

1)

(a) (i) Explain what is meant by the term *tissue*.

.....  
.....  
.....  
..... [2]

(ii) Name **one** type of epithelial tissue found in the lungs.

.....  
..... [1]

(b) Explain why the lungs can be considered to be an organ.

.....  
.....  
.....  
..... [2]

(c) In the lungs, goblet cells secrete mucus. The mucus is then moved by cilia.

Name **one** cellular structure from the list below that is associated with each of the following functions. You must select a structure once only.

**mitochondria    ribosome    Golgi vesicle    centriole    nucleus    cytoskeleton**

(i) release of energy .....

(ii) movement of cilia .....

(iii) secrete mucus ..... [3]

[Total: 8]

2)

(a) Complete the passage below.

Membranes have a variety of functions in cells. All membranes are ..... permeable. This means that they allow the passage of certain substances by processes such as active transport or ..... through the membrane. The cell surface membrane, also known as the ..... membrane, surrounds the cytoplasm. The cell surface membrane consists of a bilayer of ..... To stabilise the structure of the membrane and keep it fluid, molecules of ..... are also found in this bilayer. [5]

(b) Membranes contain a variety of proteins. Some of these proteins are combined with carbohydrates to form glycoproteins.

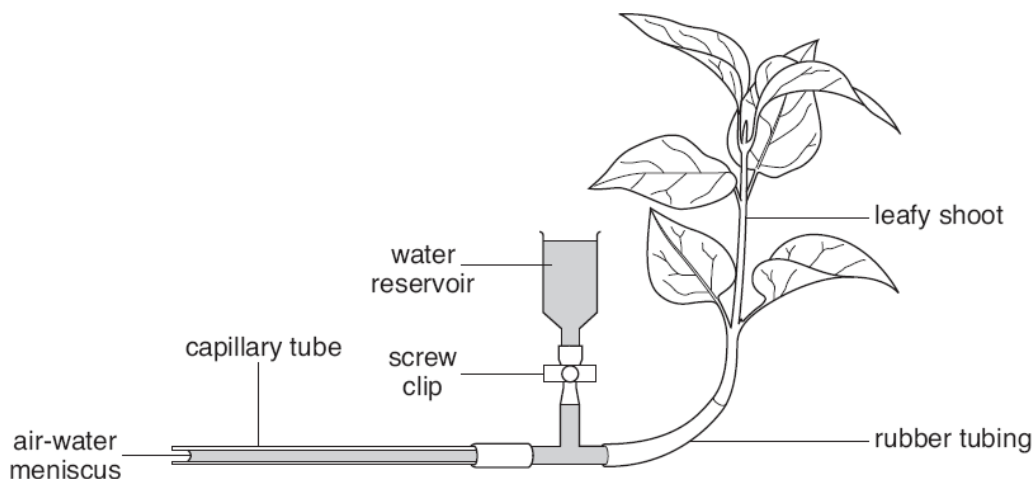
Describe the functions of glycoproteins in the cell surface membrane.



*In your answer you should use appropriate technical terms, spelt correctly.*

3)

Fig. 4.1 shows a potometer, a piece of apparatus used for estimating the rate of transpiration.



**Fig. 4.1**

(a) State **one** essential component of the apparatus, not shown in Fig. 4.1, that must be added before any results can be recorded.

..... [1]

(b) Describe **three** steps a student should take when **setting up** the potometer to ensure that the apparatus works correctly.

- (c) A student used the apparatus shown in Fig. 4.1 to investigate how transpiration rates vary during the day. The student placed the potometer on a window ledge in the laboratory and estimated the rate of transpiration four times during the day.

The results are shown in Table 4.1.

**Table 4.1**

time of day	rate of transpiration (arbitrary units)			
	replicate 1	replicate 2	replicate 3	mean
10.00	32	29	31	30.7
12.00	37	35	38	36.7
14.00	23	26	25	24.7
16.00	25	27	24	

- (i) Calculate the mean value for the rate of transpiration at 16.00 hours.

Give your answer to **one decimal place**.

Answer = ..... [1]

- (ii) Explain why, for each time of the day, the student carried out three replicates to calculate a mean.

.....  
 .....  
 .....  
 ..... [2]

- (iii) Suggest **two** possible reasons, other than light and temperature, why the rate of transpiration was **lower** in the afternoon than in the morning.

