

BIOLOGY



KS3 SCIENCE EXAM PREPARATION STUDENT BOOK

RESPIRATION

Please complete all of these questions in this book and store this work in your student revision files.

This will provide a useful resource for revision.

Name	
Class	
Teacher	

Revision Question Book
KS3 Science

This book is suitable for
students carrying out the KS3
Science course



In the following book there are several questions based on KS3 Science. These questions are additional to the work which you do on in your lessons.

To gain the highest grade possible in KS3 Science it is recommended that you complete these questions at home or in revision sessions outside of lessons.

This will both familiarise yourself with both the concepts found in the syllabus and the examination technique found in examinations.

The mark scheme to the questions is integrated in the book for you to use independently.

To improve competency in answering questions on KS3 Science and achieve mastery in this module, answer all of these questions independently.

When you have completed your work in this book, please store this work in your student files.

Many thanks for all of your hard work in Science.

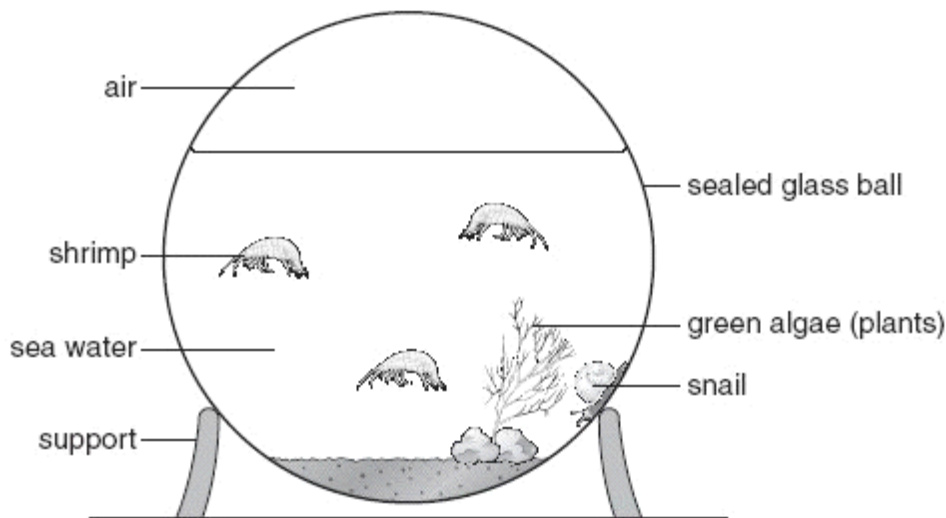
Mr. Turnbull



HIGHER TIER

1. An ecosphere is a model habitat that can last for many years.

The ecosphere below is a sealed glass ball containing sea water, green algae, bacteria, a snail and shrimps.



not to scale

1.1 The ecosphere must receive plenty of light.

Explain why light is necessary for the survival of the green algae and the animals in the ecosphere.

[3 Marks]

.....

.....

.....

.....

.....

.....

1.2 When organisms in the ecosphere die, they are broken down by bacteria.

Nutrients, such as nitrates, are released back into the ecosphere.

Why is this necessary for the survival of the other organisms in the ecosphere?

[1 Mark]

.....

.....



1.3 The table shows how the mass of oxygen dissolved in water changes with temperature.

temperature of the water (°C)	mass of oxygen dissolved (mg/100 cm ³)
15	10.2
17	9.7
19	9.3
21	9.0
23	8.7
25	8.4
27	8.1
29	7.9

This ecosphere was kept at a temperature between 17°C and 23°C.

In this ecosphere, respiration in the organisms is affected less if the temperature falls to 15°C than if it rises to 27°C.

Use information in the table to explain this.

[1 Mark]

.....

.....



2. Plants lose water vapour from their leaves. Most of this water vapour is lost through the stomata.

2.1 Draw a ring around the correct answer to complete the sentence.

[1 Mark]

