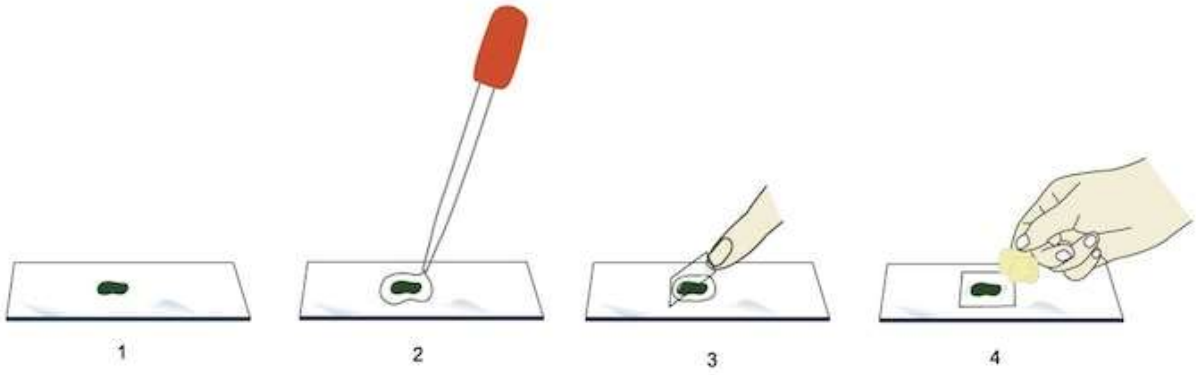
1(a) **Examine under the microscope an animal cell (e.g. from fresh liver) and a plant cell (e.g. from Elodea, a moss, onion epidermis, or any suitable, locally available material), using an appropriate temporary staining technique, such as iodine or methylene blue.**

Preparation of microscopic Slide

1. Cut a thin section of the plant material
   Or take a drop of liquid sample. Place the material on the clean glass slide
2. Pour few drops of a stain/dye on it
3. Place a cover glass
4. Blot the extra stain



Viewing an object under light microscope

1. Place the slide on the stage
2. Turn on lamp
3. Adjust the objective
4. Raise the stage by coarse adjustment
5. Looking through eye piece focus the image with fine focus

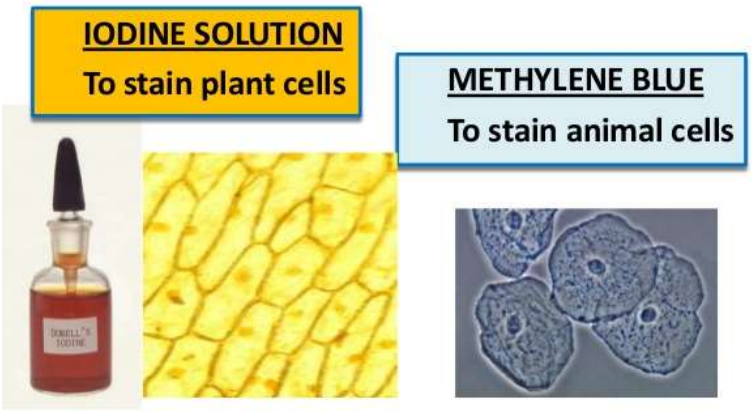
Recording microscopic observations

1. Take a photo micrograph

2. Draw a diagram

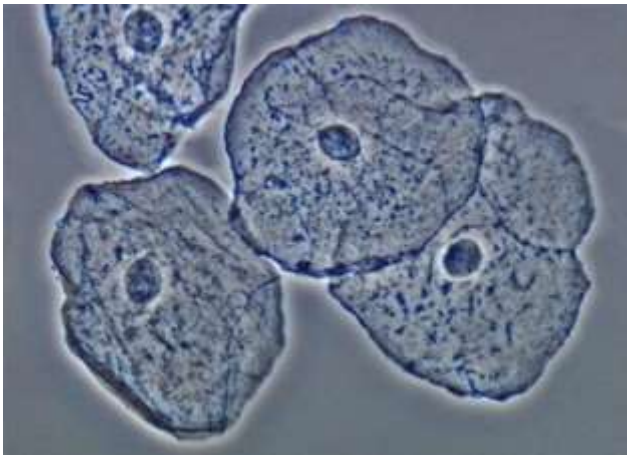
Use of Stains

- other cell structures which are not so obvious can often be shown up more clearly by the addition of dyes called **STAINS**

