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الوطنية الأرثوذكسية
الشميساني

The National
Orthodox School
Shmaisani

Photosynthesis

Grade: 8 CS

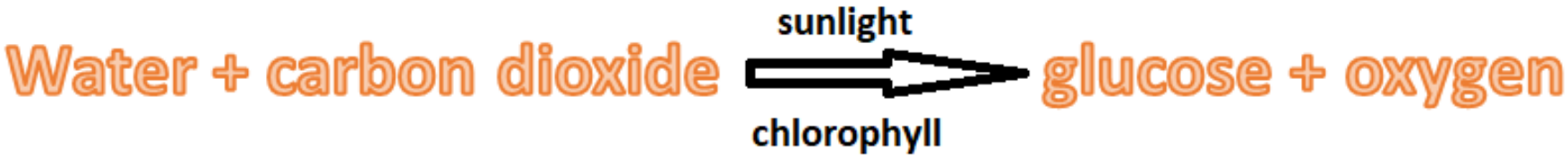
Objective : To understand the leaf structure and write the equation of photosynthesis.

Resources : book pages 84 , 85 , 158.

Workbook pages : 39

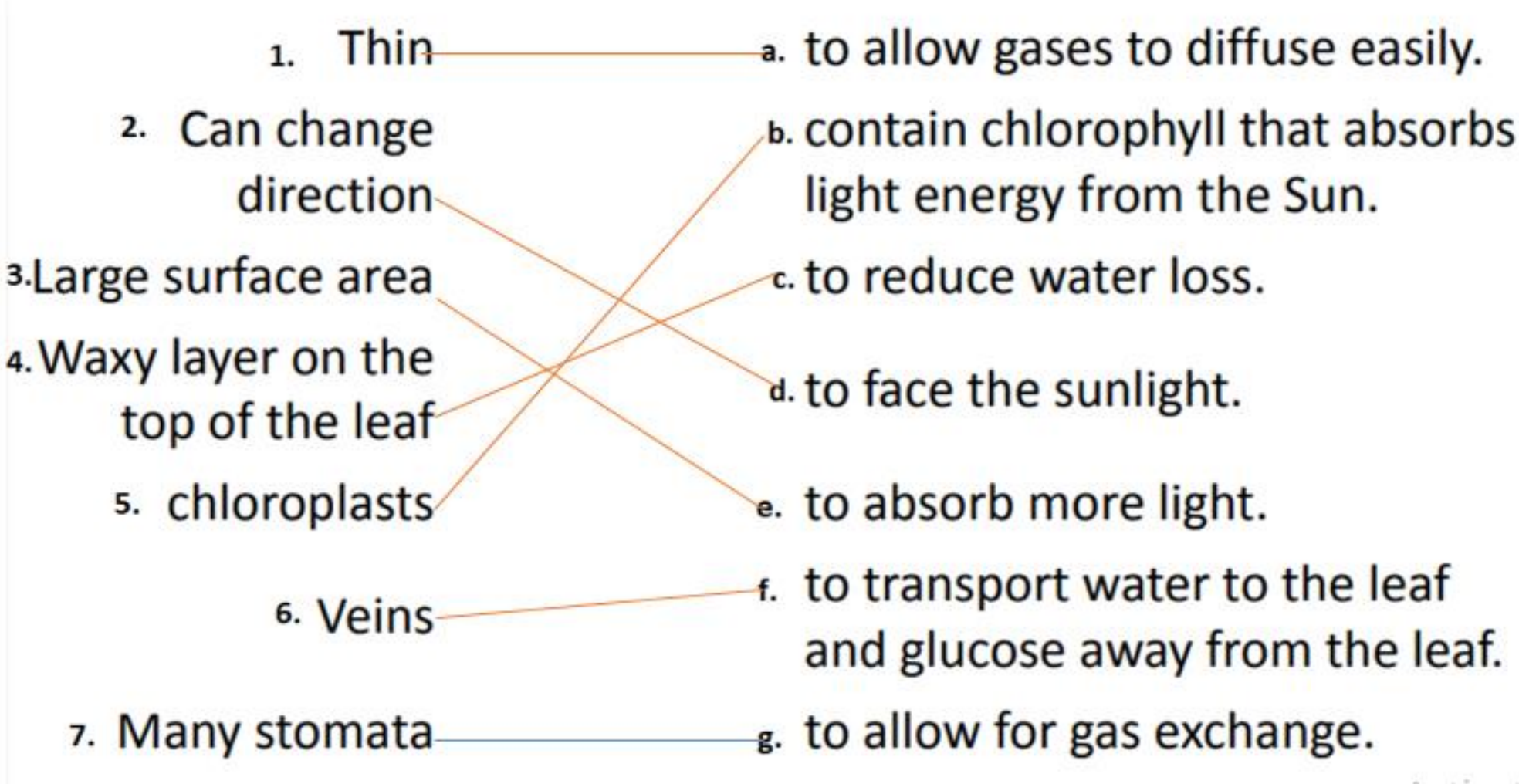
Photosynthesis :

