Mark schemes

(a) any two from:
  • carbon dioxide / CO₂
  • urea
  • protein
  • water / H₂O
  • hormones / insulin.

  ignore food / waste / alcohol / drugs / enzymes
  ignore glucose and oxygen
  allow two correct hormones for 2 marks
  allow two correct food components for 2 marks
  allow antibodies
  allow antitoxins

(b) (i) plasma

  platelets

(ii) (cardiac) muscle

  allow muscular

(c) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) 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)
There is a description of at least one advantage of the cow tissue valve or a description of at least one disadvantage of the cow tissue valve.

Level 2 (3–4 marks)
There is a description of at least one advantage of the cow tissue valve and at least one disadvantage of the cow tissue valve.

Level 3 (5–6 marks)
There is a description of the advantages and disadvantages of the cow tissue valve or a description of several advantages of the cow tissue valve and at least one disadvantage.
Examples of the points made in the response

Advantages of cow tissue valve:

• abundant supply of cows
• so shorter waiting time
  *ignore can take many years to find a suitable human donor*
• no need for tissue typing
• quicker operation
• less invasive or shorter recovery time
• cheaper operation costs
• less operation / anaesthetic risks.

Disadvantages of cow tissue valve:

• made from cow so possible objections on religious grounds
  *ignore ethical arguments*
• new procedure so could be unknown risks
  *allow possible transfer of disease from cow*
• risks of using a stent eg. blood clots, stent breaking or valve tearing
• not proven as a long term treatment
• may be rejected
  *ignore information copied directly from the table without value added.*

2

(a) (i) diffusion

(ii) carbon dioxide
  *accept CO\(_2\) / CO2*
  *do not accept CO²*

(iii) red blood cells

(b) 70
  *if no / incorrect answer then*
  70 000 000
  *or*
  280 x 0.25 gains 1 mark
  *ignore doubling the answer*

(c) allows more gas / oxygen / CO\(_2\) (exchange)
  *do not accept air*
(a) any three from:

- parts of organisms have not decayed
  accept in amber / resin
  allow bones are preserved
- conditions needed for decay are absent
  accept appropriate examples, eg acidic in bogs / lack of oxygen
- parts of the organism are replaced by other materials as they decay
  accept mineralised
- or other preserved traces of organisms, eg footprints, burrows and rootlet traces
  allow imprint or marking of organism

(b) (i) teeth for biting (prey)
  must give structure + explanation
  claws to grip (prey)
  accept sensible uses
  wing / tail for flight to find (prey)

(ii) any two from:

- new predators
- new diseases
- better competitors
- catastrophe eg volcanic eruption, meteor
- changes to environment over geological time
  accept climate change
  allow change in weather
- prey dies out or lack of food
  allow hunted to extinction

(a) A - atrium
  ignore references to right / left

B - ventricle

(b) (i) muscular

(ii) push blood
  accept pump / force
arrows approx as indicated

arrow(s) showing flow from A to B
from B out / up / to artery

(d)  (i) male

65 and over

(ii) fatty deposits / material in (coronary) arteries

allow correct points made about heart attacks

narrows / blocks / reduces flow

decreases oxygen supply (to heart muscle)

(a)  (i) stomach

(ii) small intestine
(b)

<table>
<thead>
<tr>
<th></th>
<th>salivary glands</th>
<th>stomach</th>
<th>pancreas</th>
<th>small intestine</th>
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<tbody>
<tr>
<td>amylase</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>lipase</td>
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<td>✗</td>
<td>✓</td>
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<tr>
<td>protease</td>
<td>✗</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

1 mark per correct row

or

if no correct row max 1 mark for any one correct column

(c) enzyme / protease / pepsin most effective in acid conditions / low pH

accept optimum / correct pH

do not accept ref to incorrectly named enzymes

ignore killing bacteria

ignore acid breaks down food

(d) Enzyme         Breakdown products

Amylase breaks down starch into...
- amino acids

Lipase breaks down lipids into...
- bases
- fatty acids and glycerol

Protease breaks down proteins into...
- sugars

(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**

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

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

**for 1 mark**

(c) less water loss / transpiration / evaporation

(d) hot

*ignore bright / sunny conditions*

dry / low humidity

wind(y)

(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

(a) (i) \( A = \text{(cell) membrane} \)

B = cytoplasm

*do not* accept cytoplasm

(ii) To control the activities of the cell

(b) extra lines cancel

(a) (i) amino acid(s)

*accept peptide(s)*

*do not allow polypeptide(s)*

(ii) protease

(b) (i) 2

(ii) repeat

*do not allow other enzyme / substrate*
using smaller pH intervals between pH1 and pH3
allow smaller intervals on both sides of / around pH2
allow smaller intervals on both sides of / around answer to (b)(i)

(iii) enzyme / pepsin denatured / shape changed
do not allow enzyme killed
allow enzyme ‘destroyed’

enzyme / pepsin no longer fits (substrate)
allow enzyme / pepsin does not work

(c) hydrochloric (acid)
allow phonetic spelling
accept HCl
allow HCL
ignore hcl
do not allow incorrect formula – e.g. H$_2$Cl / HCl$_2$

(a) (i)

White blood cells
- carry glucose around the body

Red blood cells
- carry oxygen around the body
- help the blood to clot

Platelets
- destroy microorganisms

one mark for each line
extra line negates a mark

(ii) any one from:
- carbon dioxide / CO$_2$
- urea
do not allow urine
ignore water
ignore ions
(b) (i) B

(ii) D

(iii) vein

   accept correct named

   examples

(c) (i) any one from:

   • keeps artery / blood vessel open or widens artery / blood vessel
   • allows (more) blood to heart / cardiac muscle
   • (allows) blood to flow more easily
   • allows (more) oxygen to heart / cardiac muscle

(ii) any two from:

   • bleeding

   allow blood clots

   • infection

   • damaging blood vessels

   • damaging the heart

   • risk from anaesthetic

[10]