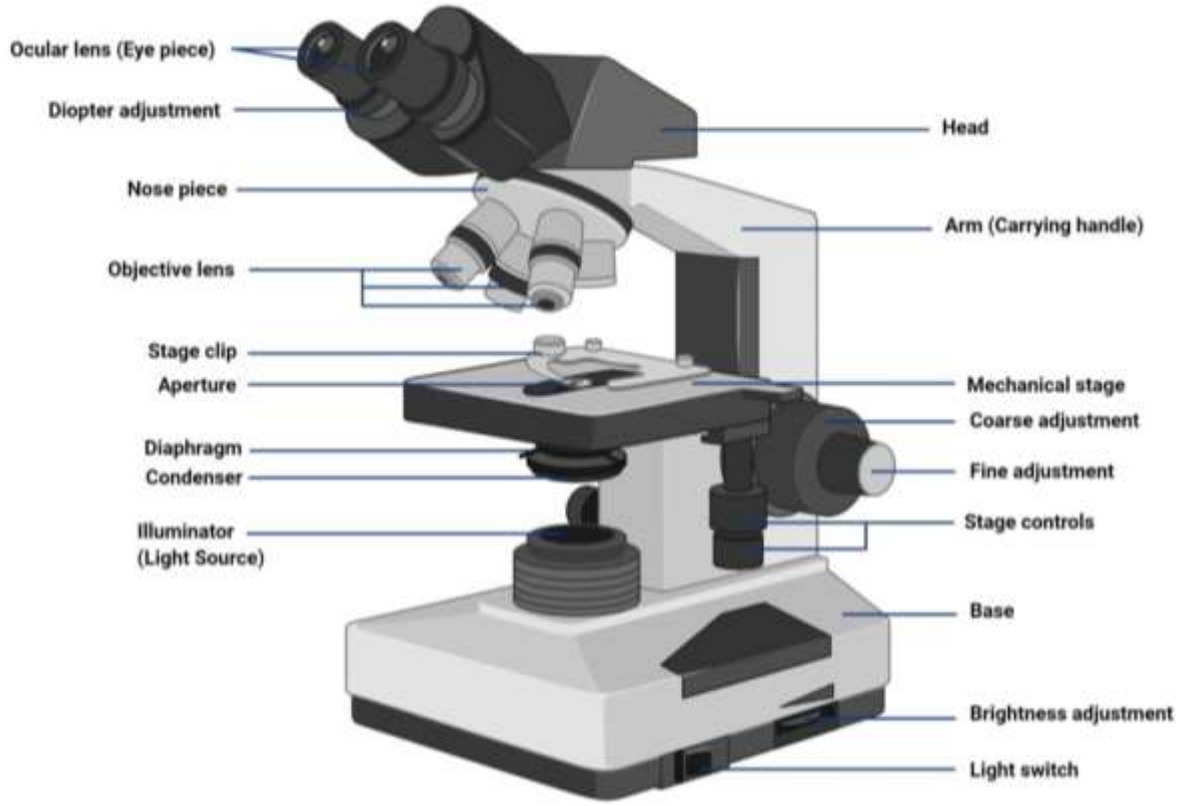


Plant cells

Animal cells



Light Microscope



Question 1

The diagram shows three different cells, not drawn to the same scale.

Which are animal cells?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

1(b) **Draw diagrams to represent observations of the plant and animal cells examined above**

Making a biological correct drawings

1. Reasonable size
2. Draw what you see NOT what you know
3. Soft pencil
4. No shading
5. Clear, sharp unbroken, no feathery lines
6. Follow instructions
7. Label only when required

Example question

2 Fig. 2.1 shows blood cells as seen using a light microscope.

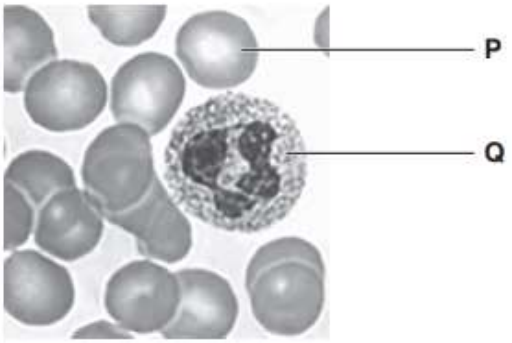


Fig. 2.1

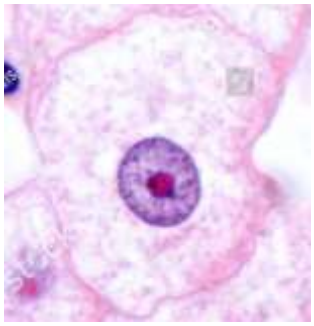
(a) In the space below, make a drawing of the cell labelled **Q** in Fig. 2.1, magnified ×2.
You do not need to label your drawing.

