Core 1

Two characteristics of living organisms are nutrition and respiration.

(a) (i) List **three** other characteristics of living organisms.

1. .....

2. .....

3. .....[3]

(ii) Name the process by which green plants produce carbohydrates.

.....[1]

[Total: 4]

Core 2

Table 1 describes some of the characteristics of living organisms. Complete the table by identifying each characteristic described. The first one has been completed as an example.

Table 1

Description	Characteristic
Responding to stimuli in the environment	Irritability
Releasing energy from sugars	
Producing more organisms of the same type	
Getting rid of waste chemicals made in the organism	
Obtaining the materials for growth	

[4]

[Total : 4]

Core 3

Fig. 1 shows a red blood cell and a root hair cell.

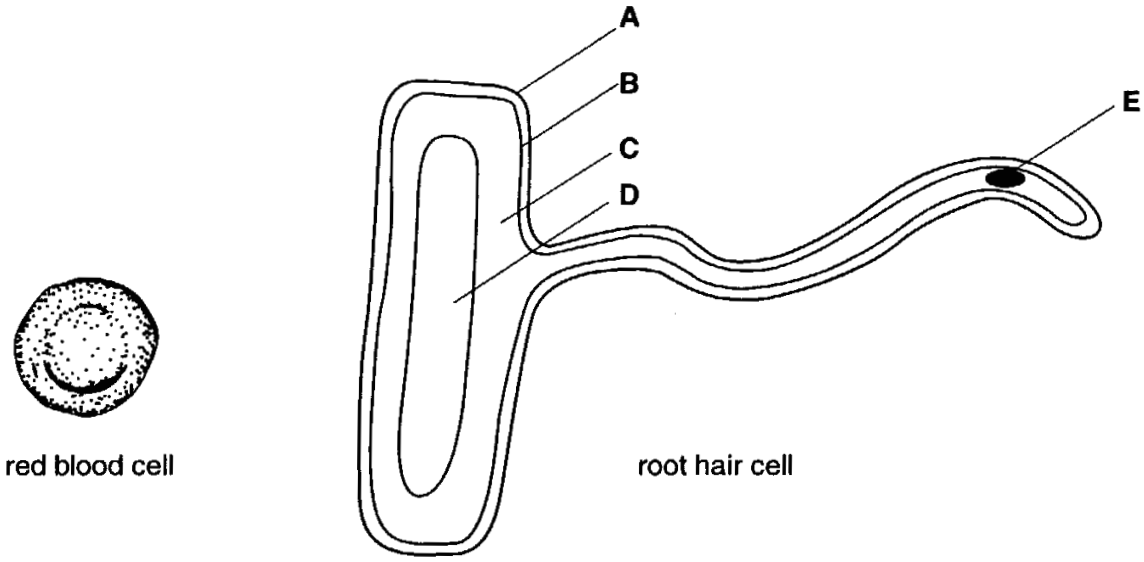


Fig. 1

(a) (i) Select **two** structures in the root hair cell which are also present in the red blood cell. In each case state the letter, **A** to **E**, and name the structure.

1. *Letter* .....

   Name of structure .....

2. *Letter* .....

   Name of structure .....[2]

(ii) Name **one** structure which is typical of many plant cells but which is not present in the root hair cell.

.....[1]

Core 3

(b) State **one** major function of each cell and describe **one** way in which the cell is adapted to carry out this function.

(i) Red blood cell.

Function .....

.....

Adaptation .....

.....[2]

(ii) Root hair cell.

Function .....

.....

Adaptation .....

.....[2]

[Total : 7]

Alternative to Practical 1

An experiment was carried out to investigate the effect of different concentrations of sucrose solution on the length of potato strips.

Five test-tubes were set up, each containing a different concentration of sucrose solution. Another tube was set up containing the same volume of distilled water.

