

Activity 3 – Practice Exam Questions

Mark schemes

Q1.

- (a) (i) mitochondrion / mitochondria
must be phonetically correct 1
- (ii) carbon dioxide / CO₂ 1
- water / H₂O 1
- in either order*
*accept CO₂ but **not** CO²*
accept H₂O or HOH but not H²O
- (iii) diffusion 1
- high to low concentration
allow down a concentration gradient 1
- through (cell) membrane **or** through cytoplasm
*do **not** accept cell wall* 1
- (b) ribosomes make proteins / enzymes 1
- using amino acids 1
- part A / mitochondria provide the energy for the process
allow ATP
*do **not** accept produce or make energy* 1

[9]

Q2.

- (a) **B**
- no mark for "B" alone, the mark is for B **and** the explanation.*
- large(r) surface / area **or** large(r) membrane
accept reference to microvilli
ignore villi / hairs / cilia
accept reasonable descriptions of the surface eg folded membrane / surface
*do **not** accept wall / cell wall* 1

- (b) (i) any **one** from:
- (salivary) amylase
 - carbohydrase
- 1

- (ii) many ribosomes
- do **not** mix routes. If both routes given award marks for the greater.*
- 1

ribosomes produce protein
accept amylase / enzyme / carbohydrase is made of protein

or

(allow)

many mitochondria (1)

mitochondria provide energy to build / make protein (1)
accept ATP instead of energy

1

[4]

Q3.

- (a) vena cava
- 1

- (b) 0.5 mm = 0.05 cm
- 1

$$\text{time} = \frac{10.00 - 0.05}{0.4}$$

allow alternative correct substitution

1

24.875

1

25 (s)

*an answer of 25 (s) scores 4 marks
 allow 24 for 3 marks (no conversion of mm to cm)
 allow 23.8 / 23.75 for 2 marks (no conversion of mm to cm
 and incorrect sf)*

1

- (c) (blood) travels through (the) pulmonary vein
- 1

(blood) enters left atrium

1

(blood) enters (the) left ventricle

1

(blood) leaves the heart via / through (the) aorta
allow blood travels through arterioles

allow blood (travels round the body and) reaches the cells / tissues via / in capillaries

1

ignore ref to valves / systole / diastole throughout

(d) **Level 3 (5-6 marks):**

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

Level 2 (3-4 marks):

Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

No relevant content (0 marks)

Indicative content

S = structural F = functional

- (S) both have a large surface area
- (S) villi have many microvilli
- (S) alveolar walls are not flat / are folded

- (F) to maximise diffusion (of gases) / absorption of (food) molecules

- (S) both have many capillaries / good blood supply / capillaries near the surface
- (F) to maintain concentration / diffusion gradient

- (S) both have thin walls / walls that are one cell thick / one cell thick surface
- (F) to provide a short diffusion distance (for molecules to travel)

- (S) villi have many mitochondria
- (F) to provide energy for active transport (of food molecules)

- (S) cells of the villi have microvilli / more projections
- (F) to further increase the surface area / increase the number of proteins in the membrane / to allow more active transport to take place

[15]

Q4.

- (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)

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

Q5.

- (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]

Q6.

- (a) (i) diffusion is down the concentration gradient
for a description of diffusion
ignore along / across gradients 1

- to enter must go up / against the concentration gradient
accept by diffusion ions would leave the root

- or**

- concentration higher in the root / plant

or

concentration lower in the soil

1

(ii) active transport

allow active uptake

1

(b) (i) (root hairs →) large surface / area

1

(ii) (aerobic) respiration

do not allow anaerobic

1

releases / supplies / provides / gives energy

accept make ATP (for active transport)

do not allow 'makes / produces / creates' energy

1

(iii) starch is energy source / store (for active transport)

allow starch can be used in respiration

do not allow 'makes / produces / creates' energy

1

[7]

Q7.

(a) 86

allow this answer only

do not accept 85.7

if no answer given, check for answer in the table

1

(b) as salt concentration increases, percentage of open stomata (in field of view) decreases (above 0.1 mol / dm³)

or

allow percentage of open stomata stays the same between 0.0 and 0.1 (mol / dm³) then decreases as salt concentration increases)

ignore references to number of open stomata

allow converse

allow idea that mean concentration (of salt) in guard cells is between 0.3 and 0.4 mol per dm³

1

(c) use concentrations between 0.3 (mol / dm³) and 0.4 (mol / dm³)

or

draw a graph of the data and read off the value at 50% (open stomata)

allow a list of appropriate concentrations i.e. 0.32 mol / dm³), 0.34 (mol / dm³), 0.36 (mol / dm³) etc.

1

(d) ($\pi \times 0.1875^2$) = 0.11 (mm²)

an answer of 36 scores 3 marks

$$\frac{4}{0.11}$$

1

36 (per mm²)

allow 36.22 / 36.23 or 36.2

if answer is incorrect allow for 2 marks for sight of number of open stomata = 9 per mm² (diameter used instead of radius)

*if no other marks awarded allow for 1 mark any **one** from:*

- *sight of area = 0.44(mm²) (diameter used instead of radius)*
- *sight of number of open stomata = 9.1 / 9.05 / 9.06 per mm² (diameter used instead of radius and no rounding)*

1

1

(e) (potassium) ions increase the concentration of the solution (inside guard cells)
or

(potassium) ions make cell more concentrated / less dilute

allow (potassium) ions decrease concentration of water / water potential (of guard cells)

1

water moves into the (guard) cell by osmosis

1

cell swells unevenly (so stoma opens)

1

as inner wall is less flexible than outer wall **or** thick part of the wall is less flexible than the thin part (of the wall)

1

[10]