

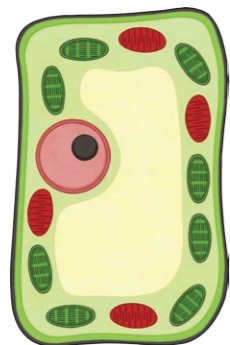
Complete the word equation for photosynthesis.
 _____ + _____ → _____ + glucose

Join the chemical formula to the correct chemical name.

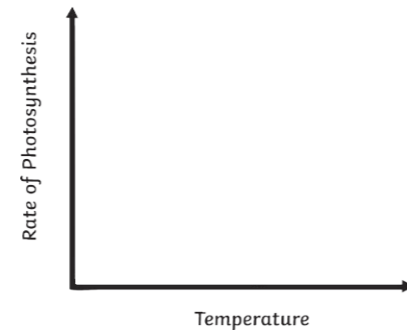
CO ₂	oxygen
H ₂ O	glucose
O ₂	carbon dioxide
C ₆ H ₁₂ O ₆	water

Choose the correct answer:
 Photosynthesis is an exothermic/endothermic reaction.
 Fill in the blanks:
 In photosynthesis, _____ is transferred from the e_____ to the c_____ by l_____.

On the diagram of a plant cell below, label the part of the cell where photosynthesis happens.

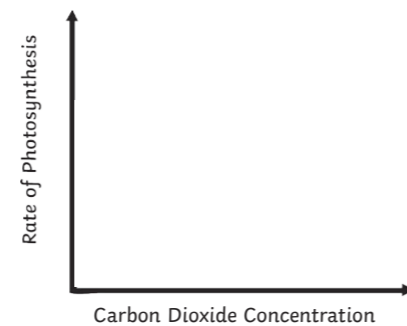


Draw a line on the graph to show how temperature affects the rate of photosynthesis.



Explain how temperature affects the rate of photosynthesis.
 As the temperature increases, the rate of photosynthesis _____. When the temperature gets too high, the enzymes that control photosynthesis _____ and the rate of photosynthesis _____.

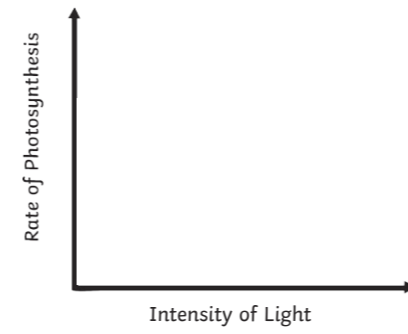
Draw a line on the graph to show how carbon dioxide affects the rate of photosynthesis.



Describe how carbon dioxide affects the rate of photosynthesis.
 Increasing the concentration of carbon dioxide will _____ the rate of the photosynthesis until _____.

How does the rate of photosynthesis affect the biomass of a plant?

Draw a line on the graph to show how light intensity affects the rate of photosynthesis.



Describe how light intensity affects the rate of photosynthesis.

Increasing light intensity _____ the rate of photosynthesis until _____.

Use the keywords to complete the five ways that glucose produced in photosynthesis could be used.

1. For _____.
 2. Converted into insoluble _____ for _____.
 3. Used to produce _____ or _____ for _____.
 4. Used to produce _____, which strengthens the _____.
 5. Used to produce _____ for _____.
- To produce _____ plants also need _____ ions that are absorbed from the soil.

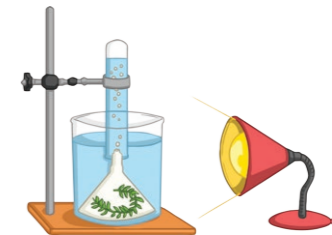
Keywords: cellulose, nitrate, starch, amino acids, respiration, storage, proteins, cell wall, oil, fat, protein synthesis

Explain how the amount of chlorophyll in a leaf affects the rate of photosynthesis.
 The less chlorophyll in a leaf, _____

Give two reasons there may be less chlorophyll in the leaf.

1. _____
2. _____

The illustration shows a method for investigating the effect of light intensity on photosynthesis.



How could you measure the rate of photosynthesis using this equipment?

Circle the independent variable in this experiment from the list below.

