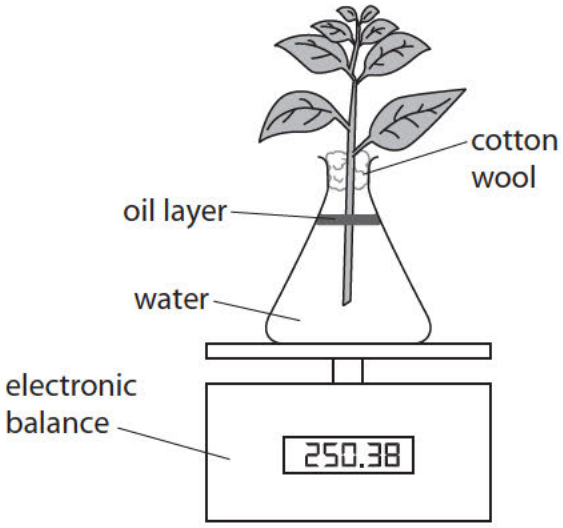
1 A student sets up this apparatus to investigate the transpiration rate of a plant.



(a) (i) Suggest how the student could determine the transpiration rate of the plant.

(2)

.....

.....

.....

.....

(ii) Draw a diagram of the apparatus that the student should set up as a control.

(3)

(b) The student changes the conditions in which the plant is kept. This affects the transpiration rate of the plant.

Complete the table by giving the missing information.

(5)

Change of condition	Change in transpiration rate	Explanation for change in transpiration rate
warmer air		
put in the dark	decrease	
increased wind	increase	
increased humidity		decreased concentration gradient

(c) Explain why transpiration is important to plants.

(2)

.....

.....

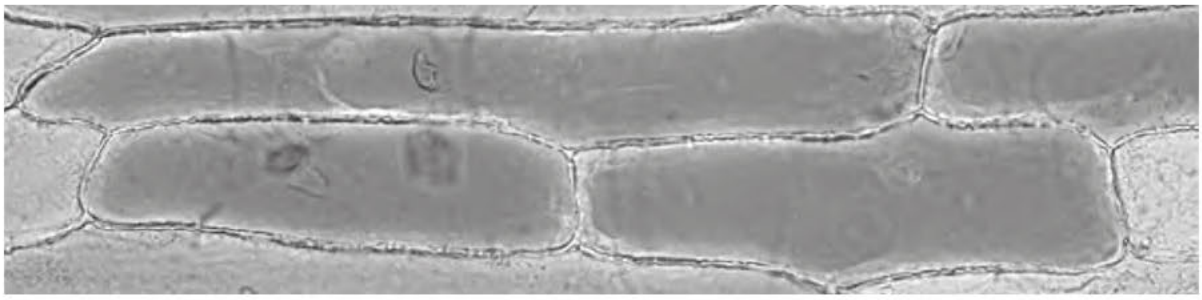
.....

.....

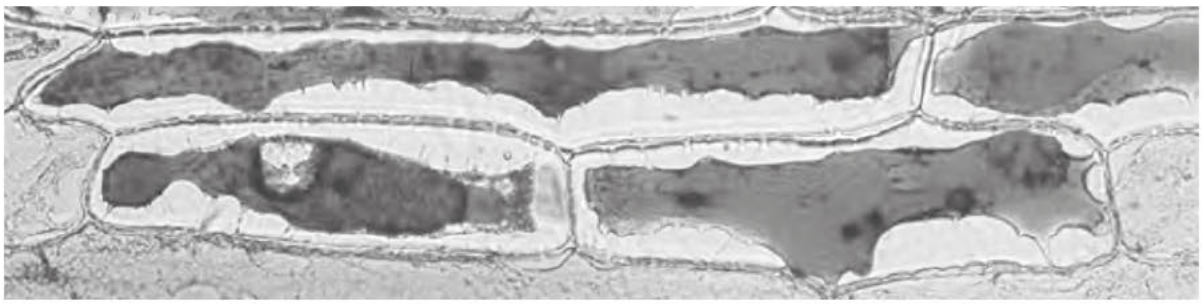
(Total for Question = 12 marks)

2 A student prepared some plant cells taken from an onion. She placed the cells in a few drops of distilled water. She then used a camera attached to a microscope to photograph the cells.