Plants lose water vapour by

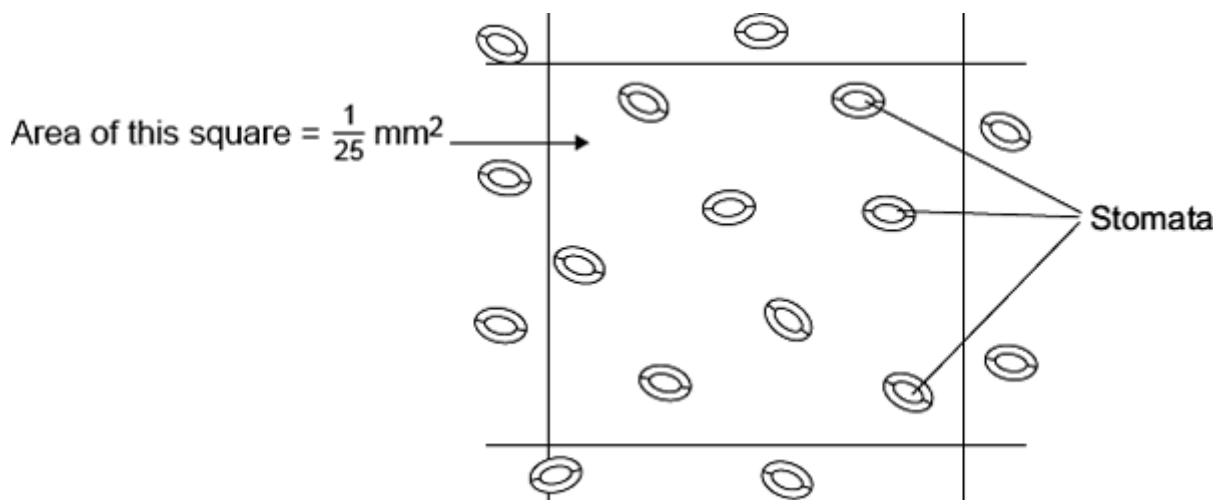
- distillation.
 filtration.
 transpiration.

A class of students investigated the number of stomata per mm^2 on the upper surface and on the lower surface of the leaves of three species of plant, **P**, **Q** and **R**.

The students placed samples of the surface cells onto a grid on a microscope.

Student **X** counted the stomata on the lower surface of a leaf from one of the plant species.

The diagram shows part of the grid that student **X** saw under the microscope.



2.2 Complete the calculation to estimate the number of stomata per mm^2 on the lower surface of this leaf.

[2 Marks]

Number of stomata in $\frac{1}{25} \text{ mm}^2 = \dots\dots\dots$

Number of stomata in $1 \text{ mm}^2 = \dots\dots\dots$



The table shows the mean results for the class.

Plant species	Mean number of stomata per mm ² of leaf	
	Upper surface of leaf	Lower surface of leaf
P	40	304
Q	0	11
R	85	195

2.3 Student **X** had counted the stomata on the lower surface of a leaf from one of the plant species.

Use your answer to **2.2** and information in the table, to help you to answer this question.

From which plant species, **P**, **Q** or **R**, was student **X**'s leaf most likely to have been taken?

[1 Mark]

2.3 Species **Q** is normally found growing in hot, dry conditions.

Explain **one** way in which species **Q** is adapted for living in hot, dry conditions.

Use information from the table.

[2 Marks]

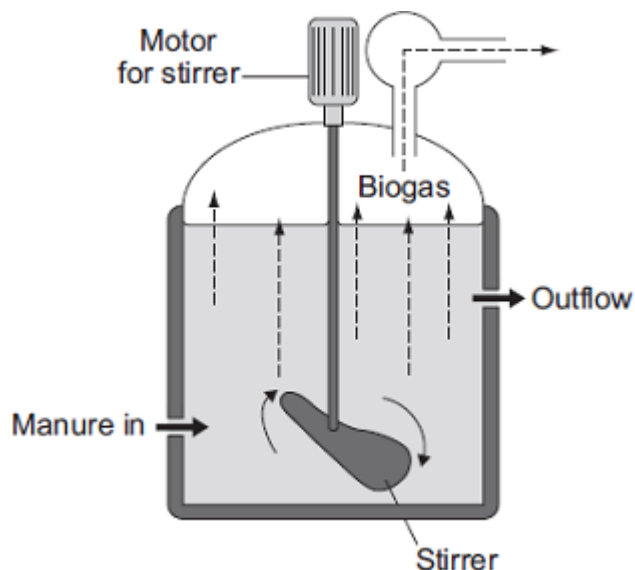
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3. The diagram shows one type of biogas generator.



3.1 With this type of biogas generator, the concentration of solids that are fed into the reactor must be kept very low.

Suggest **one** reason for this.

Tick (✓) **one** box.

[1 Mark]

A higher concentration contains too little oxygen.

