

1. A)

(I) label line and **X** pointing to any part of the 'star' in the centre of the root section ;

II) composed of (group of) cells with similar structures ;
working together to perform shared functions ;

B)

xylem supplies water ;

air spaces ;

large (internal) surface area ;

water evaporates from surface of mesophyll cells ;

guard cells, open / close, stomata ;

water vapour, diffuses / moves, out through stomata ;

2A) the probability of an organism will surviving and reproducing (in the environment in which it is found) / AW ;

II)

aerial roots

for anchorage / stability (in flowing water) / (aerobic) respiration

/ gas exchange / oxygen absorption ;

floating seeds

for (seed) dispersal (carried on water) / reduce competition (from parent)

/ access to oxygen (to germinate / respire) ;

3a.i) sucrose / sugar ;

Amino acids

ii.....?

b)

functions

conduct / transport, water (and mineral ions) ;
ref to transpiration ;
reduced resistance to water flow / AW ;
structural) support (for plant) ;
prevents (inward) collapse (of xylem vessels) ;
(spirals) allows (some) flexibility / bending, of stems
(to prevent breaking) ;

adaptations

long / elongated (cells / vessels / tubes) ;
ref to lignin (in walls) ;
(cell walls) are water impermeable / waterproof / AW ;
(secondary) thickening of cell walls ;
hollow / no cytoplasm / no (named) organelles ;
no, end / cross, walls (between cells) ;
end plates to connect vessels (end to end) ;
pits in walls (for water movement between vessels) ;

4.a)

A (upper) epidermis ;
B palisade (mesophyll) ;

ii)

(cell surfaces are sites of) gas exchange ;
movement of gases by diffusion ;
ref. to efficient / faster / AW, gas exchange / diffusion / photosynthesis ;
carbon dioxide is, raw material / needed, for photosynthesis ;
absorption of carbon dioxide (when light available) ;
loss of oxygen (when light available) / absorption of oxygen ;
oxygen is required for (aerobic) respiration ;
more evaporation ;
idea of maximising light absorption ;

iii)

allows for, movement of (named) gases / diffusion / gas exchange, throughout the whole of the leaf ;

ref. to faster / efficient / AW, diffusion / gas exchange ;

allows / AW, photosynthesis / respiration / transpiration / evaporation ;

ref. to storage of carbon dioxide ;

(air spaces) connect (to outside air) via stomata ;

b.i)

no / little, water ;

high temperature ;

low humidity / dry air ;

high wind speed ;

long day length / high light intensity ;

high salinity / salt ;

freezing ;

disease ;

(soil) waterlogging / low oxygen concentration / pH ;

mineral / magnesium, deficiency ;

ii)

ref to osmosis ;

water, lost from / moves out of, cells / vacuoles ;

down water potential gradient ;

pressure of, water / cell contents, on (inelastic) cell wall decreases ;

correct ref. to turgor / turgidity / flaccid / plasmolysed ;

ref. to plants / cells, rely on water, for (structural) support / to prevent wilting ; **ora**

water in cells not being replaced as quickly (as it is being lost) ;

AVP ;;

iii)

stomata close ;

to prevent more water loss ;

water conserved for, other processes / other parts of plant ;

decrease surface area, exposed to the Sun / for absorption of heat ;

5) i)

increased rate of transpiration ;
greater concentration of water vapour inside the leaf than outside ;
more water vapour diffuses out of the leaf ;
through stomata ;
more water is drawn up through xylem / transpiration pull ;

ii)

by osmosis ;
the soil has a higher water potential than the root cells ;
water moves from an area of higher water potential to lower water potential ;
across a partially permeable membrane ;
ref to root hair cell ;

6. I) active transport ;

II)

1 protein uses, energy / ATP (from respiration) ;
2 *idea of* protein interaction with ions ;
3 (to) change shape of protein ;
4 ions move through the protein ;
5 against concentration gradient / lower concentration to high concentration
(across a membrane) ;
6 AVP ;

7A.

water enters by osmosis ;
down a water potential gradient / high(er) to low(er) water potential ;
through partially permeable membrane ;
needs to remove water to prevent bursting ;

B)

as concentration of sea water increases the removal of water decreases ;
as concentration of sea water increases the water potential gradient decreases ;
therefore less water enters at higher concentrations of sea water ;
less excess water ;

8)

root hair (cells);
long and thin;
thin cell wall;
large surface area;
for absorption;
(water by) osmosis ;
(ion / nutrients by) active transport;
against the concentration gradient;
protein (pumps) in membrane;
require energy / ATP;
ref. to many mitochondria;

8a) air spaces in the leaf for, buoyancy / AW;

max 1 for any of the following

leaves are closer to the light / 'gets more light'
to absorb more light;
for more photosynthesis;
to exchange gases with the, air / atmosphere;

b) xerophyte(s);

c) inherited feature ;

feature helps an organism survive and reproduce;
in its, habitat / environment;
(a named) adaptive feature increases organism's fitness;