Space for your drawing

Question	Answer	Marks
2(a)	drawing 35–45 mm diameter ; overall shape and proportions ; nucleus correct shape ; clear, continuous, smooth (rather than sketchy outline) of cell with no shading, stippling or cross-hatching ;	4

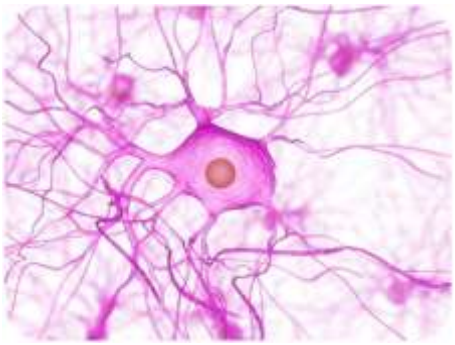
1(c) **Identify, from fresh preparations or on diagrams or photomicrographs, the cell membrane, nucleus and cytoplasm in an animal cell**

Liver cell

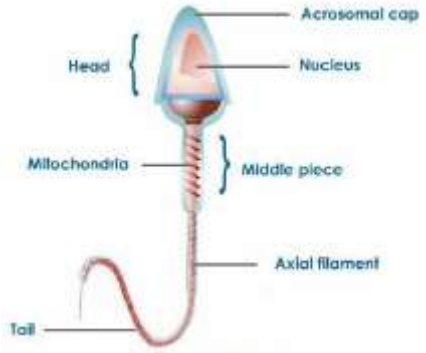


Muscle cell

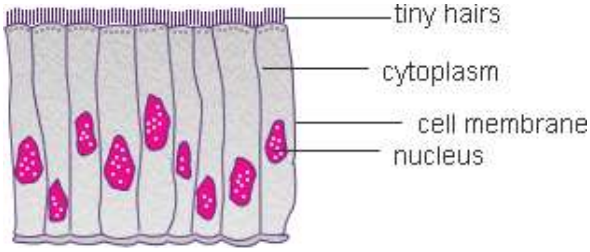
Nerve cell



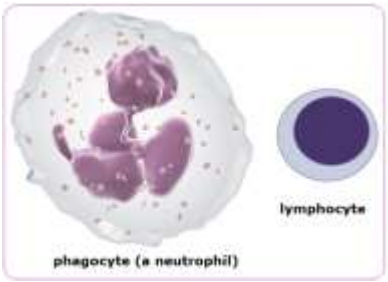
Sperm cell



Ciliated cells



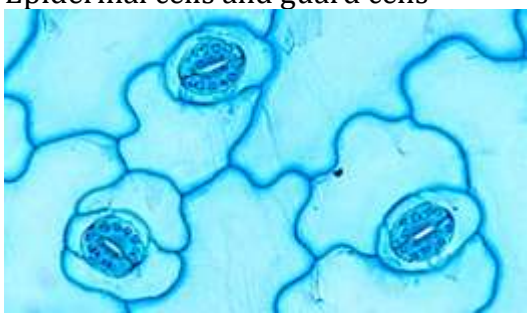
WBC



1(d) **Identify, from diagrams or photomicrographs, the cellulose cell wall, cell membrane, sap vacuole, cytoplasm, nucleus and chloroplasts in a plant cell**