A strip of potato tissue was placed in each tube. The strips were of equal size and as shown in Fig. 2

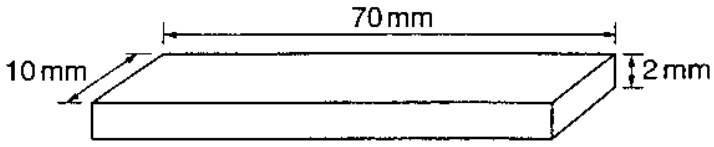


Fig. 2

These strips were completely covered by the solutions and were left in the tubes for 30 minutes. The potato strips were removed and measured. The results are shown in Table 2

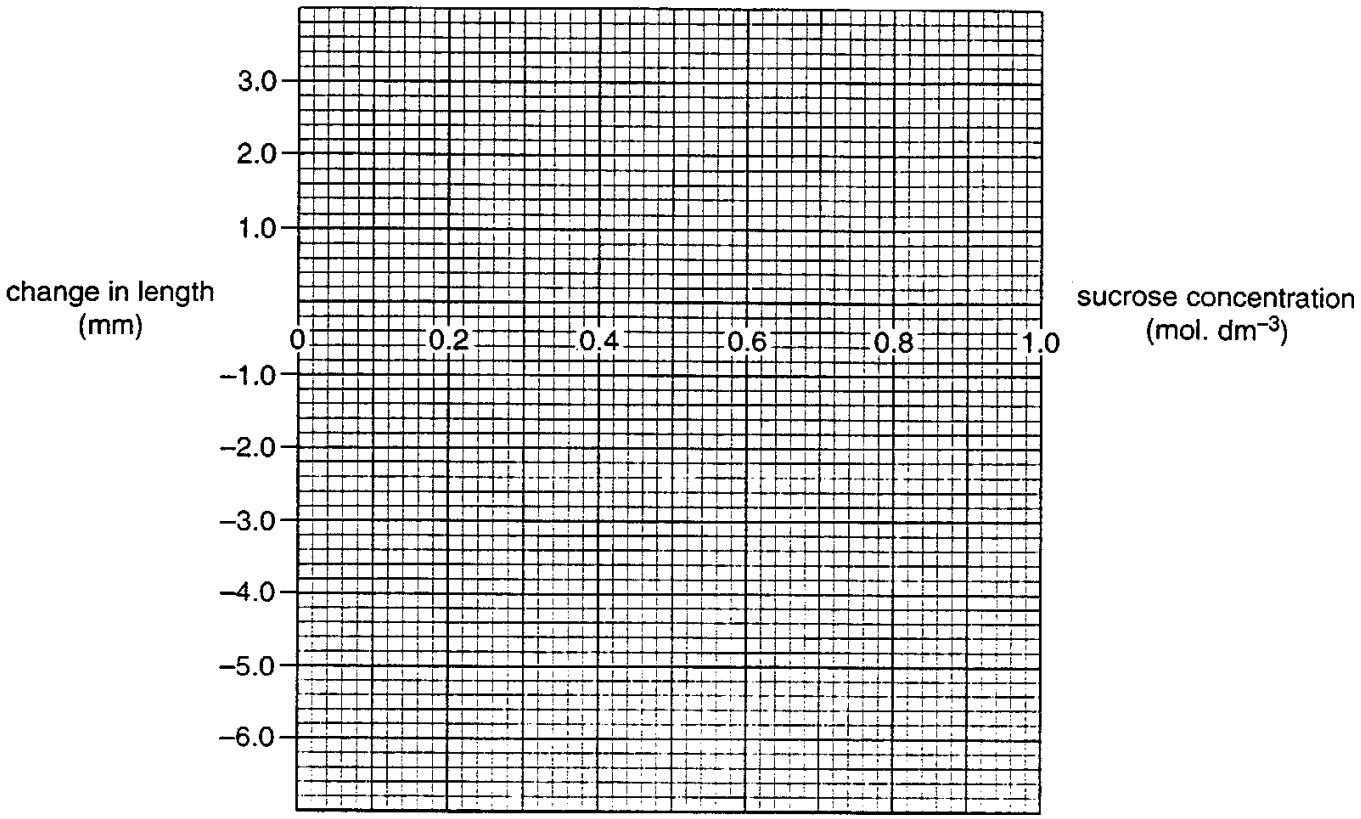
Table 2

concentration of sucrose solution (mol dm^{-3})	initial length (mm)	final length (mm)	change in length (mm)
0	70	73.0	
0.2	70	71.5	
0.4	70	69.0	
0.6	70	67.0	
0.8	70	66.0	
1.0	70	64.5	

Alternative to Practical 1

(a) (i) Complete Table 2 to show the change in length of each strip.