The word equation of photosynthesis :

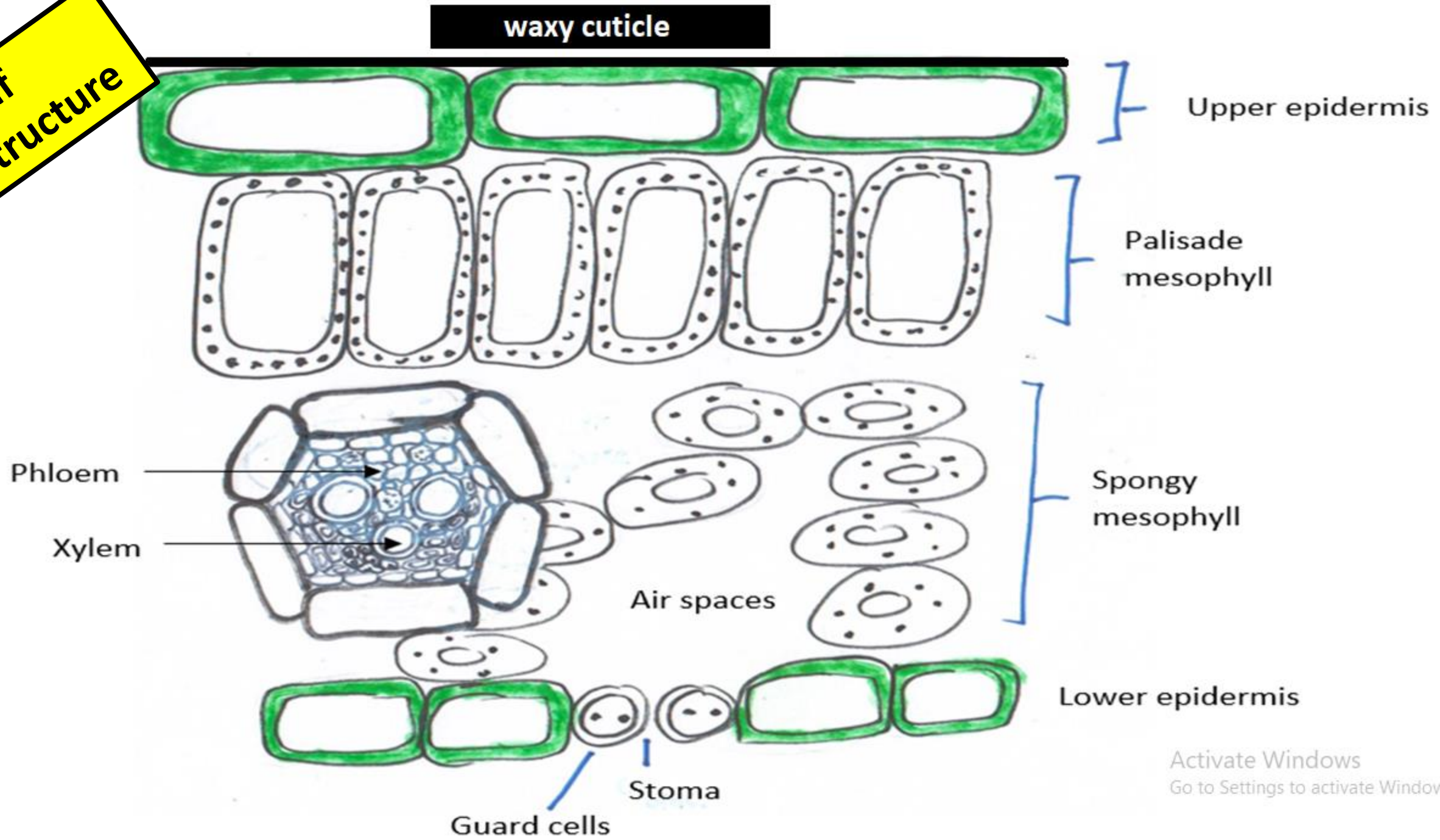


- Leaf cells absorb the carbon dioxide they need from air .
- Water is transported from the roots in xylem vessels
- Glucose stores energy .
- Stored energy is transferred along food chains to animals .

Activity 1 : Match each leaf adaptation to its function in photosynthesis



Leaf structure



Part	Function
Waxy cuticle	To prevent water loss
Palisade cells	To absorb light for photosynthesis
Guard cells	Open and close the stomata
Stomata	Allow the diffusion of gases

6.1 Why we need plants

Objective

- Describe the importance of plants to life on Earth

Biomass

All the wood in these tree trunks is **biomass**, which is the material living things are made of. This biomass was made from air and water. How is that possible?

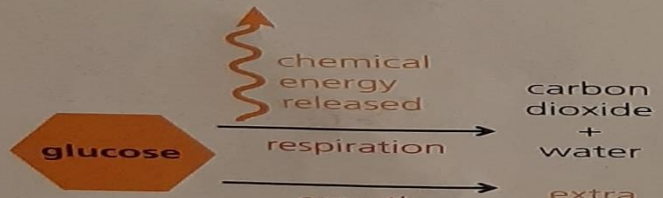
These massive tree trunks are made fr air and water.

Plant cells use chemical reactions to build biomass. To do this they need two small molecules – carbon dioxide and water – and energy from the Sun.

The solar energy enables plants to build larger molecules such as glucose from the atoms in carbon dioxide and water. The reaction also relea oxygen. This chemical reaction is **photosynthesis**. It sustains life on Earth.

carbon dioxide + water → (photosynthesis; light energy) → glucose + oxygen

All the food we eat comes from the glucose plants make. All the oxygen we breathe comes from the oxygen they release.