Mesophyll cell

Epidermal cells and guard cells



Xylem vessel

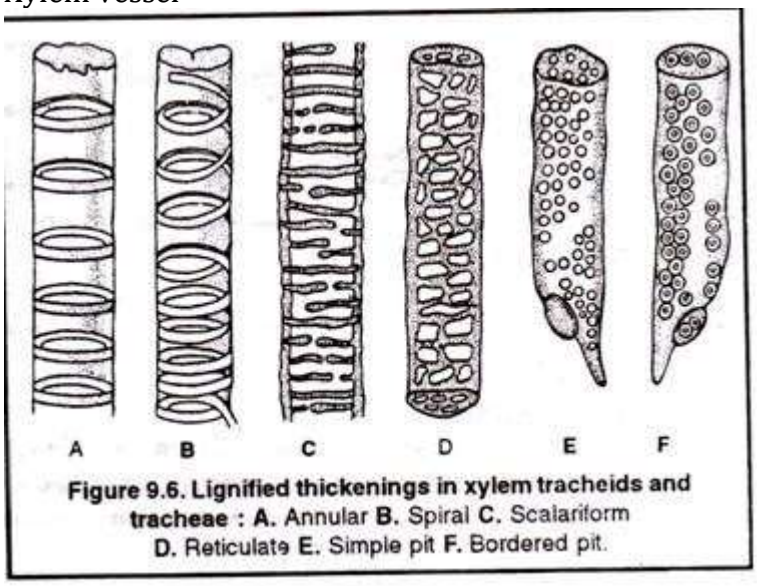
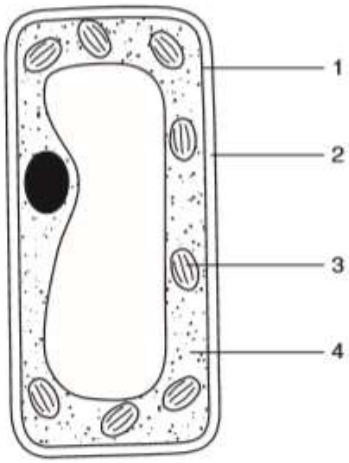


Figure 9.6. Lignified thickenings in xylem tracheids and tracheae : A. Annular **B.** Spiral **C.** Scalariform **D.** Reticulate **E.** Simple pit **F.** Bordered pit.

Question 2

1 The diagram shows a cell.



Which numbers show the parts named?

	cell membrane	cell wall	cytoplasm
A	1	2	3
B	1	2	4
C	2	1	3
D	2	1	4

1(e) Compare the visible differences in structure of the animal and the plant cells examined

Question 3

Some structures found in cells are listed.

1 cell wall
2 cell membrane
3 chloroplast
4 cytoplasm
5 nucleus

Which structures are found in both animal cells and plant cells?

A 1 2 4
B 1 2 3
C 2 3 5
D 2 4 5

Question 4

What are found in plant cells but **not** in animal cells?

1 cell membrane
2 nucleus
3 cell wall
4 chloroplast

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

1(f) **State the function of the cell membrane in controlling the passage of substances into and out of the cell**

Cell membrane is a partially permeable memebrane
It is outermost boundary in animal cells and beneath cell wall in plant cells
It controls movement of substances into and out of a cell.
Substances needed in the cells move into the cell and are prevented from moving out of the cells
Wastes are moved out of the cells
Water can move into or out of cells
Ions can move into or out of cells

Question 5

1 Some processes which occur in flowering plants are listed.

1 ion uptake by roots hairs
2 water uptake by root hairs
3 ion movement up the xylem in the stem
4 water vapour loss by the mesophyll cells of the leaves

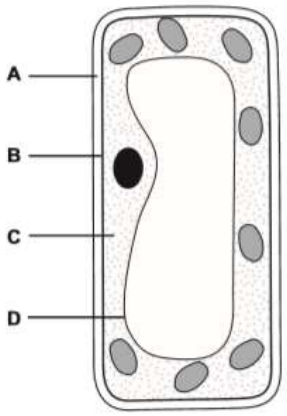
Which processes are controlled by cell surface membranes?

A 1 only
B 1 and 3
C 2 only
D 3 and 4

Question 6

I The diagram shows a plant cell.

Which labelled structure controls the passage of substances into and out of the cell?



1(g) **State the function of the cell wall in maintaining turgor (turgidity) within the cell**

If solution in the cytoplasm of cell is more concentrated than outside then water moves into the cells. It increases hydrostatic pressure in the cell. Animal cells can burst where as cell wall can withstand this hydrostatic pressure which is also known as turgor or turgor pressure and the cell becomes turgid

Question 7

The cell wall of a plant cell is removed using an enzyme.

What would happen if this cell is then placed in distilled water?

A It would take longer for the cell to become turgid.

B Proteins in the cytoplasm would leave through the cell membrane.