☐

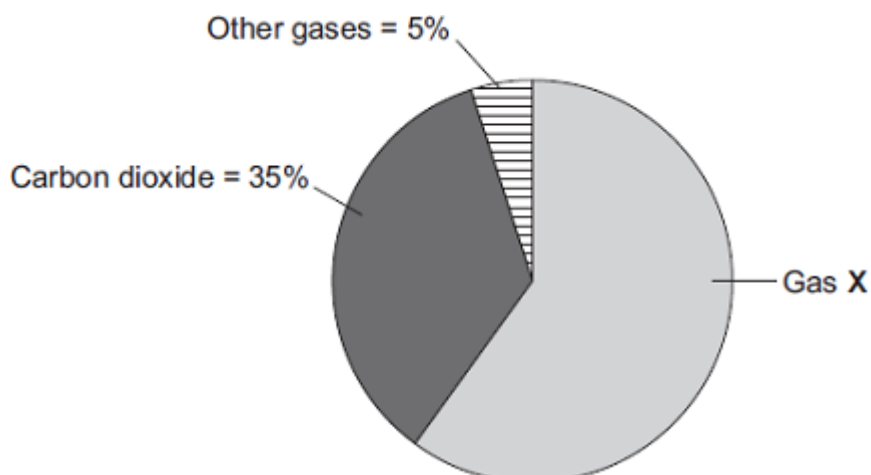
A higher concentration would be difficult to stir.

☐

A higher concentration contains too much carbon dioxide.

☐

3.2 The pie chart shows the percentages of the different gases found in the biogas.





Gas **X** is the main fuel gas found in the biogas.

What is the name of gas **X**?

Draw a ring around **one** answer.

[1 Mark]

methane

nitrogen

oxygen

3.3 What is the percentage of gas **X** in the biogas?

Show clearly how you work out your answer.

[2 Marks]

.....

.....

.....

Percentage of Gas **X** =

3.4 If the biogas generator is not airtight, the biogas contains a much higher percentage of carbon dioxide.

Draw a ring around **one** answer in each part of this question.

[1 Mark]

(i) The air that leaks in will increase the rate of

aerobic respiration.
anaerobic respiration.
fermentation.

[1 Mark]

(ii) The process in **3.4** occurs because the air contains

ammonia.
nitrogen.
oxygen.



4. A student removed three similar leaves from a plant. The student spread petroleum jelly (a waterproofing substance) on some of the leaves, as follows:

Leaf A: on the lower surface

Leaf B: on the upper surface

Leaf C: none.

The student placed each leaf in a separate beaker. He weighed each beaker at intervals. The results are shown in the table.

Time in hours	Mass of leaf + beaker in grams		
	Leaf A	Leaf B	Leaf C
0	50.00	55.01	51.99
0	49.99	54.95	51.90
3	49.97	54.90	51.85
5	49.95	54.86	51.80

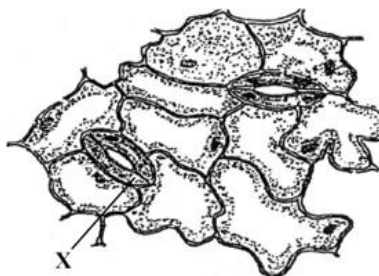
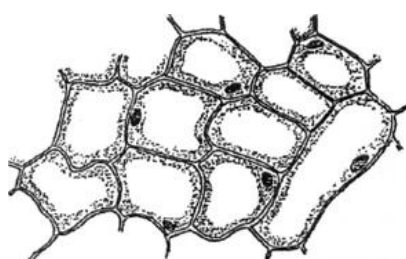
4.1 Which leaf, **A**, **B** or **C**, lost most water?

[1 Mark]

The diagram shows the appearance of the upper and lower surfaces of one of the leaves under a microscope.

Upper surface of leaf

Lower surface of leaf



4.3 Name cell **X**.

[1 Mark]



4.4 The petroleum jelly had a greater effect when it was spread on the lower surface than when it was spread on the upper surface.

Use information from the diagram to explain why.

[2 Marks]

.....

.....