- Number of bubbles;
- volume of gas;
- distance of the lamp from the pondweed;
- volume of water;
- temperature of the water.

We often add a heat shield to the apparatus shown, what is the purpose of this?
 To absorb any _____ given off by the _____ so that we can control the _____ of the pondweed.

Why do we need to control some variables in an experiment?
 To make sure it is a _____ and so that we can collect _____ results.

Respiration is an exothermic/endothermic reaction that takes place in the _____ of cells.

The more active a cell is, the more mitochondria it needs. Name two cell types that have lots of mitochondria.

Respiration transfers _____ into a form we can use for living processes.

Join the type of respiration to the correct definition to show how respiration can take place.

aerobic

without oxygen

anaerobic

using oxygen

Complete the word equation for aerobic respiration.

glucose + _____ → _____ + _____

Complete the formula equation for aerobic respiration.

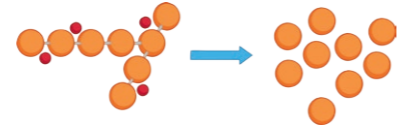
$C_6H_{12}O_6 + \text{_____} \rightarrow \text{_____} + \text{_____}$

Give three reasons that organisms need energy.

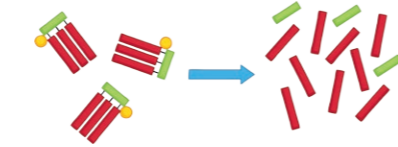
1. For c_____ r_____ that build bigger m_____.
2. For m_____.
3. For keeping w_____.

The illustrations show the macromolecules in the foods that we eat. Put the keywords into the correct boxes to identify the molecules they are broken down into.

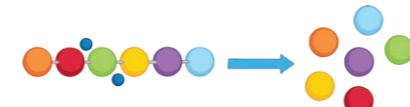
Keywords: fatty acids, sugars/glucose, amino acids, glycerol



carbohydrates



lipids



proteins

The small dots on each of the larger molecules represent the catalysts that help to break down the food. What are these called?

Why is respiration important in this process?

The e_____ need the e_____ that is r_____ from respiration to carry out their job.

Complete the word equation for anaerobic respiration in plant and yeast cells.

_____ → _____ + _____

What is anaerobic respiration in yeast called?

Why does this process have economic importance?

What is metabolism?

The sum of all the _____ in a cell, or the body.

Metabolism includes the synthesis of new molecules. Complete the sentences to identify some of the molecules that are made in plant and/or animal cells.

1. Glucose is converted to s_____, g_____ and c_____.
2. Glycerol and _____ molecules of fatty acid are used to form _____.
3. Glucose and n_____ ions are used to form _____, which are used to form _____.

What happens to excess proteins in the body? They are broken down to form u_____ for excretion.

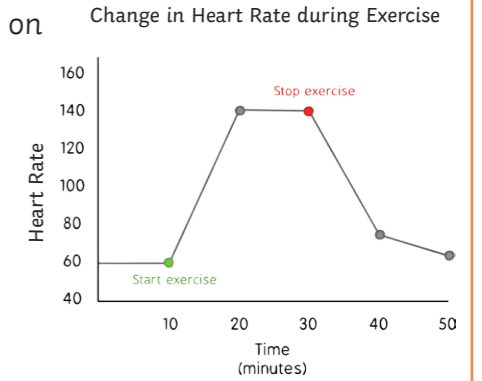
Explain what happens to your heart rate when you exercise.

- Your heart rate _____ so that _____ oxygenated blood is carried to your muscles.
- Therefore, more _____ and _____ reach the cells.
- The rate of _____ can increase to transfer more _____ for muscle _____.
- _____ is removed from the muscles at a faster rate.

Explain what happens to your breathing rate when you exercise.

- Your breathing rate and breath volume _____.
- The rate at which _____ is brought into your body is _____.
- The rate at which _____ is removed is _____.
- This means more _____ is available to be transported to cells for _____.

The graph shows the effect of exercise on heart rate.



How long did the person exercise for?

How much did their heart rate increase during exercise?

When does anaerobic respiration happen?

Complete the word equation for anaerobic respiration in muscles.

_____ → _____

Why is anaerobic respiration not as efficient as aerobic respiration?

