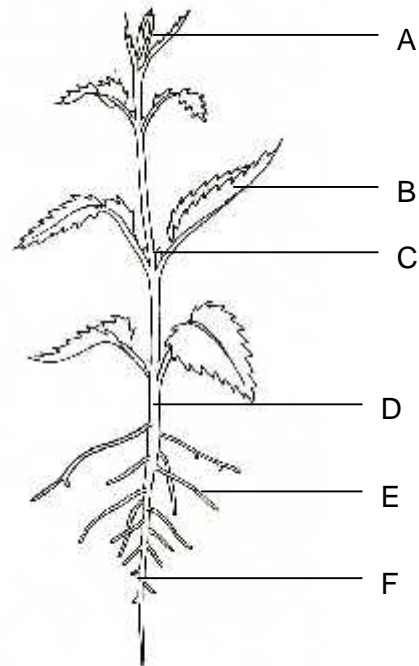


## 6 Plant structure and function

1 Name the parts of the plant shown in the drawing.

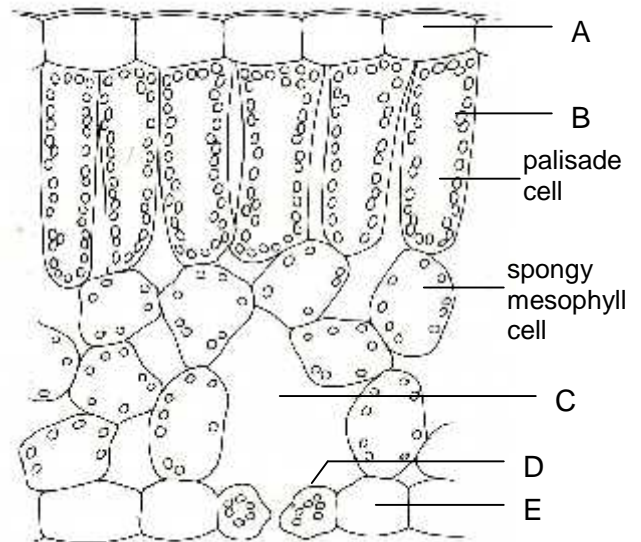
2 Match the structures stem, leaf, root, terminal bud, lateral bud to the following functions:

- (a) produces carbohydrates
- (b) carries water to leaves
- (c) absorbs sunlight
- (d) continues growth in height
- (e) absorbs mineral salts
- (f) makes branches
- (g) anchors plant in soil
- (h) conducts food to roots
- (i) evaporates water
- (j) produces new leaves
- (k) spaces out leaves
- (l) produces flowers
- (m) absorbs carbon dioxide
- (n) absorbs water.



3 The drawing represents a vertical section through a leaf x 200

- (a) Name the parts indicated by the letters A - E.
- (b) What differences can you see between the palisade cells and the spongy mesophyll cells
- (c) What is the function of C?
- (d) (i) Name the features represented in the diagram, which are thought to adapt the leaf to its function in photosynthesis.  
(ii) Say how these features help to promote this process.
- (e) State three other structural features, not shown in the drawing, which are thought to be adaptations to the process of photosynthesis in most leaves.  
Explain briefly how these features contribute to the efficiency of photosynthesis.

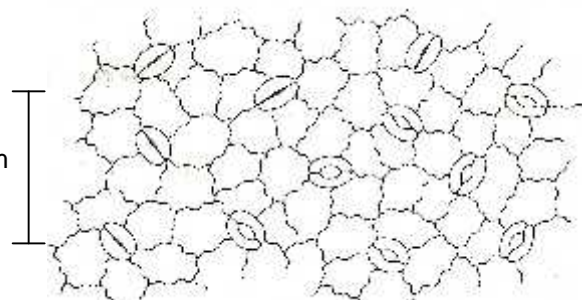


4 Which of the following are most likely to be true? When the stomata are open, the leaf is

- (a) absorbing oxygen
- (b) giving off water vapour
- (c) absorbing carbon dioxide
- (d) giving off carbon dioxide
- (e) giving off oxygen

5 (a) How many stomata are shown in this drawing of leaf epidermis?

- (b) How many of the stomata are open?
- (c) How many are likely to be open at night?
- (d) What is the magnification of the drawing?



**Plant structure and function (continued)**

- 6 (a) What process is responsible for the movement of carbon dioxide into a leaf?  
 (b) In what conditions might the same process cause oxygen to enter a leaf?

- 7 The diagrams represent transverse sections through a root and a stem.  
 (a) Say which one represents the stem and which one represents the root, giving your reasons.  
 (b) Name the parts of these organs represented by the letters A-J.