She then added a few drops of concentrated salt solution to the cells and waited a few minutes. She then took another photograph of the same cells.



photograph of cells in distilled water



photograph of cells in concentrated salt solution

(a) Describe the differences in the appearance of the cells in concentrated salt solution compared with the cells in distilled water.

(2)

.....

.....

.....

.....

(b) The student thought that the differences in the cells were caused by osmosis.

What is meant by the term **osmosis**?

(2)

.....

.....

.....

.....

(c) Explain what happens to the cells in concentrated salt solution to change their appearance.

(3)

.....

.....

.....

.....

.....

.....

(d) Another student investigated the appearance of red blood cells in distilled water and in concentrated salt solution.

Use your knowledge of osmosis and the structure of red blood cells to describe and explain what the red blood cells would look like

(i) in distilled water

(2)

.....

.....

.....

.....

(ii) in concentrated salt solution.

(2)

.....

.....

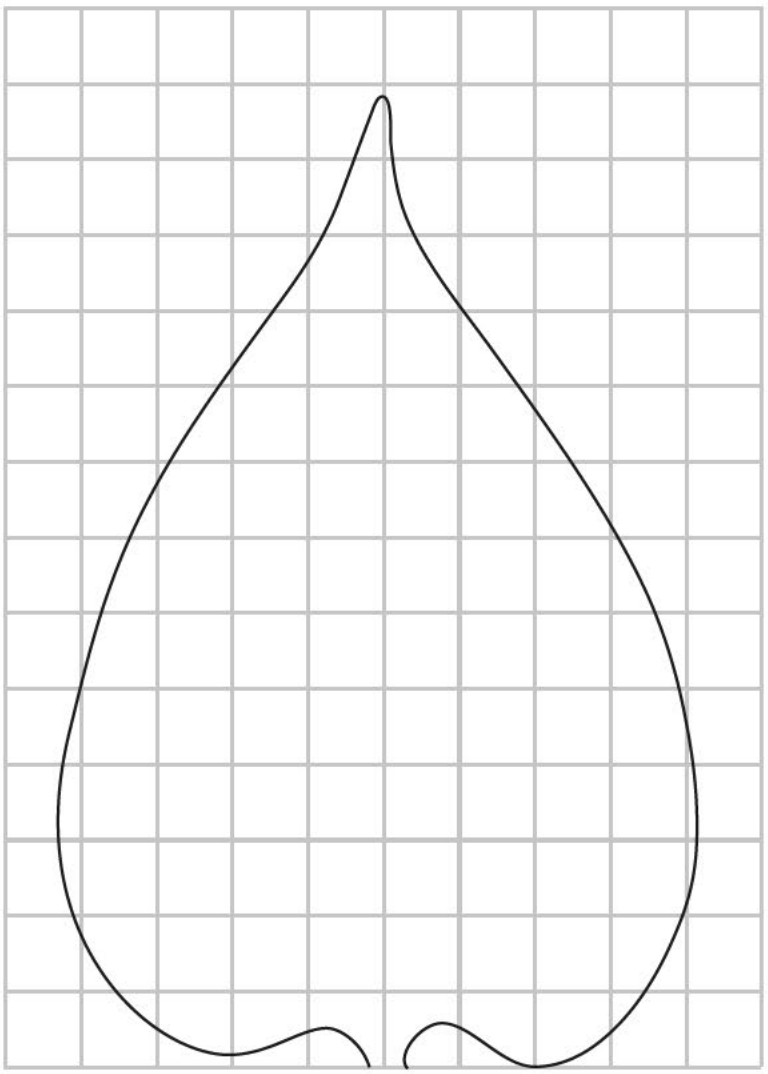
.....

.....

(Total for Question = 11 marks)

3 Bethany wanted to compare the mass of water lost from the upper surface and the lower surface of a leaf.

She set up an experiment using four leaves from the same species of tree. She estimated the surface area of each leaf by drawing around its outline on squared paper as shown in the diagram.