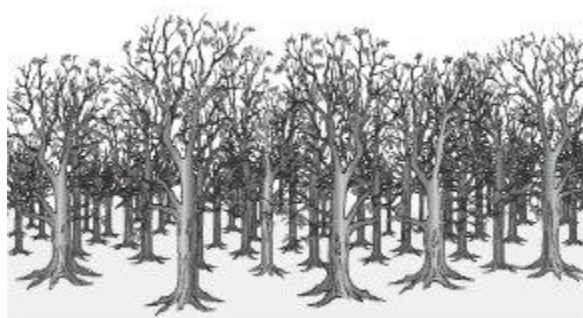
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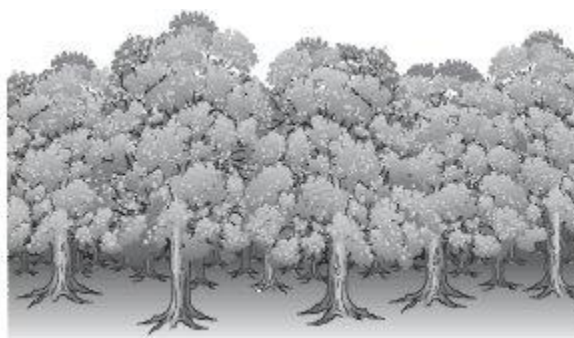
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**FOUNDATION TIER**

1. The drawings below show the trees in a woodland area at the beginning of May and at the end of May.

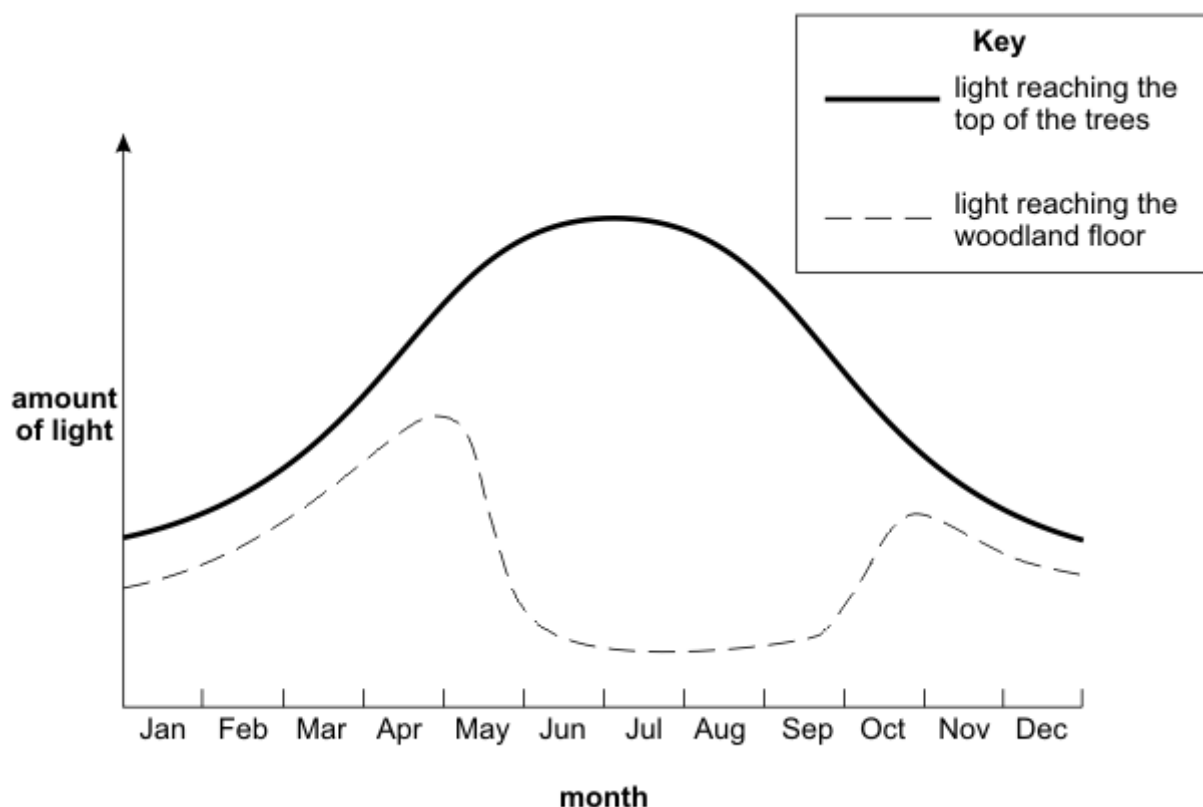


beginning of May



end of May

The graph below shows the amount of light reaching the top of the trees and the woodland floor over one year.



1.1 Why does the amount of light reaching the woodland floor decrease during May?

[1 Mark]

.....

.....



1.2 Plants grow on the woodland floor.

Explain why these plants grow bigger **and** faster when there is plenty of light.

[2 Marks]

.....

.....

.....

.....

.....

.....