Explain what happens to your muscles during long periods of vigorous activity.

There is a build up of _____ which contributes to muscle f_____.

Muscles stop _____ effectively.

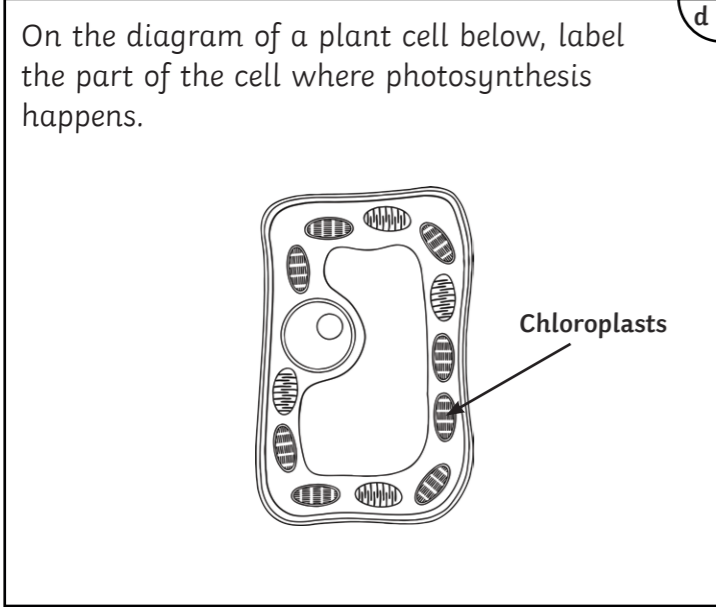
An o_____ d_____ is created.

Complete the word equation for photosynthesis.
sunlight
carbon dioxide + water → oxygen + glucose

Join the chemical formula to the correct chemical name.

CO ₂	oxygen
H ₂ O	glucose
O ₂	carbon dioxide
C ₆ H ₁₂ O ₆	water

Choose the correct answer:
 Photosynthesis is an exothermic/**endothermic** reaction.
 Fill in the blanks:
 In photosynthesis, **energy** is transferred from the **environment** to the **chloroplasts** by **light**.



Draw a line on the graph to show how temperature affects the rate of photosynthesis.

Rate of Photosynthesis

Temperature

Explain how temperature affects the rate of photosynthesis.
 As the temperature increases, the rate of photosynthesis **increases**. When the temperature gets too high, the enzymes that control photosynthesis **denature** and the rate of photosynthesis **decreases**.

Draw a line on the graph to show how carbon dioxide affects the rate of photosynthesis.

Rate of Photosynthesis

Carbon Dioxide Concentration

Describe how carbon dioxide affects the rate of photosynthesis.
 Increasing the concentration of carbon dioxide will **increase** the rate of the photosynthesis until **another factor limits the rate**.

How does the rate of photosynthesis affect the biomass of a plant?
The more photosynthesis, the more biomass the plant makes, so the faster it grows.

Draw a line on the graph to show how light intensity affects the rate of photosynthesis.

Rate of Photosynthesis

Intensity of Light

Describe how light intensity affects the rate of photosynthesis.
 Increasing light intensity **increases** the rate of photosynthesis until **another factor limits the rate**.

Use the keywords to complete the five ways that glucose produced in photosynthesis could be used.

- For **respiration**.
- Converted into insoluble **starch** for **storage**.
- Used to produce **fat** or **oil** for **storage**.
- Used to produce **cellulose**, which strengthens the **cell wall**.
- Used to produce **amino acids** for **protein synthesis**. To produce **proteins** plants also need **nitrate** ions that are absorbed from the soil.

Keywords: cellulose, nitrate, starch, amino acids, respiration, storage, proteins, cell wall, oil, fat, protein synthesis

Explain how the amount of chlorophyll in a leaf affects the rate of photosynthesis.
 The less chlorophyll in a leaf, **the less photosynthesis**.
 Give two reasons there may be less chlorophyll in the leaf.
 1. **If the plant has diseases, like tobacco mosaic virus or rose black spot.**
 2. **If the plant does not have enough minerals, like magnesium.**

The illustration shows a method for investigating the effect of light intensity on photosynthesis.

