B2
ORGANISATION
TEST 3
Mark schemes

1. (a) (i) alveoli / alveolus
   - allow air sacs
   - allow phonetic spelling
   
   (ii) any one from:
   - protection (of lungs / heart)
   - help you breathe / inflate lungs.

   (b) (i) diffusion
   
   (ii) capillaries

   (iii) any two from:
   - (have many) alveoli
     - allow air sacs
   - large surface / area
   - thin (exchange) surface or short diffusion pathway
     accept only one / two cell(s) thick
   - good blood supply / many capillaries
     - allow (kept) ventilated or maintained concentration gradient.

2. (a) (i) water / H₂O
   - accept oxygen
   - allow H₂O
     - do not allow H₂O or H₂O

   (ii) the mineral ions are absorbed by active transport

   the absorption of mineral ions needs energy

   (iii) have (many root) hairs

   (which) give a large surface area (for absorption)
(b) carbon dioxide in
   or
   oxygen out
   or
   control water loss
   accept gas exchange
   ignore gases in and out
   ignore gain / lose water

(c) (i) guard cells

(ii) (stomata are) closed
   allow there is no gap / space

(iii) plant will wilt / droop
   ignore die

(a) (i) 64

(ii) 36
   allow e.c.f from (i) i.e. 100 – answer given in (a)(i)

(iii) any one from:
   • only considers 16-year-olds
     ignore lack of evidence
     allow does not refer to all ages
   • only about some / 5 countries
     allow does not refer to all countries.

(b) the more exercise done the healthier a person is
   allow the more exercise done the higher the health rating
   allow the less exercise done the lower the health rating

(c) having a high cholesterol level

(d) (i) antibodies

(ii) antibiotics
(a) (i) any one from:
- glucose
- oxygen
- carbon dioxide
- urea
- water

allow hormones
allow named example of a product of digestion

(ii) (cardiac) muscle

allow muscular

(b) (i) B

(ii) D atrium / atria

ignore references to left or right

E ventricle(s)

ignore references to left or right

(c) (i) a vein

(ii) an artery

(iii) keeps artery open / wider

allow ecf from part cii

(so) blood / oxygen can pass through (to the heart muscle)

(a) (i) A = (cell) membrane

B = cytoplasm

do not accept cytoplast

(ii) To control the activities of the cell
Layer of cells lining the stomach

Stomach

Mouth, stomach, intestines, liver and pancreas

An organ

An organism

An organ system

A tissue

extra lines cancel

3

[6]
Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

Level 3 (5–6 marks):
Processes used for obtaining specified materials are given. and correctly linked to the vessels that the materials are transported in or correctly linked to a description of the direction of movement of the materials. 
**For full credit**, in addition to the above descriptors at least one of the processes must be linked to the vessel that the material is transported in and the direction of the movement of the material.

Level 2 (3–4 marks):
At least one process for obtaining a specified material is given and is correctly linked to the vessel that the material is transported in or correctly linked to a description of the direction of movement of the material.

Level 1 (1–2 marks):
At least one process (P) for obtaining a material is given or at least one vessel (V) and the material it carries is given or there is a description of the direction of movement (M) for at least one material.

0 marks:
No relevant points are made

examples of points made in the response Ions:
(P) taken up by diffusion or active transport
• from an area of high to low concentration (diffusion) or an area of low to high concentration (active transport)
  (V) travels in the xylem
  (M) to the leaves or from the roots / soil

Water:
(P) taken up by osmosis
• from an area of low to high concentration
  
  *allow high concentration of water to low concentration of water*
  *allow from high water potential to low water potential*
  *ignore along a concentration gradient*
  (V) travels in the xylem
  (M) to the leaves or from the roots / soil
  (P) transpiration stream
• movement replaces water as it evaporates from leaves
  (V) in the xylem

Sugar:
(P) made during photosynthesis
(V) travels in the phloem
(M) to other parts of the plant or to storage organs or travels up and down
(a) guard (cells)
    allow phonetic spelling

(b) (i) as carbon dioxide (concentration) increases, the (mean) number of stomata decreases
    allow there is a negative correlation
    (there is a) rapid drop initially
    allow use of any number between 1.5 and 3.0 to indicate “initially”

(ii) (there is) more carbon dioxide so plant doesn’t need as many stomata (to obtain the amount needed)
     or
     (there is) less carbon dioxide so the plant needs more stomata (to obtain enough)

(c) (i) may lose too much water
    allow plant may wilt
    ignore references to oxygen / carbon dioxide
    plants lose a lot of water is insufficient
    ignore flaccid

(ii) any one from:
    • hot
    • dry
    • windy
    ignore environments unqualified eg desert
Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance and apply a ‘best-fit’ approach to the marking.

