

Kirkcaldy High School

N3/4 Science



Food

Name: _____

Class: _____

Teacher: _____

Date: _____

Growing Food

Starter

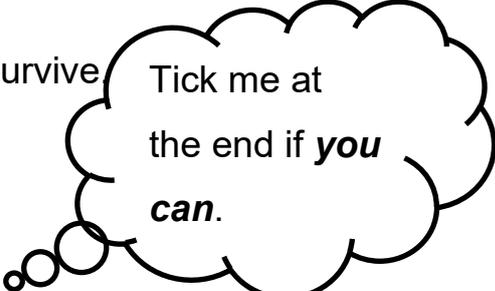
1. List 3 foods you ate yesterday:

- _____
- _____
- _____

2. Where do you think each food came from? (e.g. country, farm, factory)

Learning Intention

- To learn how plants grow and what they need to survive.



Tick me at
the end if *you*
can.

Success Criteria

- I can describe the conditions needed for plant growth.

Note

Plants need _____, _____, and _____, to grow.

Germination Investigation

Aim: To find out what seeds need to grow

Method: Plant seeds in different conditions (light/dark, water/no water, etc.)

Variables: *What do you need to keep the same in each dish?*

Results:

Condition	Did the seed grow?	Observations
Light + Water		
Dark + Water		
Light + No Water		

Conclusion:

Evaluation:

Plenary: Write down, or draw your prediction of what the results will be.

Date: _____

Fertilisers and Food Production

Starter

- Draw a labelled diagram of the experiment you set up last lesson.

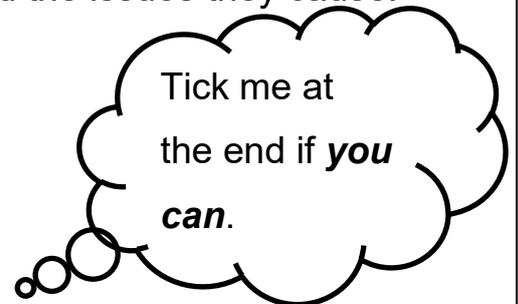


Learning Intention

- To understand how fertilisers help plants grow and the issues they cause.

Success Criteria

- I can name the key nutrients in fertilisers (NPK).
- I can describe the benefits and problems of using fertilisers.



Note

Fertilisers need essential _____ to grow. These are _____ (N), _____ (P), and _____ (K),

Fertilisers Investigation

Aim: What effect do fertilisers have on seed growth?

Method: Plant seeds using different fertilisers.

Results:

Seed	Observations with no fertiliser	Observations with fertiliser
Cress		
Mustard		

Conclusion:

Evaluation:

Plenary: Write, or draw problems that might happen if fertilisers get into rivers.

Problem-Based Learning

Design an advert (could be for a magazine, radio, or TV/YouTube) for a fertiliser. It must include...

- The name of your fertiliser.
- The elements that are in your fertiliser.
- The names of plants that need...
- High nitrogen levels.
- High phosphorus levels.
- High potassium levels.
- A diagram showing the inside of a seed.
- A graph showing fertiliser use in different countries.

Photosynthesis

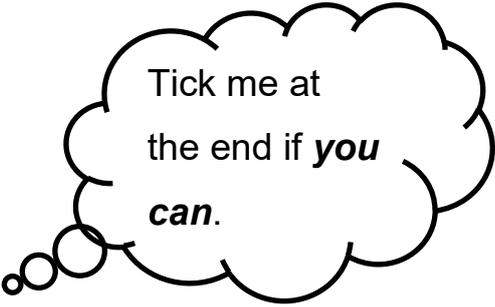
Starter

Learning Intentions

- To identify why plants are vital to sustaining life on earth.
- To describe the process of photosynthesis in terms of raw materials and products

Success Criteria

- I can state why plants are vital to life on earth
- I can describe photosynthesis in terms of raw materials and products



Tick me at
the end if ***you***
can.

Quoting the legendary David Attenborough



The biggest living thing that exists on this planet is a _____, like this giant sequoia tree in _____.

Plants, whether they are _____, like this one, or _____, are the basis of all life, including ourselves.

1

We _____ upon them for every mouthful of _____ that we eat and every lungful of _____ that we breathe.



3

Throughout this forest, plants are competing ferociously with one another to claim the _____. The battle is at its fiercest on the forest floor where only _____ of the sunlight filters through.