C The cell would become smaller as water passes out.

D The cell would burst as water moves into it.

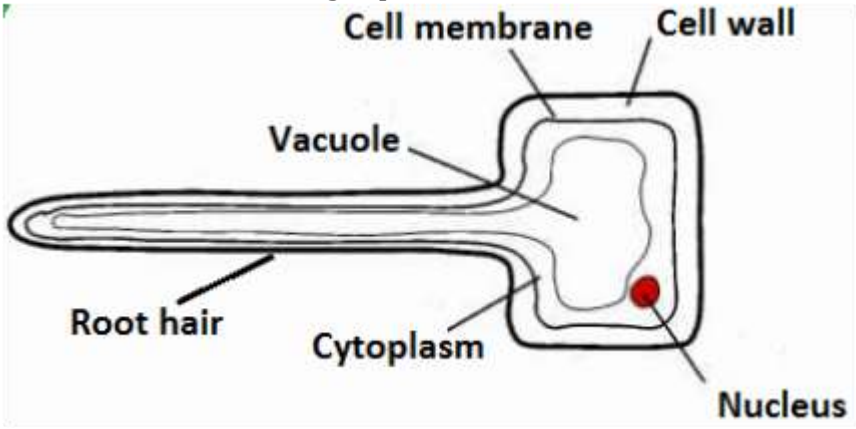
1(h) **State, in simple terms, the relationship between cell function and cell structure for the following:**

- **absorption – root hair cells***
- **conduction and support – xylem vessels**
- **transport of oxygen – red blood cells***

Adaptations of root hair cells

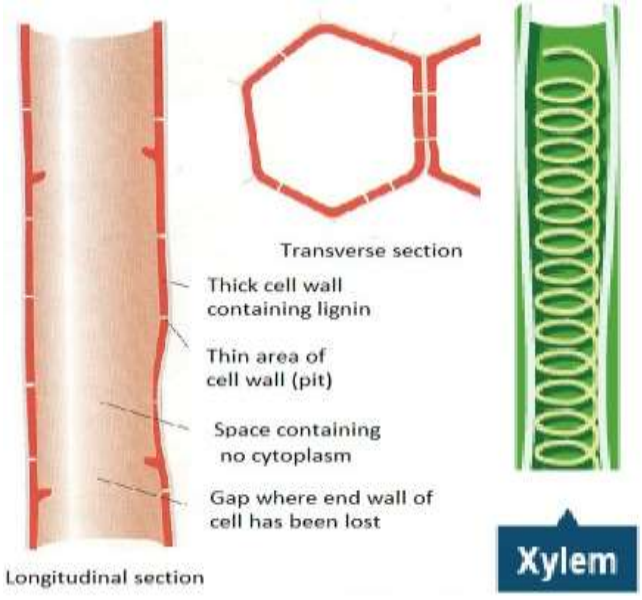
Root hair cells are cells which extend into the soil to absorb water and mineral salts.

(a) Elongated cells which extends into the soil to absorb water. This increases the surface area to volume ratio of the cell, resulting in faster absorption.
(b) Partially permeable membrane maintains concentration gradient
(c) More mitochondria provide energy for active uptake of salts
(d) Cell wall withstands turgor pressure



Adaptations of Xylem vessels

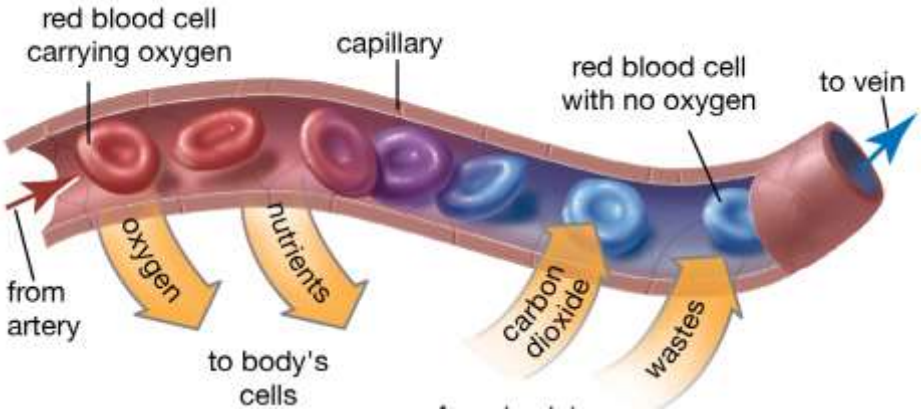
(a) Hollow tubes. Xylem vessels are elongated hollow tubes that are made of xylem cells linked end to end. They conduct water and mineral salts from the roots to the leaves of the plant.
(b) Absence of protoplasm and cross-walls which could impede water flow through the lumen (internal cavity)
(c) Fully permeable cell walls allow horizontal movement of water to other tissues.
(d) Deposition of lignin on the cell walls which strengthens vessel walls which provides mechanical support to the plant
(e) Water plants do not need mechanical support



