

1. (a)

	glucose	sodium ions	haemoglobin
Tissue fluid	✓	✓	✗;
Blood plasma	✓	✓	✗;

Mark for each correct row

2

- (b) Hydrostatic pressure higher than osmotic “effect”;
 Forces/squeezes/pushes out;
 Water/small molecules/ions/examples;

max 2

[4]

2. (a) Apoplastic – Via cell walls / spaces external to cell membrane / external to cytoplasm / between cells;
 As far as endodermis / Casparian strip / layer of wax;
 Caused by transpiration pull;
 Cohesion / hydrogen-bonding between water molecules;

Symplastic – Through cell surface membrane (of epidermis / root hair cell) / ref. vacuoles membrane;
 High to low ψ / ψ_s ;
 Diffusion / osmosis;

Cell-to-cell via plasmodesmata / via strands of cytoplasm;
 Secretion / active transport of ions into xylem by endodermis;

OR

Active uptake of ions from soil at epidemis;
 Lowers ψ / ψ_s in xylem / increases osmosis into xylem;

[If symplast & apoplast are confused – max 5 marks]

max 6

- (b) 1. Diameter of trunk minimal at warmest / brightest time of day / midday = warmest / brightest;
 2. Stomata open in light → more water loss;
 3. Water evaporates more when warm / more heat energy for water evaporation;
 4. Hydrogen-bonding between water molecules;
 5. Cohesion (/ described) between water molecules;
 6. Adhesion (described) between water molecules and walls of xylem vessels;
 7. (Xylem) pulled inwards by faster flow of water / pulled in by tension;
 8. Reduced pressure at leaves / top of plant / pull from top / from leaves / tension from leaves / from top of plant due to transpiration / evaporation;
 9. Water pulled up plant;

max 6

(c)

Feature	Explanation
Thick cuticle / wax layer	waterproof / impermeable;
Sunken stomata	saturated layer of still air outside;
Hairy	saturated layer of still air outside;
Leaves small / reduced to spines / needles	reduced S.A. for water loss;
Leaves roll up in dry weather	less S.A. for water loss / stomata covered / saturated region of still air;
Reduced number of stomata	reduced S.A. for water loss;
CAM (/ Crassulacean Acid Metabolism)	stomata closed in light / in warm / only open in dark / when cool;

3 features but no explanations – max 1 mark

max 3

[15]

3. (a) valid working;
1.95; 2
- (b) (i) contraction of the ventricle / heart/systole; 1
- (ii) frictional force / resistance (of capillary walls);
loss of fluid / not all (filtered) fluid is returned; 2
- (c) by lymphatic system;
lymph vessels very permeable / muscles contract squeezing vessels /
possess one-way valves / enters subclavian veins; 2
4. (a) Molecules will have more (kinetic) energy;
Move faster;
Reject references to vibrating in this context 2
- (b) (i) Oxygen diffuses faster/has a higher rate of diffusion
in air than in water; 1
- (ii) Alveolar epithelium/surface is permeable to small molecules;
Water is a small molecule;
Higher concentration of water in cell/blood than outside;
Water diffuses from blood/cells into alveoli; max 2

[7]

- (c) Large number gives large (total) surface area;
For diffusion;
Short distance between tracheoles gives short pathway;
Movement/diffusion through muscle is slow;
Reject references to muscle simply being close to tracheoles. Must convey idea of short pathway to gain credit for third point.

3

[8]