Mark schemes

Q1.

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

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

1

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Q2.

(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

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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)

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