OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B3.2 HOW DO PRODUCERS GET THE SUBSTANCES THEY NEED? (FOUNDATION)

SCORE	PERCENTAGE
/37	%

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1. John grows tomatoes in his greenhouse.



(i) John needs to water his tomato plants regularly.

The water will be moved through the plant by the xylem.

Which sentence best explains how the xylem is adapted to its function?

Put **one** tick (✓) in the correct box.

Companion cells contain mitochondria to release energy.	☐
Perforated plates allow movement between cells.	☐
Cells are joined end to end with no connecting cell walls.	☐
Cells are joined end to end and contain cytoplasm.	☐

[1]

(ii) It is a lovely summer's day in John's greenhouse.

Various factors affect the rate of photosynthesis:

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- light intensity
- temperature
- carbon dioxide concentration

Which **one** of the factors above is likely to limit the rate of photosynthesis of John's tomato plants?

Explain your answer.

---

[3]

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2(a). A student does an experiment to find out more about how the process of osmosis works.

The student was provided with ten pieces of potato, each about 5 cm long.

She was also given five dishes each containing a different **unknown** concentration of sugar solution.

The student put two pieces of potato in each dish and left them for 30 minutes. She then removed the potato pieces and re-measured their length.

The student recorded the results in this table.

Dishes of sugar solution	Length of potato (cm)				Change in mean length (cm)	Percentage change
	Original	After 30 minutes in sugar solution				
		Piece 1	Piece 2	Mean		
1	4.9	5.0	5.4	5.2	+0.3	
2	5.1	4.3	4.1	4.2	–0.9	–18.4
3	5.0	4.8	4.4	4.6	–0.4	–8.0
4	5.2	5.7	5.9	5.8	+0.6	+11.5
5	4.9	4.8	4.8	4.8	–0.1	–2.0

(i) The student has not finished working out the results.

Calculate the missing value and write it in the table.

[2]

(ii) The table below shows the concentration of sugar solution in each of the five dishes.

Use the results from the student's experiment to show which solution was in each dish.

Write down the correct dish number in the column headed **"Dish"**.

Sugar solution concentration (mol dm^{-3})	Dish
0.2	
0.4	
0.6	
0.8	
1.0	

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[1]

(iii) The student measured the length of the pieces of potato as a quick way to obtain results.

Why does this method not measure the total change to the pieces of potato?

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[1]

(iv) How could the student modify the experiment to show the rate of water movement by osmosis in pieces of potato?

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[2]

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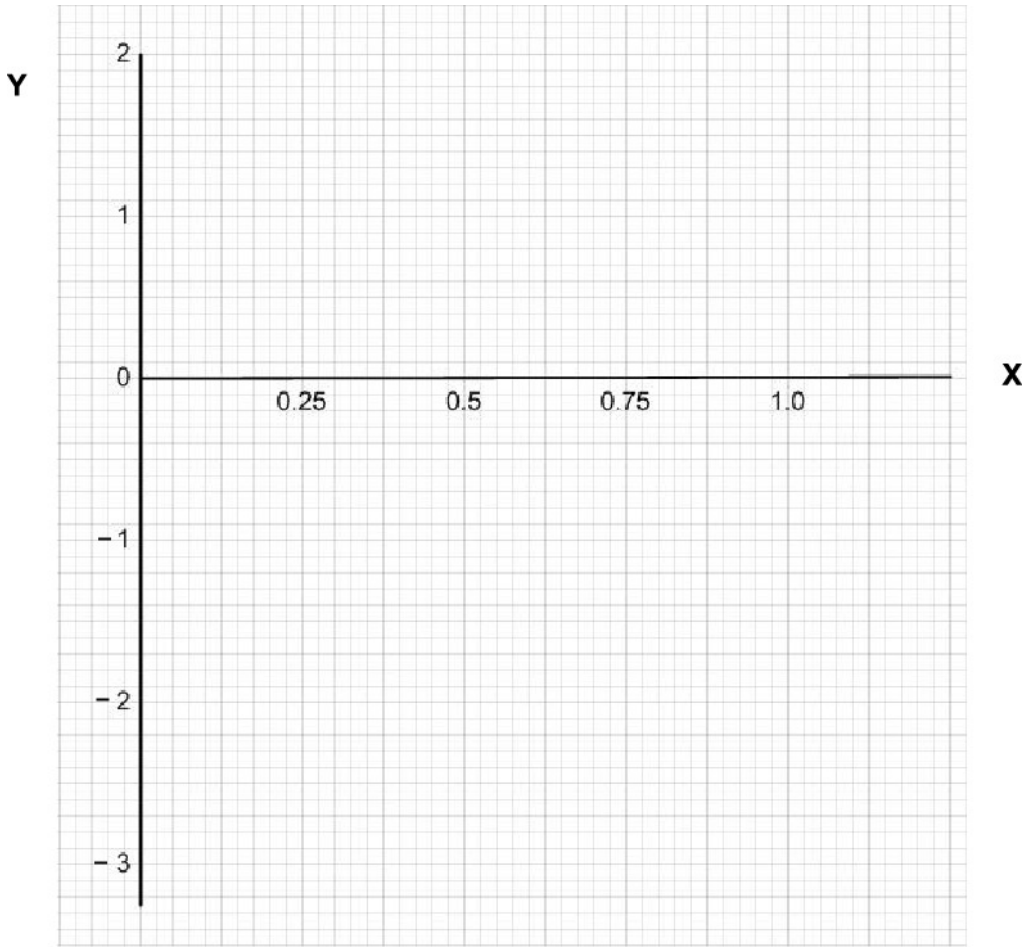
(b). Another student did a similar experiment.