(a) Estimate the total surface area of this leaf in cm^2.

(2)

..... cm^2

(b) She applied a thin layer of petroleum jelly to the leaves as described below.

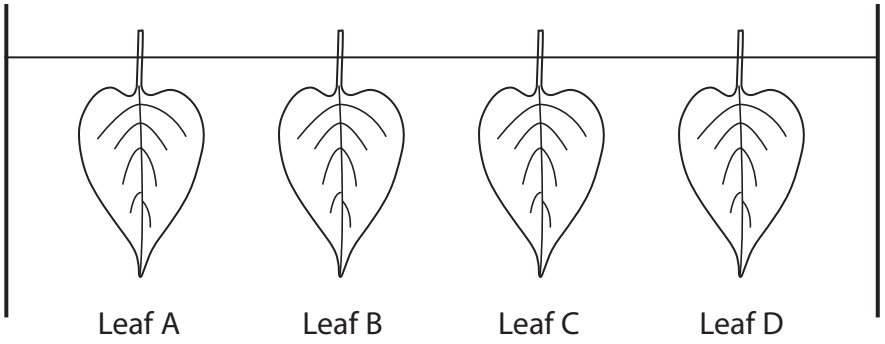
Leaf A no surface covered

Leaf B lower surface covered

Leaf C upper surface covered

Leaf D upper and lower surfaces covered

She then carefully weighed the leaves and recorded their mass. She hung the leaves by their stalks from a wire as shown. She left the leaves for 6 hours and then carefully weighed them again.



Leaf C had a lower surface area of 24 cm^2 and lost 0.2 g in 6 hours.

Calculate the loss of mass from leaf C in g per cm^2 in 1 hour.

(2)

Answer ..... g per cm^2 in 1 hour

(c) Identify the independent variable in this experiment.

(1)

.....

(d) Identify the dependent variable in this experiment.

(1)

.....

(e) State **one** variable that Bethany should control in this experiment.

(1)

.....

(f) (i) Complete the table to show the order in which the leaves A to D are most likely to lose mass.

(2)

Mass lost	Leaf
Most ↓ Least	

(ii) Give an explanation for your answer.

(3)

.....

.....

.....

.....

.....

.....

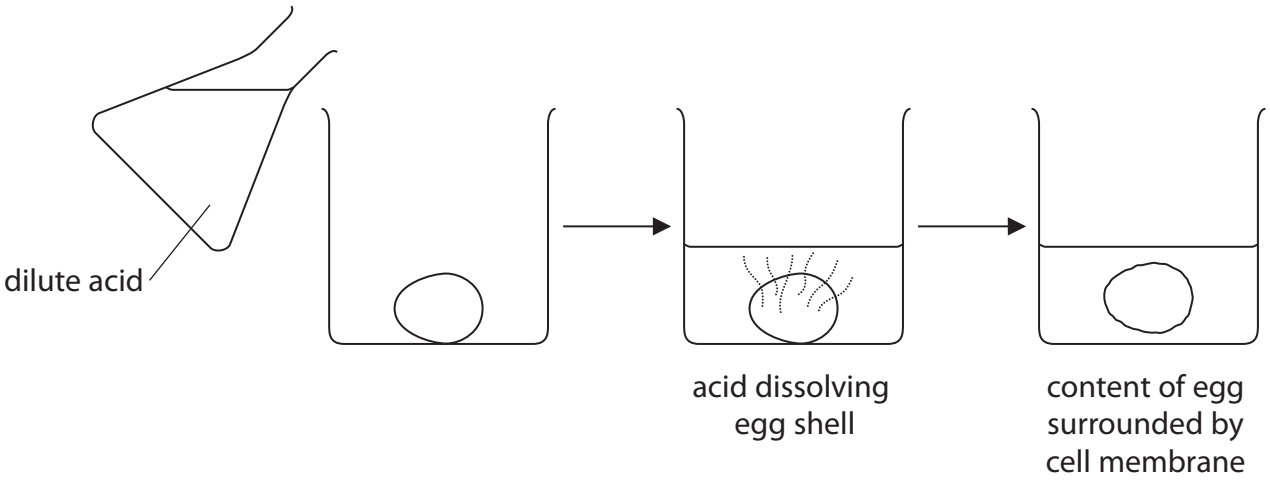
(Total for Question = 12 marks)

4 A chicken egg is a single cell protected by a shell on the outside.

A student puts three chicken eggs into dilute acid and leaves them for three days.