1 .....  
 .....  
 2 .....  
 ..... [2]

- (iv) Explain why the potometer only gives an **estimate** of the rate of transpiration.

4)

- (a) Amino acids are the basic building blocks for proteins. Fig. 4.1 shows the amino acid cysteine.

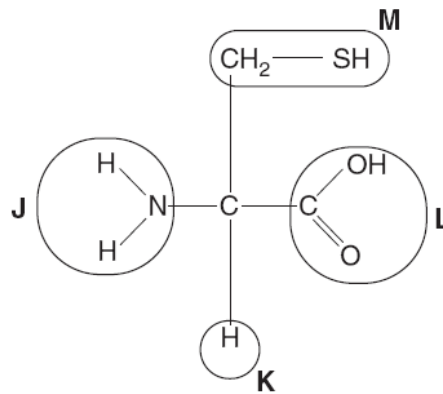


Fig. 4.1

- (i) Complete the table by selecting the letter, **J**, **K**, **L** or **M**, that represents the following groups in cysteine.

group	letter
carboxyl	
R group	
amine group	

[3]

- (ii) The primary structure of a protein consists of a chain of amino acids.  
Describe how a second amino acid would bond to cysteine in forming the primary structure of a protein.

- (b) Each amino acid has a different R group.

Describe how these R groups can interact to determine the **tertiary** structure of a protein.

.....

.....

- (c) Fig. 4.2 shows the structure of two polymers, glycogen and collagen, that are found in mammals.

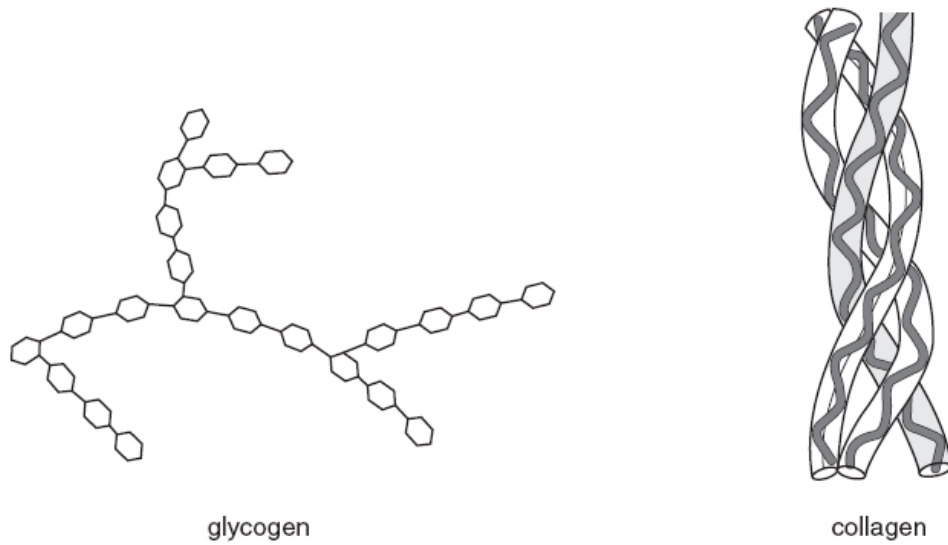


Fig. 4.2

- (i) Complete the table below to give three **differences** between the **structure** of glycogen and collagen.

glycogen	collagen

[3]

- (ii) Collagen is found in the ligaments which hold bones together at joints.  
State **two** properties of collagen that make it suitable for this purpose.

[2]

5)

DNA and RNA are nucleic acids.

(a) (i) State the components of a **DNA** nucleotide.

.....  
.....  
.....  
..... [3]

(ii) Describe how the structure of RNA differs from that of DNA.

.....  
.....  
.....  
..... [2]

(b) Before a cell divides, the DNA needs to be accurately replicated.

Describe how a DNA molecule is replicated.



*In your answer you should make clear how the steps in the process are sequenced.*

.....  
.....

(c) (i) State what a gene codes for.

.....  
.....  
..... [1]

(ii) Suggest how changing the sequence of DNA nucleotides could affect the final product the DNA codes for.

.....  
.....  
.....  
.....  
..... [2]

[Total: 15]