

GCSE BIOLOGY

Topic Paper: 2.2 - 2.3 Plant and animal tissues, organs and systems
Part 1 & 2 Mark Scheme

MARK SCHEME



65 Marks



- M1.**
- (a) (i) defence against **or** destroy pathogens / bacteria / viruses / microorganisms
do not allow 'destroy disease'
accept engulf pathogen / bacteria / viruses / microorganism
accept phagocytosis
accept produce antibodies / antitoxins
allow immune response 1
- (ii) they are small fragments of cells 1
- (b) liver 1
in this order only
- kidney(s) 1
- (c) any **two** from:
 that it doesn't cause an immune response **or** isn't rejected / damaged by white blood cells
 whether it is a long lasting material / doesn't decompose / corrode / inert
 if it is strong (to withstand pressure)
 it will open at the right pressure
 that it doesn't cause clotting
 that it doesn't leak **or** it prevents backflow
 non toxic
ignore correct size 2
- [6]**

M2.

ideas that

mass of oxygen in blood unaffected/stays at 2.0g per litre at low altitudes

mass of oxygen in blood falls at higher altitudes

starts to fall above 2500 metres

75 g per litre (at 5000 metres)

Don't credit simply "gets lower as you get high", but don't penalise for 1 mark each

[4]



- M3.** (a) (i) increasing one increases the other
gains 1 mark
- but
they increase in proportion/ 1/5 taken in at first / 3/10 taken in after 2 weeks
gains 2 marks 2
- (ii) *idea that* more/faster diffusion with higher concentration
for 1 mark
- or**
with more oxygen particles/molecules (in same space) 1
- (b) (i) can take more oxygen from (the same) air/changes from 30 to 45/increases by 15
gains 1 mark
- but
takes 50% more or 1.5 times as much
gains 2 marks
- or**
increases by 15 mg breath 2
- (ii) more red blood cells develop
or
more haemoglobin in the blood
(*not just 'acclimatises'*)
for 1 mark 1
- (iii) 75
60
each for 1 mark 2

[8]

- M4.** (a) (i) haemoglobin / oxyhaemoglobin
must be phonetic 1
- (ii) carries oxygen **or** forms oxyhaemoglobin
Ignore references to CO₂ / iron
cancel if extras like food / glucose 1
- from lungs to tissues 1



(b) no nucleus **or** biconcave disc (described)

*ignore references to size
ignore vague references to being
'round' / 'donut' shaped etc.*

1

[4]

M5. (a) hold cells together **or** prevent flow of cells **or** trap cells

1

(b) 12500

if correct answer, ignore working / lack of working

$$\frac{100}{0.008} \text{ for 1 mark}$$

ignore any units

2

(c) (i) size RBC approximately same size capillary **or**
no room for more than one cell **or**
only one can fit **or**
RBC is too big

allow use of numbers

*do **not** accept capillaries are narrow*

1

(ii) more oxygen released (to tissues) **or**
more oxygen taken up (from lungs)

1

and any **two** from:

slows flow **or** more time available

shorter distance (for exchange) **or** close to cells / capillary wall

more surface area exposed

2

[7]



M6. D – many microvilli (1)

Ex – provide large surface area (1)

*five points made
max 3 descriptions
max 3 explanations*

D – many capillaries / good blood supply (1)

Ex – maintain concentration / diffusion gradient **or** quickly removes food (1)

D – thin wall / one cell thick surface / capillaries near surface (1)

*allow villi are thin
ignore villi are one cell thick*

Ex – short distance for food to travel (1)

D – many mitochondria (1)

Ex – provide energy / ATP for active uptake / transport (1)

5

[5]

M7. (a) blood has red (blood) cells / haemoglobin

1

haemoglobin combines with / carries oxygen

ignore 'mix'

NB Blood can form oxyhaemoglobin = 2 marks

1

(b) blood gains oxygen / becomes oxygenated (in the lungs)

idea of acquiring oxygen must be unambiguous

1

blood loses oxygen to the muscles / cells

1

because muscles are respiring (aerobically)

1

to provide energy (for exercise)

1

[6]

M8. (a) solution in soil is more dilute (than in root cells)

concentration of water higher in the soil (than in root cells)

1

so water moves from the dilute to the more concentrated region

*so water moves down (its) concentration gradient **or** water moves from a high concentration of water to a lower concentration*

1



concentration of ions in soil less (than that in root cells) 1

so energy needed to move ions

or

ions are moved against concentration gradient

the direction of the concentration gradient must be expressed clearly

accept correct reference to water potential or to concentrations of water

1

(b) any **three** from:

movement of water from roots / root hairs (up stem)

via xylem

to the leaves

(water) evaporates

via stomata

3

(c) (i) 0.67/0.7

accept 0.66, 0.666666... or $\frac{2}{3}$ or 0.6

correct answer gains 2 marks with or without working

if answer incorrect allow evidence of $\frac{100}{150}$ for 1 mark

*do **not** accept 0.6 or 0.70*

2

(ii) during the first 30 minutes

any **one** from:

it was warmer

it was windier

it was less humid

there was more water (vapour) in the leaves

1



so there was more evaporation
ignore 'water loss'

or

stomata open during first 30 minutes **or** closed after 30 minutes (1)

so faster (rate of) evaporation in first 30 min **or** reducing (rate of) evaporation
after 30 min (1)

1

[11]

M9. (a) guard cell

ignore stoma / stomata

1

(b) Species A:

allow converse points for species B

stomata open in dark / at night **or** close in light / in day

1

stomata closed during warm(est) period **or** open when cool(er)

1

heat (energy) / warmth increases evaporation / transpiration

must give explicit link between heat and transpiration

1

reduces water loss / evaporation / transpiration

ignore photosynthesis

1

[5]

M10. (a) (i) guard (cells)

allow phonetic spelling

1

(ii) any **one** from:

ignore reference to cells

allow carbon dioxide to enter

allow control loss / evaporation of water or control transpiration rate

allow oxygen to leave.

allow 'gaseous exchange'

1

(b) (i) 200

correct answer gains 2 marks with or without working

allow 1 mark for $0.1 \times 0.1 = 0.01$ (mm²)

2



- (ii) more / a lot of / increased water loss
allow plant more likely to wilt (in hot / dry conditions) 1
- (c) (i) 0.12 1
- (ii) the lower surface has most stomata 1
- stomata are now covered / blocked (by grease) 1
- so water cannot escape / evaporate from the stomata
ignore waterproof
to gain credit stomata must be mentioned at least once 1
- [9]