0 marks
No relevant content.

Level 1 (1–2 marks)
The method described is weak and could not be used to collect valid results, however does show some understanding of the sequence of an investigation.

Level 2 (3–4 marks)
The method described could be followed and would enable some valid results to be collected, but lacks detail.

Level 3 (5–6 marks)
The method described could be easily followed and would enable valid results to be collected.

Examples of the points made in the response:
• bean seedlings of same age
• cut material from same part of each organ (for repeats) e.g. top 1 cm of stem / a whole cotyledon / seed
• equal mass of each organ
  *accept weight for mass*
• grind / homogenise
• in equal amounts of water / buffer
• equal volumes of hydrogen peroxide solution
• equal concentrations of hydrogen peroxide solution
• same temperature
• temperature maintained in water bath
• quantitative measure of gas production eg height of foam in mm / collect gas in graduated syringe in cm³
• for same time period
• repetitions (3+ times)
• calculate mean for each.
(b) (i) correct answer: 40

1 mark for 45 as the anomalous result has been included in the calculation

or

1 mark for \( \frac{38 + 41 + 42 + 39}{4} \)

or 160

\[
\frac{4}{4}
\]

(ii) vertical axis correctly labelled:
‘Enzyme activity in arbitrary units’

allow ecf from (b)(i)

points plotted correctly ±1 mm

**deduct 1 mark for each incorrect plot**

suitable line of best fit

not feathery, not point to point

(iii) 6.0 / 6

allow ± 0.1

if 6.0 not given, allow correct for candidate’s graph ± 0.1

(iv) in range 0 to 14 units

allow correct for candidate’s graph

(v) enzyme denatured / enzyme (active site) shape changed

allow substrate no longer fits (active site)

ignore reference to temperature

do not allow enzyme dies

9

(a) (i) glycerol

(ii) pancreas / small intestine

accept duodenum / ileum

ignore intestine unqualified
(b) any two from:
- type of milk
- volume / amount of milk
- vol. bile equals vol. water
- volume of lipase
- concentration of lipase
- temperature
  ignore time interval
  ignore solution unqualified
  do not allow pH
  ignore starting pH
  ignore volume / amount of bile / water
  ignore concentration of bile
  accept amount of lipase if neither volume nor concentration given

(c) (i) fatty acid (production)

(ii) faster reaction / digestion (with bile)
  or
  pH decreases faster (with bile)
  or
  takes less time (with bile)
  or
  steeper fall / line (with bile)
  allow use of data
  ignore easier

(iii) all fat / milk digested
  or
  same amount of fatty acids present
  or
  (lower pH) denatures the enzyme / lipase
  allow all reactants used up
  ignore reference to neutralisation
  allow enzyme won’t work at low pH
  do not allow enzyme killed

(a) guard cells

(b) (i) any one from:
  - species / plant
  - length of time
  ignore temperature and size of leaves
(ii) 20

correct answer = 2 marks

\[
\frac{1.6 - 1.28 \times 100}{1.6}
\]

or
\[
\frac{0.32 \times 100}{1.6}
\]

for 1 mark

(c) less water loss / transpiration / evaporation

1

(d) hot

ignore bright / sunny conditions

dry / low humidity

wind(y)

1

(a) (i) doesn’t have valves

allow veins have valves

has a thicker wall or thicker layer of muscle

allow has a smaller lumen

ignore references to elastic (in walls)

1

(ii) any two from:

• (artery has) more oxygen
• (artery has) more glucose

allow (artery has) more amino acids / fatty acids
• (artery has) less carbon dioxide
• (artery has) less lactic acid

ignore urea

ignore reference to pressure

accept converse for veins if veins is clearly stated

2
(b) any two from:
- no rejection
  *allow no tissue matching required*
- abundant supply
- low risk of infection
  *allow named example ie HIV, CJD*
- longer shelf life
  *allow less space needed for storage*
  *ignore side effects*

(a) (i) xylem

(ii) water

minerals / ions / named example(s)
*ignore nutrients*

(b) (i) movement of (dissolved) sugar
*allow additional substances, eg amino acids / correct named sugar (allow sucrose / glucose)*
*allow nutrients / substances / food molecules if sufficiently qualified*
*ignore food alone*

(ii) sugars are made in the leaves

so they need to be moved to other parts of the plant for respiration / growth / storage

(c) (i) mitochondria

(ii) for movement of minerals / ions
*Do not accept ‘water’*

against their concentration gradient