1.3 Respiration takes place in the cells of all plants.

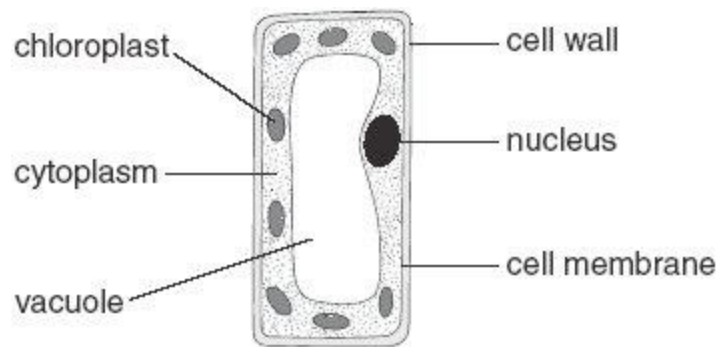
Complete the word equation for **respiration**.

[2 Marks]

oxygen + $\longrightarrow$ carbon dioxide +



2. The diagram below shows a plant cell.



2.1 In which part of a plant would you find this type of cell?

[1 Mark]

.....

2.2 Give the function of the nucleus.

[1 Mark]

.....

.....

2.3 Give the function of the chloroplasts.

[1 Mark]

.....

.....

2.4 Give the function of the cell wall.

[1 Mark]

.....

.....

1 mark

2.5 Give the names of **two** labelled parts that are **not** present in animal cells.

[2 Marks]

1.

2.



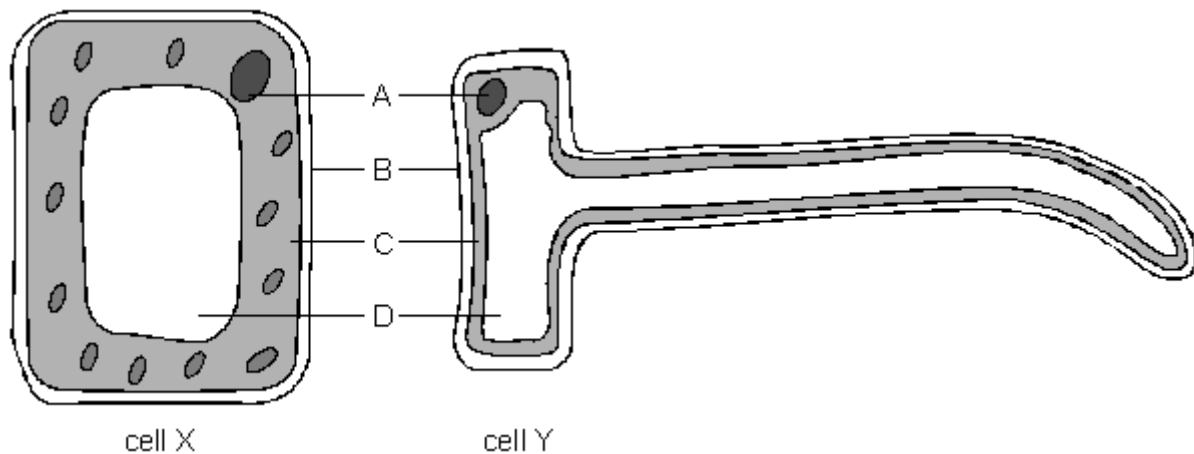
2.6 Tick **one** box in each row to show whether the statement is true for photosynthesis **or** for respiration.

[2 Marks]

Statement	Photosynthesis	Respiration
carbon dioxide is produced		
light is needed		
it occurs in plants and animals		
oxygen is produced		



3. The diagrams show two plant cells.



not to scale

3.1 In which part of a plant would these cells be found?

[2 Marks]

Cell **X**

Cell **Y**

3.2 Give the name of part **B**.

[1 Mark]

.....

3.3 Give the letter which labels the nucleus.

[1 Mark]

.....

3.4 What is the function of the nucleus?

[1 Mark]

.....

.....

1 mark

3.5 How can you tell from the diagram that photosynthesis **cannot** take place in cell **Y**?

[1 Mark]

.....

.....