Plants use some of the glucose they make for respiration and the rest for growth.

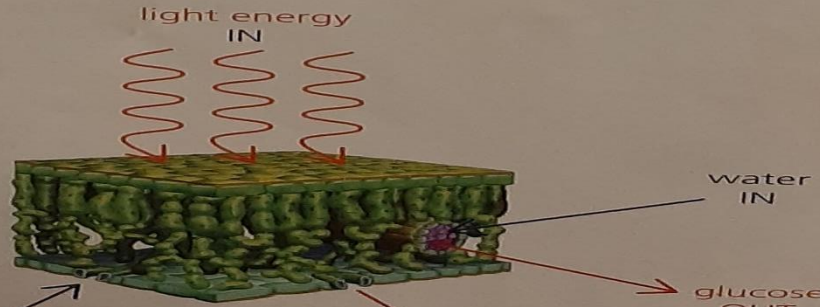
Energy

Glucose molecules contain stored energy. Cells can release energy from glucose using respiration. Photosynthesis and respiration are the reverse of each other. Photosynthesis stores energy, and respiration releases it.

A plant uses about half the glucose it makes to release energy in respiration. It uses the rest of the glucose molecules, and small amounts of minerals, for growth and repair. The molecules used for growth add to the plant's biomass.

photosynthesis : is an endothermic reaction.

Respiration : is an exothermic reaction.



This section through a leaf shows the different types of cell. Leaves are designed to bring water and carbon

Leaves

Most photosynthesis takes place in the tall thin **palisade** cells near the top of a leaf. You can take a closer look at them on page 43. They have plenty of **chloroplasts** to absorb light energy.

Veins bring water and minerals from the roots up the stem to the leaves. The water and minerals travel along hollow tubes called **xylem** (see pages 88 and 89).

Carbon dioxide diffuses into the leaf from the air through tiny pores called **stomata**. The **spongy mesophyll** layer at the bottom of the leaf makes it easy for gases to circulate. Any oxygen that the cells don't need diffuses out through the stomata.