The illustration shows a glass beaker containing pondweed (Elodea) submerged in water. A funnel is placed over the plant, and a test tube is inverted over the stem of the funnel to collect gas bubbles. A lamp is positioned to the right, shining light on the setup.

How could you measure the rate of photosynthesis using this equipment?
Count the number of bubbles released in a given time (e.g. per minute).

Circle the independent variable in this experiment from the list below.

- Number of bubbles;
- volume of gas;
- distance of the lamp from the pondweed;**
- volume of water;
- temperature of the water.

We often add a heat shield to the apparatus shown, what is the purpose of this?
 To absorb any **heat** given off by the **lamp** so that we can control the **temperature** of the pondweed.

Why do we need to control some variables in an experiment?
 To make sure it is a **fair test** and so that we can collect **valid** results.

a

Respiration is an **exothermic**/endothermic reaction that takes place in the **mitochondria** of cells.

The more active a cell is, the more mitochondria it needs. Name two cell types that have lots of mitochondria.
muscle cells, sperm cells, ciliated epithelial cells, phloem companion cells

Respiration transfers **energy** into a form we can use for living processes.

Join the type of respiration to the correct definition to show how respiration can take place.

aerobic	without oxygen
anaerobic	using oxygen

b

Complete the word equation for aerobic respiration.

glucose + **oxygen** → **carbon dioxide** + **water**

Complete the formula equation for aerobic respiration.

$$C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$$

c

Give three reasons that organisms need energy.

- For **chemical reactions** that build bigger **molecules**.
- For **movement**.
- For keeping **warm**.

d

The illustrations show the macromolecules in the foods that we eat. Put the keywords into the correct boxes to identify the molecules they are broken down into.

Keywords: fatty acids, sugars/glucose, amino acids, glycerol

carbohydrates → **sugars/glucose**

lipids → **fatty acids and glycerol**

proteins → **amino acids**

The small dots on each of the larger molecules represent the catalysts that help to break down the food. What are these called?
enzymes

Why is respiration important in this process?
 The **enzymes** need the **energy** that is **released** from respiration to carry out their job.

e

Complete the word equation for anaerobic respiration in plant and yeast cells.
glucose → **ethanol** + **carbon dioxide**

What is anaerobic respiration in yeast called?
fermentation

Why does this process have economic importance?
It is used to make alcohol and bread.

f

What is metabolism?
 The sum of all the **reactions** in a cell, or the body.

Metabolism includes the synthesis of new molecules. Complete the sentences to identify some of the molecules that are made in plant and/or animal cells.

- Glucose is converted to **starch, glycogen** and **cellulose**.
- Glycerol and **three** molecules of fatty acid are used to form **lipids**.
- Glucose and **nitrate** ions are used to form **amino acids**, which are used to form **proteins**.

What happens to excess proteins in the body?
 They are broken down to form **urea** for excretion.

g

Explain what happens to your heart rate when you exercise.

- Your heart rate **increases** so that **more** oxygenated blood is carried to your muscles.
- Therefore, more **oxygen** and **glucose** reach the cells.
- The rate of **respiration** can increase to transfer more **energy** for muscle **contraction**.
- Carbon dioxide** is removed from the muscles at a faster rate.

h

Explain what happens to your breathing rate when you exercise.

- Your breathing rate and breath volume **increase**.
- The rate at which **oxygen** is brought into your body is **increased**.
- The rate at which **carbon dioxide** is removed is **increased**.
- This means more **oxygen** is available to be transported to cells for **respiration**.

i

The graph shows the effect of exercise on heart rate.

How long did the person exercise for?
20 minutes

How much did their heart rate increase during exercise?
80 beats per minute

j

When does anaerobic respiration happen?
When your body can't supply oxygen to the muscles fast enough.

Complete the word equation for anaerobic respiration in muscles.
glucose → **lactic acid**

Why is anaerobic respiration not as efficient as aerobic respiration?
The glucose molecules are not completely broken down, so much less energy is transferred.

k

Explain what happens to your muscles during long periods of vigorous activity.

There is a build up of **lactic acid** which contributes to muscle **fatigue**.

Muscles stop **contracting** effectively.

An **oxygen debt** is created.