3.6 Which process takes place in **both** cell **X** and cell **Y**?
Tick the correct box.

[1 Mark]

egestion ☐

fertilisation ☐

pollination ☐

respiration ☐



MARK SCHEME HIGHER

1.1 any **three** from

- plants **or** algae need light for photosynthesis
accept 'for photosynthesis'
- photosynthesis **or** algae **or** plants supply or produce oxygen
- plants **or** animals need oxygen
accept 'oxygen is used for respiration'
- photosynthesis supplies glucose **or** carbohydrate **or** biomass
accept 'glucose is a source of energy for the plant'
*accept 'the herbivores eat the plants' **or** 'animals eat plants'*
***or** 'snails eat plants'*
- carbon dioxide is produced by plants **or** animals

3 (L7)

1.2 any **one** from

- materials can be recycled
- makes nutrients available
- makes minerals available

1 (L7)

1.3 any **one** from

- at 27°C the oxygen concentration would drop too low
accept 'the higher the temperature the less oxygen is dissolved'
accept 'at a higher temperature they would suffocate'
- at 15°C there is more oxygen
accept 'the lower the temperature the more oxygen there is'
'there would be more oxygen' is insufficient

1 (L6)
[5]



2.1 transpiration

1

2.2 200

correct answer with or without working

if answer incorrect:

*allow **1** mark for 8×25 **or***

*allow **1** mark for answer from candidate's count $\times 25$*

2

2.3 R

*allow **P** or **Q** if candidate's answer to **2.2** nearer to value for one of those*

*do **not** allow **R** if the answer to **2.2** would give an answer of **P** or **Q***

*allow **R** if **2.2** is blank*

1

2.4 few stomata

allow no stomata on upper surface / all stomata on lower surface

1

little / less transpiration **or** little / less water (vapour) loss / enable water to be retained

allow no water loss from upper surface

1

[6]



3.1 a higher concentration would be difficult to stir

3.2 methane

1

3.3 60

100 - (5 + 35) but incorrect answer allow 1 mark

2

3.4 aerobic respiration

1

3.5 oxygen

1

[6]



4.1 C

1

4.2 guard (cell)

1

4.3 temperature water movement / transpiration
through stomata / pores / holes /(region) X

or

petroleum jelly blocks / covers stomata / pores / holes / X

1

stomata / pores / holes / X found on lower surface

1

[4]



FOUNDATION

1.1 leaves are bigger

*accept 'there are leaves **or** a canopy'*

*accept 'leaves open **or** grow'*

'trees block the light' is insufficient

1 (L5)

1.2 any **two** from

- light is needed for photosynthesis

accept 'photosynthesis'

- more (photosynthesis)

accept, for two marks, 'the rate

***or** amount of photosynthesis increases if the light increases'*

- light provides energy for growth

'they need light to grow' is insufficient

'light is a source of food' is insufficient

- biomass **or** food **or** sugar **or** starch **or** carbohydrate is produced

2 (L6)

1.3 • glucose

1 (L6)

- water

answers must be in the correct order

1 (L6)

[5]



2.1 • leaf

*accept 'stem' **or** 'stalk'*

1 (L5)

2.2 • it controls the cell **or cell's activities**

accept 'it tells the cell what to do'

'it is the brain of the cell' is insufficient

*accept 'it contains **or** passes on (genetic) information **or** genes **or** DNA'*

1 (L5)

2.3 any **one from**

- absorbs light **or** Sun's energy

*accept 'traps **or** catches light'*

*do **not** accept 'it attracts light'*

- photosynthesis

*accept 'it makes food **or** glucose **or** sugar **or** starch **or** carbohydrate'*

'it produces oxygen' is insufficient

1 (L6)

2.4 any **one from**

- gives the cell its shape

'it protects the cell' is insufficient

- supports the cell

1 (L6)

2.5 any **two from**

- cell wall

accept 'wall'

- vacuole

- chloroplast

2 (L6)

**2.6 •**

<i>photosynthesis</i>	<i>respiration</i>
	✓
✓	
	✓
✓	

if **all four** answers are correct, award two marks

if **two or three** answers are correct, award one mark

if more than one box is ticked in any row, do not credit that row

2 (L6)
[8]



3.1 the leaf

answers must be in the correct order

accept 'a green part'

*accept 'stem' **or** other named green part*

1 (L5)

root

accept 'root hair'

1 (L6)

3.2 cell wall

1 (L6)

3.3 A

1 (L6)

3.4 to control the cell

accept 'contains genetic information'

***or** 'controls the production of enzymes'*

1 (L6)

3.5 any **one** from

it has no chloroplasts **or** no chlorophyll

1 (L6)

3.6 respiration

if more than one box is ticked, award no mark

1 (L6)

[7]



Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the KS3 Science Specification.

