

# *thebiotutor*

AS Biology OCR

Unit F211: Cells, Exchange & Transport

Module 2.3 Transport in Plants

Answers

1. (i) transports water (up plant);

*ACCEPT alternative wording for transport e.g. movement*

*DO NOT ACCEPT up and down*

*DO NOT ACCEPT water and sugars*

transports, minerals / ions, (up plant);

*ACCEPT alternative wording for transport*

*IGNORE ref nutrients / solutes*

*DO NOT ACCEPT sugars*

support (plant / stem / shoot);

*ACCEPT keeps plant upright*

1 max

- (ii) *Functions:*

**F1** (lignin), strengthens / thickens, the (xylem) wall;

*ACCEPT support only if in specific context of supporting the xylem wall*

**F2** waterproofing (wall) / AW;

*ACCEPT waterproofs cell*

**F3** (improving) adhesion of water (molecules);

*DO NOT ACCEPT adhesion and cohesion when used together*

**F4** (spiral) pattern allows flexibility / stretching / movement;

*Flexibility / stretching must ref, pattern of lignin laid down i.e. spirals*

*Explanation:*

**E1** prevents collapse of xylem;

**E2** (water) under tension / at low pressure / negative pressure;

*DO NOT CREDIT loss of water unqualified*

**E3** reduces (lateral) loss of water, through wall;

**E4** increases capillarity / AW;

**E5** prevents stem breaking / AW;

*Award mark(s) for function and explanation independently*

2 max

(iii) (pits) allow water to move, in / out / between, vessel(s);

*ACCEPT lateral movement for 'out'*

to bypass blockage;

*ACCEPT bypass air lock*

supply water to other, tissues / (other types) cells / parts of plant;

*ACCEPT any named, tissue / cells*

*e.g. to allow water to other tissues* 1 mark

*to allow water out to other tissues* 1 mark

*to allow water out of vessel to other tissues* 2 marks

**3 max**

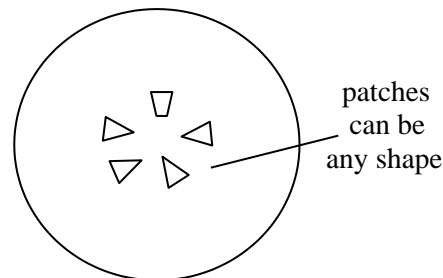
[6]

2. 3 – 5 discrete patches in ring (near centre);

*if xylem drawn then phloem must be labelled*

**DO NOT ACCEPT** vascular bundles around edge

**DO NOT ACCEPT** if phloem occupies more than half total width



[1]

3. **G;**  
**I;**

2

[2]

4. (i) potometer; R 'transpirometer'

1

(ii) transpiration is the loss of water, vapour/by evaporation;

(apparatus) measures water uptake;

to replace loss;

assumes all uptake is lost/AW; ora some may be used

explanation of how some uptake may be used e.g. used to regain turgor/used in photosynthesis;

uptake by detached shoot may not be same as whole plant/AW;

max

3

- (iii) cut shoot under water/insert into apparatus under water/AW;  
cut shoot at a slant;  
no, airlocks/bubbles/AW in, plant/apparatus, **or** airtight/watertight, joints;  
dry off leaves/AW; use a healthy/undamaged/AW, shoot; **A fresh**  
allow time to acclimatise/AW;  
keep (named) condition(s) constant; **R 'control' conditions if unqualified**  
measure per unit time;  
AVP; e.g. reference to scale, qualified – note position/fix scale  
**R 'set at 0'**  
qualified reference to reservoir

**R repeat readings – gives reliable results not valid readings**  
max

4

[8]

5. (a) transpiration;  
xylem;  
osmosis;

stoma(ta) / stomatal pore;

**DO NOT ACCEPT** 'diffusion' alone  
**ACCEPT** diffusion with osmosis used as qualification  
**DO NOT ACCEPT** 'pore' or 'guard cells'

4 max

- (b) (i) stomata (open to) allow, gaseous exchange / carbon dioxide in /  
oxygen out / AW;  
  
(gaseous exchange) for photosynthesis;  
(photosynthesis) essential for plant to, gain energy / make sugars;  
some water lost through cuticle;