This SEM image shows the starch grains inside a potato cell – magnified 640 times.

Starch

Plant cells need to store some glucose so their cells can respire at night when photosynthesis stops. Small, soluble molecules such as glucose can't be stored in cells. Instead, they are joined together to make giant molecules of starch.

Leaves can store enough starch to last for 2 or 3 days. Starch is easy to detect because it makes brown iodine solution turn a dark blue-black colour.

Some of the glucose made by leaf cells is sent to cells that can't make their own glucose. It travels down to the roots in phloem tubes inside veins.

Oxygen

Instead of taking carbon dioxide for photosynthesis from the air, pondweed takes it from water.

You can see when photosynthesis is taking place in pondweed. The spare oxygen the plant releases forms bubbles in the water. This is useful if you want to measure how fast the photosynthesis reaction is going. You can count the bubbles or measure the volume of oxygen produced.

Photosynthesis makes bubbles o oxygen escape from pondweed.

13.1 Photosynthesis

Objective

- *Understand the process of photosynthesis and write the word equation*

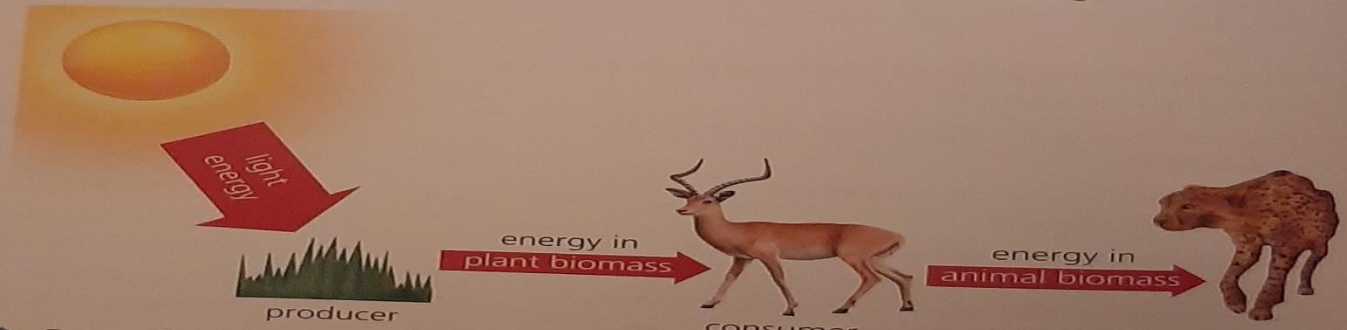
Energy

All plants need light. They use energy from light to make sugars such as glucose. Glucose stores energy. This energy can be released using respiration when the plant's cells need energy.

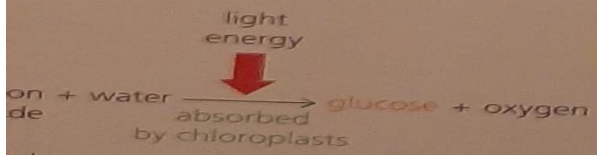
Plants also use glucose to build new cells. The more light energy plants absorb, the more they photosynthesise and the more their biomass increases.

Plant biomass keeps every animal alive – including us. It supplies the energy and building materials that herbivores use for growth. Then it gets passed along food chains to carnivores.

Trees can get very tall as they grow towards the light.



Energy flows through food chains as it transfers from producers to consumers.



ght energy is absorbed during hotosynthesis.

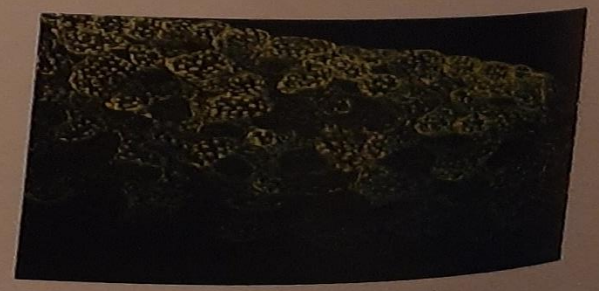
Respiration and photosynthesis are opposite processes.