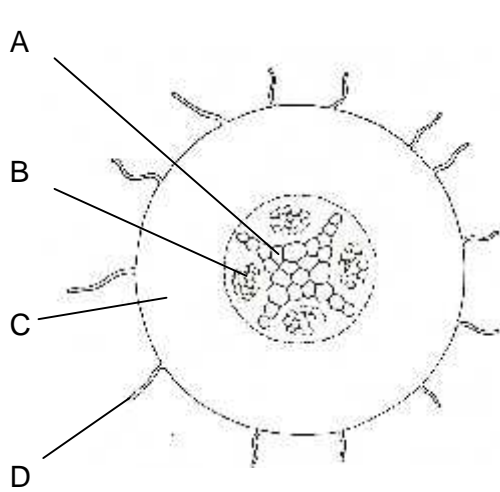


Figure 1

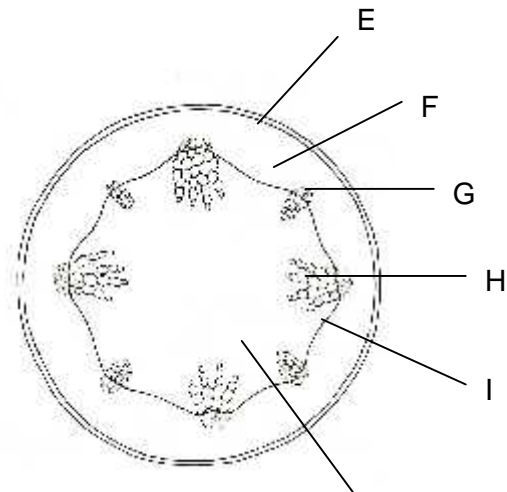


Figure 2

## 6 Plant structure and function - answers

1 A-terminal bud, B-leaf, C-lateral bud, D-stem, E-lateral root, F-root (tap root),

**2 The stem** (b) carries water to the leaves, (h) conducts food to the roots and (k) spaces out the leaves. If the stem is green it may also (a) produce carbohydrates and (c) absorb sunlight. If it is not covered by bark, the stem will probably (i) evaporate water.

**The leaf** (a) produces carbohydrates, (c) absorbs sunlight and (i) evaporates water.

**The root** (e) absorbs mineral salts, (g) anchors the plant in the soil and (n) absorbs water.

**The terminal bud** (d) continues growth in height, (j) produces new leaves and may (l) produce flowers.

**The lateral bud** (f) makes branches, (j) produces new leaves and may (l) produce flowers.

3 (a) A - upper epidermis, B - chloroplast, C - air space (intercellular space), D - guard cell, E - lower epidermis.

(b) The palisade cells are elongated and have many chloroplasts; the spongy mesophyll cells are rounded and have fewer chloroplasts.

(c) The air space C permits the diffusion of oxygen, carbon dioxide and water vapour to or from the cells inside the leaf.

(d) (i) and (ii) The elongated palisade cells allow the sunlight to penetrate without being absorbed by cell walls. The abundant chloroplasts in the palisade cells absorb and use the energy from sunlight. The chloroplasts are more abundant in the upper layers where most sunlight is received, the stoma allows entry of carbon dioxide for photosynthesis; the air space allows the gas to reach the photosynthesising cells.

(e) Most leaves are broad and offer a large absorbing surface to the sunlight, which they need for photosynthesis. They are also mostly thin, a feature which reduces the distance over which carbon dioxide has to diffuse in order to reach photosynthesising cells in the leaf. The branching network of veins in a leaf delivers water to the cells which need it for photosynthesis.

4 When stomata are open the leaf will be (b) giving off water vapour. If the stomata are open, it is likely to be daylight and therefore the leaf will be photosynthesising and thus (c) absorbing carbon dioxide and (e) giving off oxygen.

5 (a) There are twelve stomata in the drawing. (c) None of them is likely to be open at night.  
(b) Seven of them are open. (d) The magnification is x200.

6 (a) Diffusion is responsible for the movement of carbon dioxide into a leaf.

(b) Oxygen will diffuse into a leaf when the concentration of oxygen inside the leaf is lower than its concentration in the air outside. This might occur in low light intensities when the rate of respiration exceeds the rate of photosynthesis.

**Plant structure and function - answers (continued)**

7 (a) Figure 1 represents a transverse section through a root. The presence of root hairs and the central position of the vascular tissue (xylem and phloem) are the features which identify this structure as a root.

Figure 2 represents a transverse section through a stem. The diagnostic features are the distinct epidermis, the central pith and the distribution of vascular bundles round the periphery.

(b) A-xylem (or vessels), B-phloem, C-cortex, D-root hair, E-epidermis, F-cortex, G- phloem, H-xylem (or vessels), I-cambium, J- pith.