These are his results.

Sugar solution concentration (mol dm^{-3})	Change in mean length (mm)
1.00	– 1.9
0.75	– 1.2
0.50	– 0.5
0.25	+ 0.3
0.00	+ 1.0

(i) Use the information in the table to label the X and Y axis on the grid below.

[1]



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(i) Plot the student's results on the grid.

[2]

(ii) Draw a line of best fit on the grid.

[1]

(iii) Use your graph to find the concentration of the sugar solution where the potato pieces do not change in length.

sugar solution concentration _____ mol / dm^{-3} **[1]**

(iv) What can you conclude, in terms of osmosis, at this concentration?

---

[1]

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3. Carbon dioxide enters a leaf and is used in photosynthesis.

Which of the following is the correct name for this type of movement?

Put a ring round the name of the process by which carbon dioxide enters the leaf.

diffusion osmosis phototropism respiration

[1]

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4. Water enters and leaves plant tissues by osmosis.

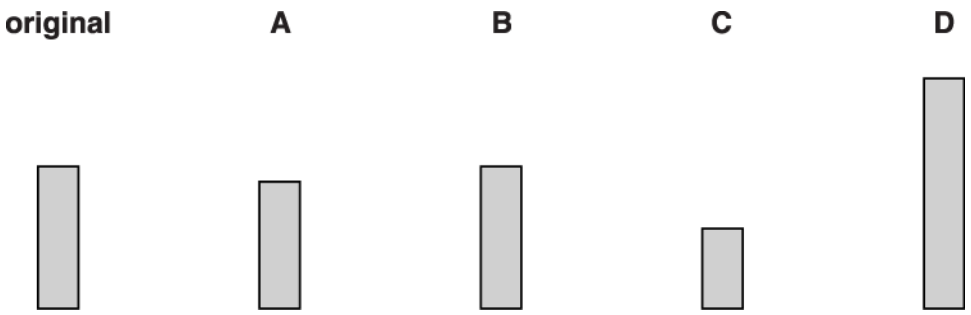
Kaye is investigating how plant tissue takes up water.

She uses four potato chips, **A, B, C** and **D**.

The chips are all cut to the **same length**.

Kaye puts the four chips into four different concentrations of sugar solution.

The diagram shows the original length of the chips and the length of each chip after soaking for 60 minutes in the sugar solutions.



(i) Write letters **A, B, C** and **D** in the table to show which chip was in each solution.

Concentration of solution in arbitrary units	Potato chip
0.0	
0.3	
0.6	
0.9	

[2]

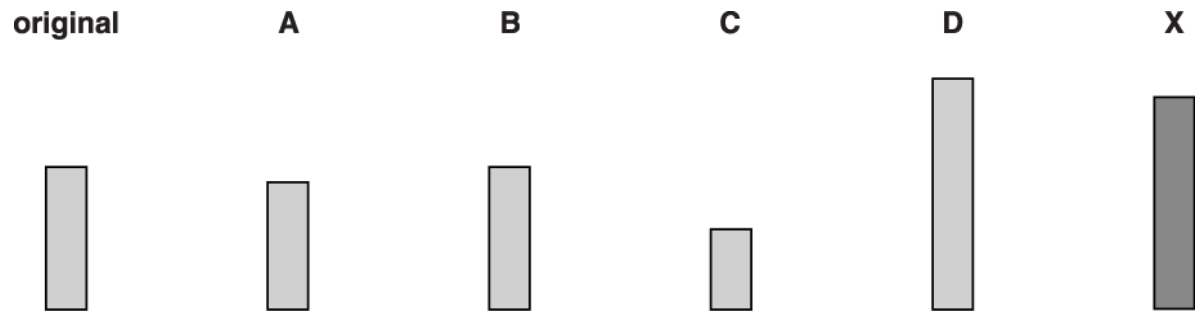
(ii) Kaye has another potato chip, **X**, which has been in a different concentration of sugar solution.