- Photosynthesis makes glucose. Respiration breaks glucose down.
- Respiration in plants and animals uses oxygen. Photosynthesis returns oxygen to the atmosphere.
- Respiration is an **exothermic** reaction – it releases energy. Photosynthesis is an **endothermic** reaction because it takes in light energy.

Chloroplasts

Photosynthesis takes place in **chloroplasts**, mainly in leaf cells. These cells take carbon dioxide from the air. Most leaves are very thin so gases diffuse in and out quickly.

The water needed for photosynthesis is brought up from the roots in **xylem** vessels



A beam of light made the

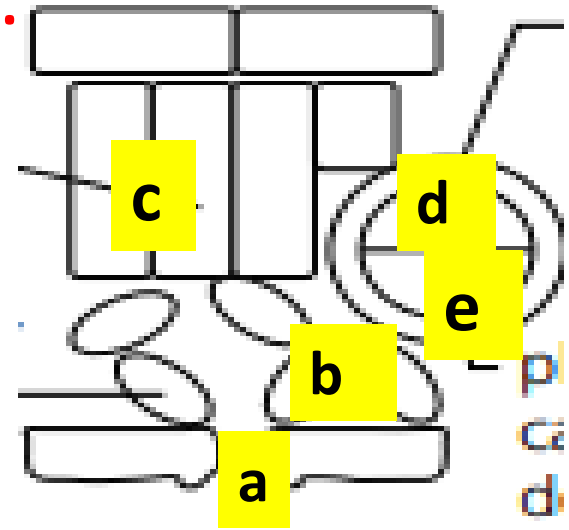
Questions 3,4,5 page 85

Q3. glucose is used for respiration

Q4. glucose is stored as starch

Q5. the sun

Q6.



1 Give two reasons why we need plants.

2 Draw an outline of a leaf. Then add arrows to show which molecules enter it and which leave when the plant is photosynthesising.

3 How do plants use the glucose they make?

4 How do they store the glucose that they can't use straight away?

5 Plants and animals both use respiration to release energy. Where did this energy originally come from?

6 The diagram on the right shows a section through a leaf. Copy the diagram and label these parts:

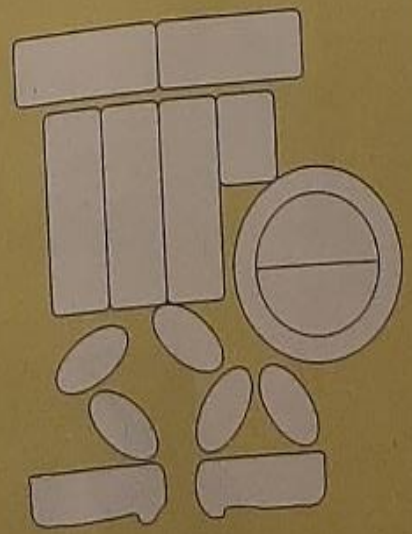
a one of the stomata that lets gases diffuse in and out of the leaf

b the spongy mesophyll that lets gases move between the cells

c the palisade cells where most photosynthesis takes place

d xylem tissue that carries water up from the roots

e phloem tissue that carries glucose down to the roots.



Workbook page 39

Read the following paragraph and fill in the gaps with words from the text box below. Each word may be used once, more than once, or not at all.

The material living things are made of is called biomass. Plants build new biomass using photosynthesis. During photosynthesis, light energy is absorbed. It makes carbon dioxide from the air react with water from the soil. The products are glucose and oxygen. Plant cells can release energy from glucose molecules, using respiration, or use them for growth.

photosynthesis oxygen energy respiration carbon dioxide biomass water

Workbook page 39

2 Decide whether the following statements refer to photosynthesis, respiration or both. Write each letter in the correct part of the Venn diagram.

a Uses carbon dioxide from the atmosphere.

b Can be used to produce starch.