The acid dissolves the egg shells, leaving the contents of the eggs surrounded by the cell membrane.

The diagram shows the student's method.

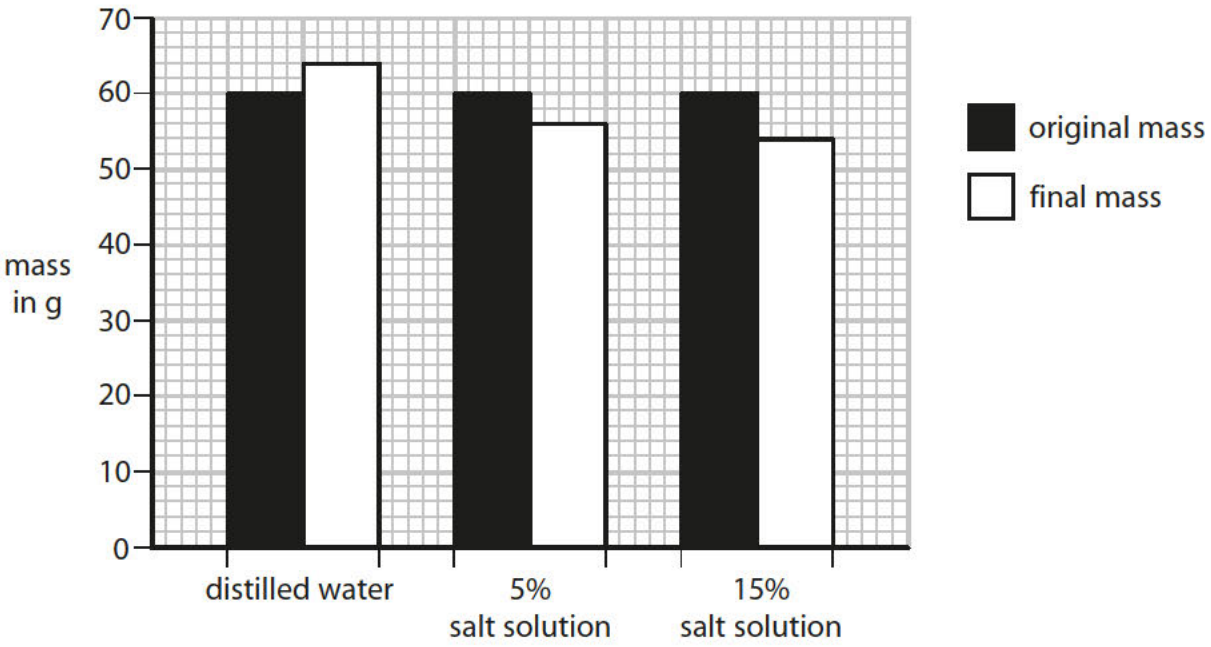


The student removes the eggs from the dilute acid and uses water to wash the surface acid away.

The student then uses the eggs for this osmosis experiment.

- he measures the mass of each egg
- he then puts one egg into a beaker containing distilled water
- he puts another egg into a beaker containing 5% salt solution
- he puts a third egg into a beaker containing 15% salt solution
- after 15 minutes he removes each egg from its beaker and measures its mass again

(a) The bar graph shows the results obtained by the student from the osmosis experiment.



Bar graph 1

(i) Name the dependent variable in this experiment.

(1)

.....

(ii) Explain the result for the egg placed in distilled water.

(2)

.....

.....

.....

.....

(b) The student calculates the percentage change in mass for the eggs placed in distilled water and in 5% salt solution.

(i) Use the data from graph 1 to calculate the percentage change in mass for the egg placed in 15% salt solution. Show your working.