2

That fuel is created in a plant's _____, as they soak up the sun. It's a process called photosynthesis. A _____ that is the basis of all life on Earth.

Leaves are covered by thousands of microscopic pores called stomata. When open, they extract _____ from the air, and, using _____ from the sun, combine it with nutrients to build the plant's tissues. And critically for us, the process releases the _____ that we and all animals need in order to breathe.

Missing words:

chemical reaction 2%

light *energy* *leaves* *California depend* *air*

microscopic *carbon dioxide* *plant* *oxygen* *enormous food*

Read over the speech bubbles on the previous page. Your next task will involve two skills:

- Memorising facts
- Understanding information (sometimes called “interpreting”)

Memorising facts:

Question 1: What is the biggest living thing that exist on our planet ?

Question 2: Why are plants important?

Question 3: What is the chemical process that allows plants to make food?

Question 4: What percentage (%) of light filters through the forest?

Understanding information:

Question 5: The process that plants use to make food is an example of a chemical reaction. Chemists call the materials that are needed for a chemical reaction “reactants”. Biologists sometimes call reactants “raw materials”. What might you call the reactants/raw materials in Home Economics?

Question 6: What are the raw materials plants use in photosynthesis?

Question 7: Where does the energy come from for photosynthesis?

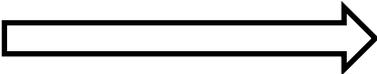
Question 8: Is energy a raw material? Why?/Why not?

Question 9: What we are left with after a reaction takes place is called a "product". What are the two products of photosynthesis?

Question 10: Complete the word equation below to show what you have learned about photosynthesis (the shaded box is for anything extra you want to say about photosynthesis that will impress your teacher!!):

Summary

Photosynthesis Word Equation:

_____ + _____  _____ + _____

Photosynthesis

Starter

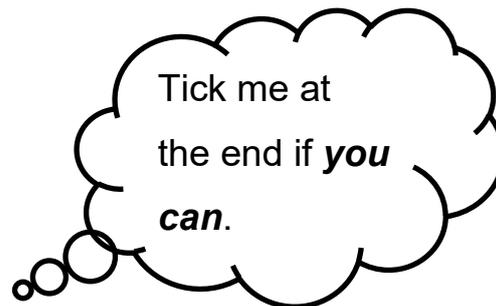
Write down everything you have learnt so far about photosynthesis.

Learning Intentions

- To describe the process of photosynthesis in terms of raw materials and products
- To test leaves for starch

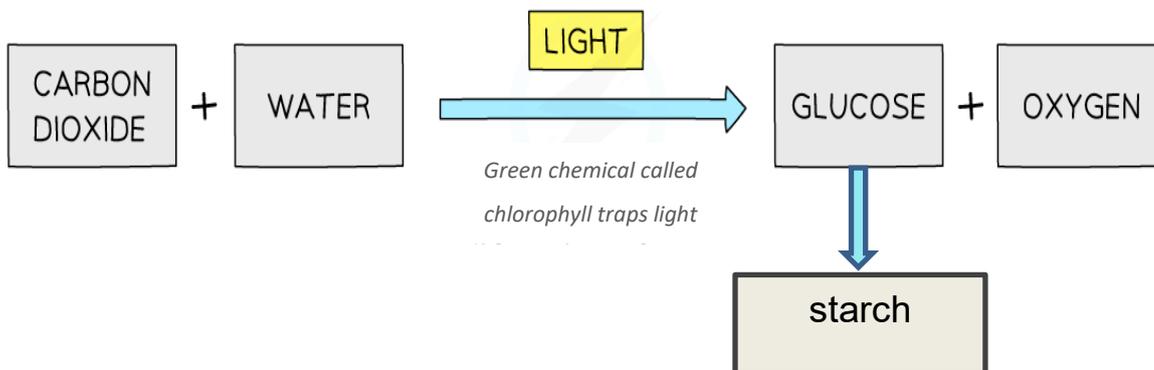
Success Criteria

- I can describe photosynthesis in terms of raw materials and products
- I can predict whether a leaf will, or will not contain starch



Note

When a plant photosynthesises, it produces a sugar called _____. It can't use all of the glucose at once, so it joins the sugar molecules together to make a storage carbohydrate called _____.



Testing Leaves for Starch

We can prove that photosynthesis is taking part in green leaves by testing them for starch.