(ii) Plot the changes in length against the concentration of sucrose solution on the axes provided. Join the points using ruled lines.



[3]

(b) (i) What conclusions can be drawn from these results?

.....

.....

.....

.....

.....[3]

(ii) Name the process that has taken place to bring about these changes in the lengths of the potato strips.

.....[1]

Extension 1

(a) Draw a labelled diagram of a **named** specialised plant cell and describe its function. [6]

(b) Describe the structure and functions of mammalian blood cells. [9]

[Total: 15]

Extension 2

(a) What is an *enzyme*? [3]

(b) State the conditions in which enzymes work best. [3]

(c) Outline the parts played by **named** enzymes in each of the following processes:

(i) germination of seeds;

(ii) the use of biological washing powders to remove protein stains;

(iii) fat digestion in the alimentary canal.

[9]

[Total: 15]

Core 1

a(i) any three of these
- growth (or alternative wording)
- movement (or alternative wording)
- irritability / sensitivity (or alternative wording)
- excretion (or alternative wording)
- reproduction (or alternative wording)

(ii) photosynthesis

Core 2

In order in the table

Respiration
Reproduction
Excretion
Nutrition / feeding

Core 3

a(i) B – cell membrane

C – cytoplasm

(ii) chloroplasts

b <u>red blood cell</u>

any one of these functions with its relevant adaptation

carries / combines with oxygen
haemoglobin present

more space for haemoglobin
lack of nucleus

oxygen uptake / release
biconcave shape / increased surface area

<u>root hair cell</u>

uptake of water / minerals
increased surface area / cell extension

reject anchorage as a function

Alternative to Practical 1

a(i) in order in the table
+ 3.0 mm
+ 1.5 mm
- 1.0 mm
- 3.0 mm
- 4.0 mm
- 5.5 mm

(ii) points plotted accurately
neat clear line passing through each point

b(i) potato strips in sucrose solutions lost or decreased in length
potato strips in water or dilute sucrose solutions increased in length
point noted of no change in length

(ii) osmosis

Extension 1

a any six of these points with a maximum of 3 for the diagram (third point)

- suitable named plant cell
- function described
- diagram recognisable with main features drawn, at least 3 accurate labels
- cell wall
- cytoplasm / reference to lack of cytoplasm
- (sap) vacuole
- nucleus
- chloroplast (or other named feature appropriate to named cell)

b nine points from the following **provided** cell is named

- red blood cell or corpuscle / erythrocyte
  - reference to lack of nucleus
  - description of shape
  - provides large surface area (or alternative wording)
  - reference to presence of haemoglobin
  - carries / transports oxygen
- phagocyte / granulocyte / monocyte / neutrophil
  - has lobed nucleus
  - can change shape / pass out of capillaries
  - engulfs bacteria (or alternative wording)
  - digests bacteria / foreign material (or alternative wording)
- lymphocyte / B cells / T cells
  - has large nucleus (or alternative wording)
  - produces antibodies
  - makes bacteria clump (or alternative wording) / ref. to long term immunity
  - produces antitoxins
  - neutralises toxins (or alternative wording)

Extension 2

a any three of these
- biological / present in living organisms
- catalyst / speeds up reaction rate / lowers activation energy
- reference to protein nature
- reference to specificity

b any three of these
- reference to optimum temperature / specified temperature eg 25 – 40 ^{0}C
- reference to optimum pH (or specified pH for named enzyme)
- only work in liquid medium (or alternative wording)
- reference to lack of limiting factors for example concentration of substrate

c(i) any three from
- amylase
- breaks down to starch
- reference to sugar / named sugar **reject** glucose / sucrose
- use, for example for energy / growth / respiration
- reference to sugar being soluble for transport

(ii) any three of these
- protease / named protein enzyme, for example pepsin, trypsin
- breaks down / digests protein
- to amino acids / peptides
- reference to solubility

(iii) any three of these
- lipase
- breaks down / digests protein
- reference to fatty acids and glycerol
- reference to molecules small enough to pass through gut wall / into lymph or lacteal
- reference to site of action, for example small intestine / duodenum / ileum