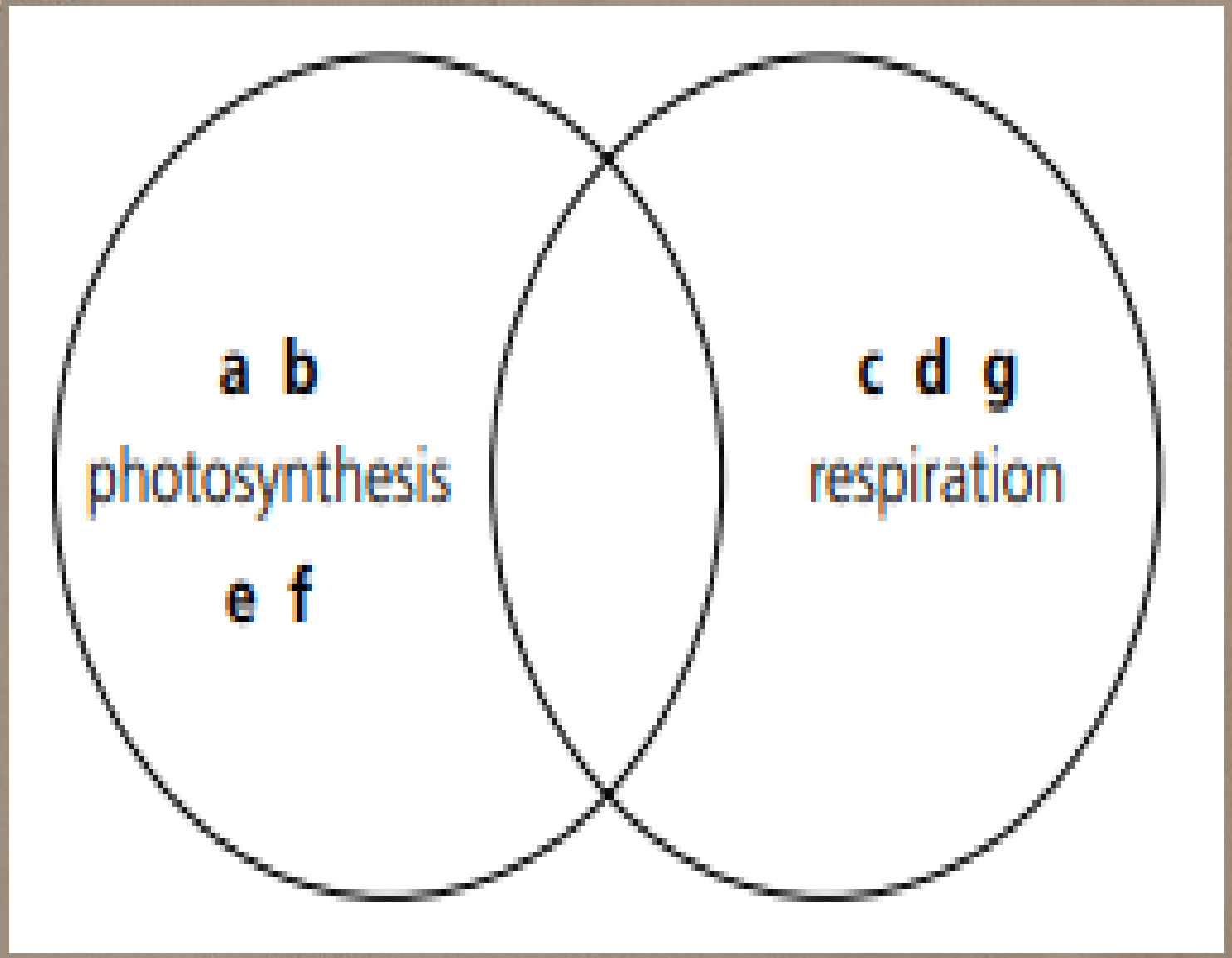
c Takes place in all living cells.

d Releases energy.

e Releases oxygen.

f Stores energy.

g Uses oxygen from the atmosphere.



Workbook page 39

3 Draw lines to match each part of a leaf to its role in photosynthesis.

Part of leaf	Role in photosynthesis
Palisade cells	Hollow tubes that carry water up from the roots
Stomata	Contain most chloroplasts to absorb light
Xylem vessels	Form a spongy layer which gases can diffuse through
Mesophyll cells	Tiny pores which let gases in and out of leaves

Answer :

Palisade cells – contain most chloroplasts to absorb light.

Stomata – tiny pores which let gases in and out of leaves.

Xylem vessels – hollow tubes that carry water up from the roots.

Mesophyll cells – form a spongy layer which gases can diffuse through

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Thank you