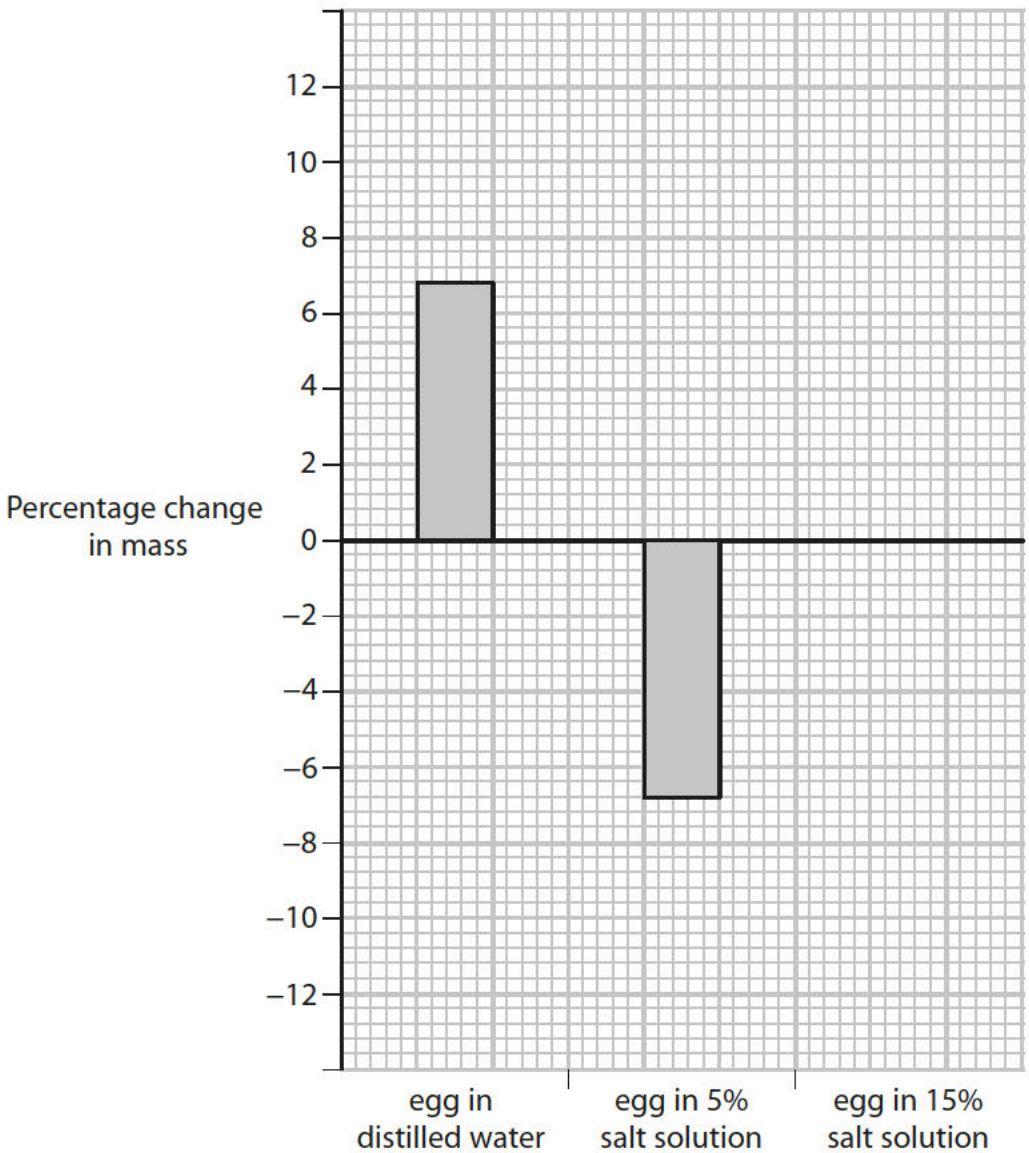
(2)

Percentage change in mass = ... %

(ii) The student plots the percentage change in mass on graph 2.

Complete the bar graph to show the percentage change in mass for the egg placed in 15% salt solution.

(1)



Bar graph 2

(c) Give one way in which osmosis differs from diffusion.

(1)

.....

.....

(Total for Question = 7 marks)