Adapatations of Red blood cells

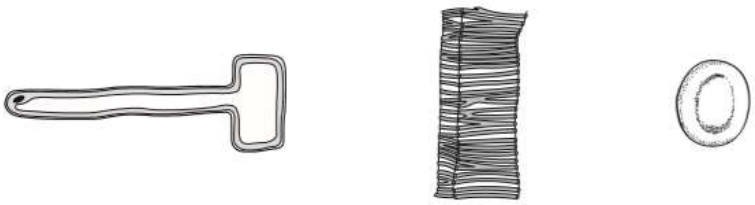
Red blood cells deliver oxygen to the body tissues via the blood.
Adaptations to this function include:

(a) Red blood cells contain haemoglobin, an oxygen-carrying protein.
(b) Red blood cells have no nucleus, so more room for haemoglobin to be present they have a flattened biconcave shape. This enables them to have a higher surface area to volume ratio for faster diffusion of oxygen. Flat disc shape also allows the cell to be more flexible when squeezing through blood capillaries.
(c) Tiny size also provides these cells to pass through narrow capillaries
(d) Tiny size allows RBC to pass through capillaries in single row. It exposes more surface area for gases exchange



Question 8

The diagram shows three cellular structures.



1 2 3

Which statements about these cells are correct?

	1	2	3
A	adapted to carry oxygen	lacks a nucleus	adapted to carry water
B	adapted to carry water	lacks a nucleus	is in contact with the soil
C	is in contact with the soil	adapted to carry water	adapted to carry oxygen
D	is in contact with the soil	is in contact with the soil	lacks a nucleus

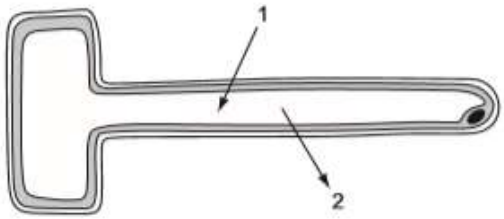
Question 9

Which adaptations of a root hair cell make it suitable for water uptake?

	partially permeable cell membrane	surface area to volume ratio of the cell
A	absent	high
B	absent	low
C	present	high
D	present	low

Question 10

The diagram shows a root hair.



Which arrows show the direction in which it is **possible** for nitrate ions and water molecules to move?

	nitrate ions	water molecules
A	1 only	1 and 2
B	1 and 2	1 and 2
C	1 and 2	2 only
D	2 only	1 only

1(i) **Identify these cells from preserved material under the microscope, from diagrams and from photomicrographs**

1 Fig. 1.1 shows cells from three different types of organism (not drawn to the same scale).

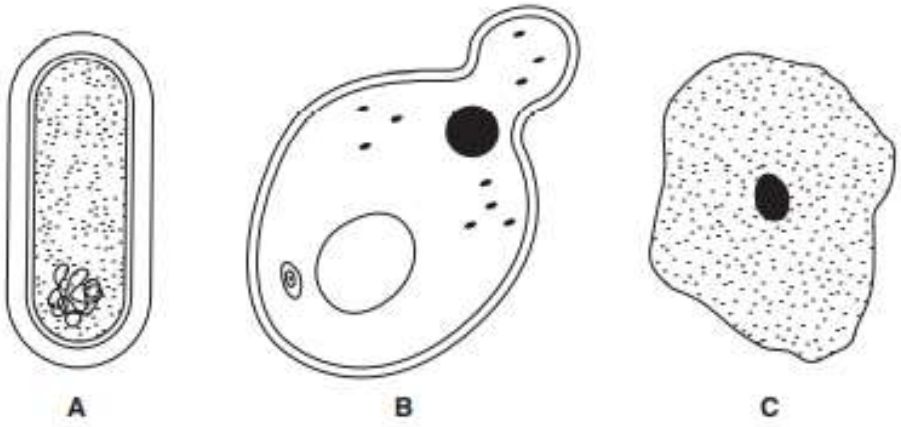


Fig. 1.1

(a) Name the type of organism represented by each of the cells and in each case give a reason for your answer.

organism ***A*** .....

reason .....

organism ***B*** .....

reason .....

organism ***C*** .....

reason .....[3]

(b) Fig. 1.2 shows a one-celled organism that has both plant and animal characteristics.

