chromosome

ignore in the DNA

1

(b) **A**, **D** and **E**

1

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

5–6

Level 2: Relevant points (reasons / causes) 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:

Difficulty digesting food

- less / no lipase
- (so) less / no fat broken down
  - into fatty acids
  - into glycerol
- less / no carbohydrase / amylase
- (so) less / no carbohydrate / starch broken down
  - into glucose / sugar
- less / no protease
- (so) less / no protein broken down
  - into amino acids

Difficulty gaining body mass

- less / no absorption
  - of small / soluble molecules
  - of fatty acids
  - of glycerol
  - of glucose / sugar
  - of amino acids

- fewer molecules **or** fewer amino acids available for building protein / muscle / cells / tissues
- less fat stored
- less respiration
- less energy
- (so less energy) for building new molecules / cells / tissues

For **Level 3** details of difficulty digesting food **and** difficulty gaining body mass are needed.

(d) large surface / area

allow large surface / area to volume (ratio)

1

(large) capillary network
or
good / efficient blood supply

allow many capillaries

1

walls are thin
or
walls are one cell thick

ignore references to membranes
ignore alveoli are thin
ignore alveoli are one cell thick
*do **not** accept thin cell walls*
ignore references to alveoli
being moist
ignore steep concentration gradient

1

(e) less (aerobic) respiration

allow (more) anaerobic respiration

1

(so) less energy (released)

*do **not** accept less energy produced / made / created*

1

(results in) less muscle contraction
or
(results in) reduced metabolism
or

allow relevant named metabolic processes

(results in) increased breathing rate / depth
or
(results in) increased heart rate

allow (results in) person getting out of breath

OR

(more) anaerobic respiration (1)

(so) lactic acid produced (1)

(results in) muscle fatigue
or
(results in) less muscle contraction
or
(results in) increased breathing rate / depth
or
(results in) increased heart rate (1)

allow muscle ache / cramp / tiredness / pain
allow (results in) person getting out of breath

1

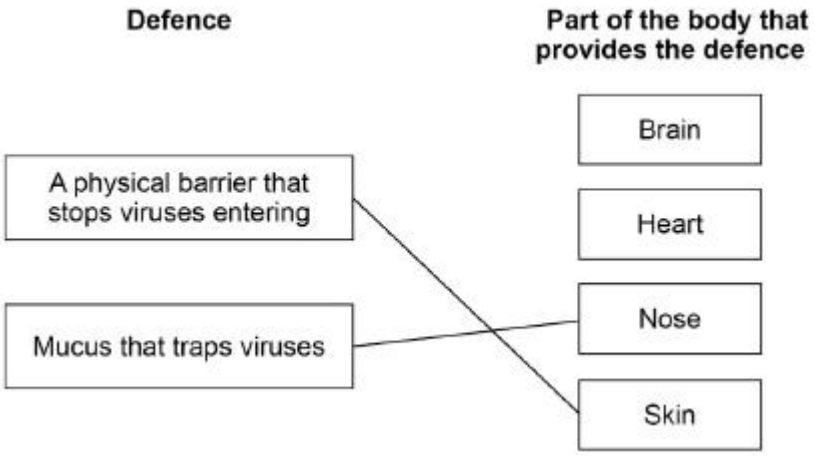
[14]

Q5.

(a) pathogens

1

(b)



do **not** accept more than one line from a box on the left

2

(c) division

1

(d) malignant tumours have cells that can spread to other parts of the body

1

malignant tumours may form secondary tumours

1

(e) (percentage) decreases

1

(f) more females were vaccinated (over time)

allow males may also be vaccinated

allow more people were vaccinated

allow increased use of (named) barrier methods of contraception

allow more awareness / education (about HPV)

1

(g) white blood cells

1

(h) antibodies

1

(i) any **one** from:

- people are afraid of side / unknown effects
  allow there are side effects
  allow people think they cause (named) disease
- religious / cultural objections
  ignore religion unqualified ignore moral / ethical objections
- (some people) believe they don't work
- some people think (HPV) vaccine encourages sexual activity
  ignore pain of injection

1

[11]

Q6.

(a) A

1

(b) C

1

(c) right atrium

1

(d) any **two** from:

- (artery) has a thick**er** muscle (tissue)
- (artery) has a thick**er** elastic (tissue)

  if neither mark awarded

  *allow **1** mark for artery has a thick**er** wall*
- (artery) has a narrow**er** lumen

  allow description of lumen
- (artery) does not contain valves

  allow converse if clearly referring to a vein

2

(e) as the percentage of the (coronary) artery that is blocked increases, blood flow decreases

allow converse

allow the greater the blockage, the less blood flows

*allow negative correlation **or** inversely proportional*

allow as one increases, the other decreases

1

(f) scale on y-axis

must take up at least 50% of axis

1

all points plotted

*allow 3 or 4 correct plots for **1** mark*

allow a tolerance of ± ½ small square

2

correct curved line of best fit

ignore line joined point to point with straight lines

ignore extrapolation

1

(g) correct answer from student's line in **Figure 3**

allow a tolerance of ± ½ small square

*if no line drawn on **Figure 3**, allow a value from 18 to 24 (cm^3/minute)*

1

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

5–6

Level 2: Relevant points (reasons / causes) 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:

- reduced blood flow to heart (muscle / tissue / cells)
- (so) less oxygen to heart (muscle / tissue / cells)
- (so) less glucose to heart (muscle / tissue / cells)

- (so) less (aerobic) respiration (in heart / body cells)
- (more) anaerobic respiration
- (so) less energy (released)

- (so) less muscle contraction
- (so) less blood / oxygen / glucose around the body (from heart) **or** slower flow of blood / oxygen / glucose to body (from heart)
- less carbon dioxide removed from body (muscle / tissue / cells)
- (resulting in) breathlessness
- (resulting in) tiredness
- (anaerobic respiration causes) production of lactic acid
- (build-up of lactic acid) causes muscle fatigue / pain **or** chest pain

For **Level 3**, students must explain the effect of reduced oxygen / glucose on respiration **or** energy release and its consequence

(i) any **one** pair from:

mark as a pair

- (insert) stent(s)

allow description

1

(to) open (coronary) artery

ignore unblock (coronary) artery

1

- (prescribe) statins (1)

(to) reduce (blood) cholesterol (1)

allow to slow down the rate of fatty material deposit

- heart (and lung) transplant (1)

(to) replace the diseased heart with a healthy heart (1)

- use an artificial heart (1)

(to) keep the patient alive while waiting for a transplant (1)

allow (artificial heart) pumps blood around the body in place of the heart

- (artery / heart) bypass (1)

allow description

(to) divert blood around the blockage (1)

[19]