Potato chip **X** was originally cut to the same length as the other chips.

The diagram shows potato chip **X after** soaking for 60 minutes in the sugar solution.

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The label on the test tube containing chip **X** has rubbed off.

Use the results of Kaye's experiment to estimate the concentration of sugar solution (in arbitrary units) in the test tube containing chip **X**.

---

[2]

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5. Paul's cat has injured its leg.

He takes the cat to the vet.

The vet explains that the cat has an infected leg, probably caused by a puncture wound.

The vet advises Paul to bathe the wound with a saline solution to help keep it clean. A saline solution contains salt dissolved in water.

Complete these sentences to explain why the vet has given this advice.
Choose the best words from this list.

around	diffusion	evaporation
into	osmosis	out of
salt	starch	water

The saline solution contains a lot of salt.

This will cause the _____ to move _____ the bacteria.

This process is called _____ .

The bacteria are killed.

[3]

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6. Molecules move in and out of cells by various processes, including osmosis.

What is **osmosis**?

Complete the sentence.

Osmosis is the overall movement of _____ molecules from a dilute to a more concentrated solution across a membrane that is _____

[1]

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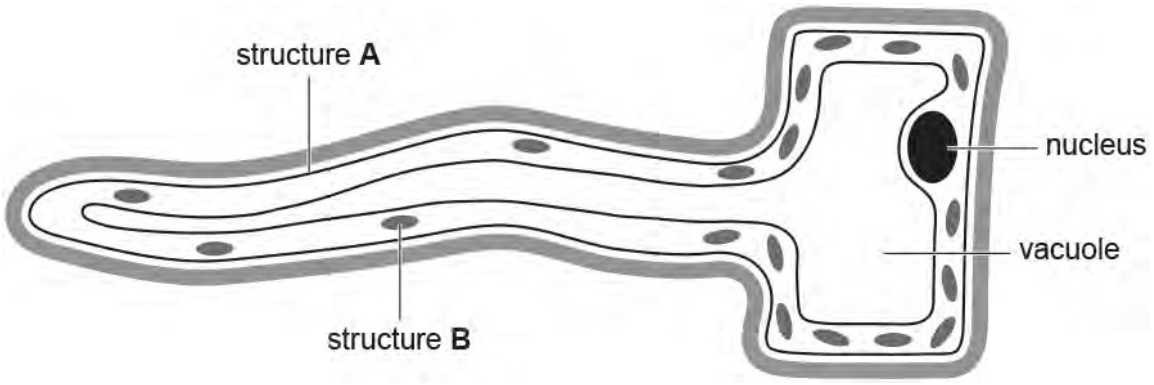
7(a). Nina is learning about substances absorbed by plants. She finds out that plants absorb nitrate ions from the soil.

Explain why nitrate ions are essential for plant growth and survival.

--- [2]

(b). Nitrate ions are absorbed into a plant root through root hair cells.

Nina finds this diagram of a root hair cell.



(i) State the names of structures **A** and **B**.

A ---

B --- [2]

(ii) Explain the roles of **A** and **B** in transporting nitrate ions into the root hair cell.

A ---

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B ----------

---

[2]

(iii) The shape of the root hair cell is an adaptation.

Explain how this adaptation helps the root hair cell to absorb nitrate ions more effectively.

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[2]

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(c). The root hair cells also absorb water from the soil.

Complete the sentences below to describe how water is transported through a plant.

Choose the correct words from the list.

Each word may be used once, more than once or not at all.

diffusion	flowers	meristem	osmosis
phloem	stomata	xylem	

Water is transported from the soil into the root cells by .....

Water is pulled from roots to leaves through the ..... tissue

in the plant stem.

Water molecules are lost from the leaves into the atmosphere because of .....

through open ..... . **[4]**

END OF QUESTION PAPER

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