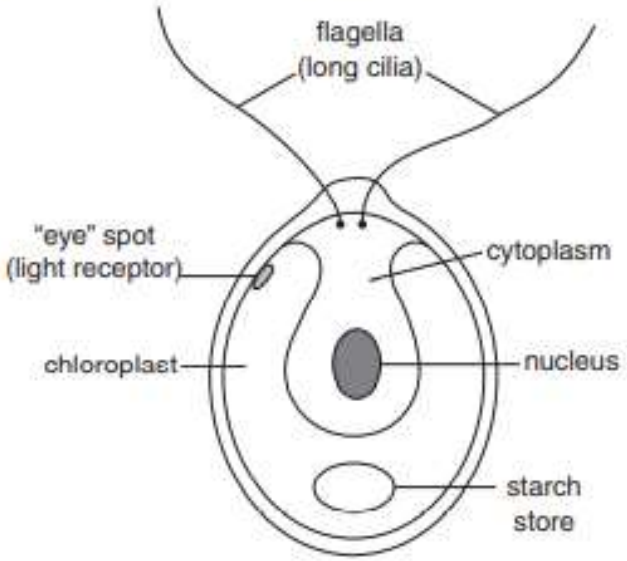


Fig. 1.2

State two reasons in each case why the organism might be identified as

(i) an animal

1. .....

2. .....[2]

(ii) a plant

1. .....

2. .....[2]

[Total: 7]

1(j) **Differentiate cell, tissue, organ and organ system as illustrated by examples covered in syllabus sections 1–12, 15 and 16**

1. The cell is the most basic unit of a living organism that can be classified as living.
2. A group of cells of the same type that are found near each other and carry out the same function comprises a tissue.
3. An organ is made up of different tissues working together to perform a specific function or a group of functions within an organism. An organ has a distinct shape which allows it to carry out its function well.
4. A group of functionally-related organs form an organ system.
5. Many organ systems working together make up a multicellular organism.

Define a cell

Define a tissue

Define an organ

Define an organ system

6 Fig. 6.1 and Fig. 6.2 show two tissues found in plants.

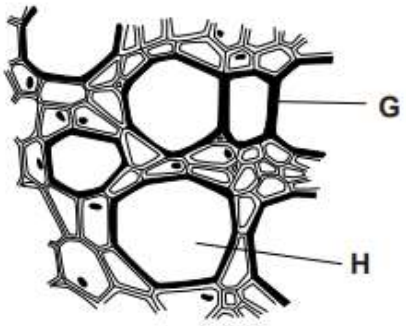


Fig. 6.1

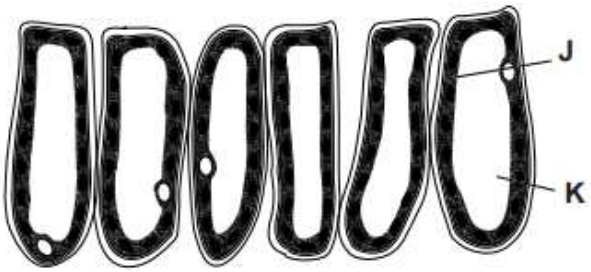


Fig. 6.2

Identify the tissues and describe their functions. Your descriptions should make appropriate reference to the importance of **G**, **H**, **J** and **K**.

name of tissue in Fig. 6.1 .....

description .....

.....

.....

.....

.....

.....

.....

name of tissue in Fig. 6.2 .....

description .....

.....

.....

.....

.....

.....

.....

[Total: 10]

Question 11

Which shows the increasing level of complexity in plants?

	simplest → most complex			
A	cell	chloroplast	organ	tissue
B	cell	tissue	chloroplast	organ
C	chloroplast	cell	tissue	organ
D	chloroplast	organ	tissue	cell