*look for reverse argument*  
**DO NOT ACCEPT** ref to air **OR** to get gases  
*OR* let gases in  
**ACCEPT** 'gases in and out'

2 max

- (ii) xerophyte;

**DO NOT ACCEPT** cactus

1

- (iii) Allow the first point once as further explanation for A1 – A4 in addition to the linked explanation:  
reduce water (vapour) **potential gradient / diffusion gradient**;

**[A 1]** hairy leaves;  
trap **water vapour** / moisture;

**[A 2]** **stomata**, in pits / sunken;  
pits trap, **water vapour** / moisture;

**[A 3]** rolled leaves / presence of **hinge cells**;  
reduce **surface area** OR (rolled leaves) trap **water vapour** / moisture;

**[A 4]** high solute concentration in cells;  
reduces water potential inside leaf cells;

**[A 5]** thick(er) **cuticle**;  
(which is) waterproof / (relatively) **impermeable**;

**[A 6]** small leaves / **needles**;  
smaller **surface area**;

**[A 7]** fewer **stomata**;  
reduces **diffusion** (of water vapour);

**[A 8]** **stomata** close, during the day;  
reduces **diffusion** (of water vapour);

**[A 9]** most **stomata** on lower surface;  
less exposure to sun OR cooler OR reduces diffusion (of water vapour);

**[A 10]** more densely packed spongy mesophyll;  
smaller surface area for evaporation (from mesophyll cell surface);

**MARK FIRST TWO ADAPTATIONS ONLY**

**ALLOW** max 2 for adaptation [A] marks

*Explanation must be linked to an appropriate statement of adaptation. Allow an explanation mark even if adaptation mark not awarded.*

**DO NOT ACCEPT** 'water' for 'water vapour' throughout

**DO NOT ACCEPT** 'transpiration' for diffusion of water vapour throughout

**DO NOT ACCEPT** surface area to volume ratio

**ACCEPT** 'spines'

**DO NOT ACCEPT** surface area to volume ratio

4 max

QWC – technical terms used appropriately and spelt correctly;

*Use three terms from:*

*cuticle, impermeable, water vapour, potential gradient, diffuse / diffusion, stoma(ta), needles, surface area, hinge cells, saturated*

1

[12]

6. loss of water from mesophyll;  
cell walls;  
more drawn from, cytoplasm / cell / AW;  
cohesion of water molecules;  
hydrogen / H, bonds;  
water under tension / ref to hydrostatic pressure gradient implied;  
**A** water 'pulled' / 'drawn' **R** sucked  
via, symplast / apoplast / vacuoles / description / AW;  
(water from) xylem / xylem vessels;  
ref to water potential gradient;  
max

4

[4]

7. source when root converts, starch / insoluble carbohydrate, into sugars / AW;  
sink when root **either** stores starch / (named) carbohydrate / assimilate  
**or** uses carbohydrate for, respiration / growth / AW;  
high hydrostatic pressure makes it a source **and** low hydrostatic pressure a sink;  
when loading it is a source **and** when unloading a sink;  
*treat refs to (potato) tubers as neutral* 2 max

[2]

8. (a) sucrose; 1
- (b) (i) **P** = companion (cell);  
**Q** = sieve (tube) element / sieve tube cell; **R** sieve tube / sieve cell 2
- (ii) *ecf - do not penalise sieve tube here*
- 1 sieve elements / **Q**, end to end or sieve plates perforated / sieve pores, for ease of flow / AW;
  - 2 companion cells / **P**, metabolically active / have many mitochondria / produce ATP / release energy / AW; **R** make energy
  - 3 (active) loading into, companion cell / **P**; **A** into, sieve elements / **Q**
  - 4 ref to proton pump;
  - 5 ref to co-transporter;
  - 6 role of plasmodesmata (between **P** and **Q**); **R** pores
  - 7 sieve element / **Q**, has few organelles / AW, for, ease of flow / more sucrose / AW;
  - 8 ref to, unloading mechanism / (hydrostatic) pressure gradient;
  - 9 ref to one role for sieve plate e.g. electro-osmosis or stops 'bulging';  
max 3

[6]