We use _____. Iodine goes _____ when in the presence of starch.

Aim: _____

Results:

Part of leaf	Starch present?
Green	
White	

Conclusion: _____

Evaluation: _____

Livestock and the Environment

Starter

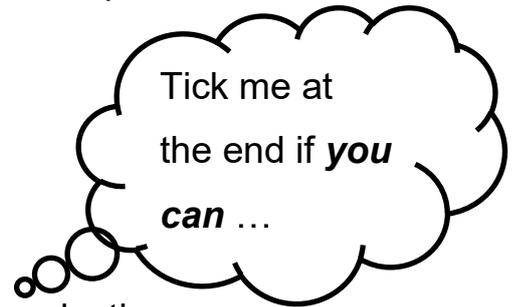
- Write down the three essential nutrients that plants need to grow.
- What are the benefits, and problems with using fertilisers?

Learning Intention

- To explore how animals are raised for food and the impact this has.

Success Criteria

- I can describe how livestock are farmed.
- I can explain the environmental impact of meat production.



Note

There are two types of farming; _____ farming (growing, and selling crops), and _____ farming (breeding, and selling animals)

Task 1: Farming Detectives – Picture Matching Worksheet

Look at each picture. Write the type of farming it shows: Arable, Pastoral, or Mixed.



Task 2: Farming Fact Cards

Copy the table onto a whiteboard, and sort the statements into the categories.

Farming Type	Good Point (👍)	Bad Point (👎)
Organic		
Intensive		
Mixed		

- Better for insects like bees
- Food can cost more to grow
- Uses chemicals to help plants grow fast
- Good use of space
- Helps keep soil healthy
- Animals may be kept in small spaces
- Grows a lot of food quickly
- Can pollute rivers and harm wildlife
- Uses natural fertilisers like manure
- Doesn't use harmful chemicals
- Grows crops and keeps animals
- Can be hard to manage both

Task 3: The Auchenshoogle Challenge

Auchenshoogle needs your help!

Use what you've learned to plan the best kind of farming for the village.

What type of farming should Auchenshoogle choose? (You can mix them!)

Why is it good for the people and animals?

What could be bad about this choice?

How does your farm help the environment?

Draw your farm idea below:

Plenary

Is cattle farming, or plant farming more sustainable? Why?

Global Food Issues

Starter

- Is cattle farming, or plant farming more sustainable? Why?

Learning Intention:

- To understand food shortages and how science can help.

Success Criteria:

- I can describe causes of food shortages.
- I can suggest scientific solutions to food problems.

Task

Research one of the following:

- Drought and crop failure
- Food waste in supermarkets
- GM crops and how they help

Present your findings as:

- Poster
- PowerPoint
- Short Report

Plenary: Discuss the benefits of local and imported food. How can we make more sustainable food choices?

Local vs Global Food

Starter

- Recall the causes of food shortages. How can science help solve these problems?

Learning Intention:

- To compare local and imported food.

Success Criteria:

- I can explain what “food miles” are.
- I can compare the benefits of local and imported food.

Research 5 food items. Where did they come from?

Food Item	Country of Origin	Local or Imported?	Distance from Origin to KHS

Plenary

- Why might local food be better for the environment?

Problem-Based Learning

Make a documentary to be released on “YouTube” about “Food Miles”. It must include...

- 5 foods that can be found within 20 miles of Kirkcaldy.
- 5 foods that have to come from overseas.
- The advantages, and disadvantages of getting food locally.
- The advantages, and disadvantages of getting food from overseas.
- A graph showing the carbon dioxide emissions from transporting food.

Review and Reflection

1. What was the most surprising thing you learned?

2. What changes could you make to your diet to help the planet?

3. What scientific solution do you think is most important for the future of food?

Word Search

I K O L P R I L T N I T R O G E N C
L E R O O T N O R I T R H S P L Y J
O H S E O E P H O S P H O R U S N L
S H E N D D M T S A L P O R O L H C
D N O F B A E A E Y T L N O I A T R
J E D E M S T P D T E P L A N T A H
S G P R C I S R I L X Q S S R S T L
A Y O T S L G O X L S N P E C L N O
E X H I T A O O O Y C T P N L A A I
E O O L B P L T I H X K N U E R V G
T R A I U N L T D P T S O T A E I B
P O I S L X S Q D O H A I R V N E Z
T S H E B I F Q L R Q C C I E I H S
I I N R X P O O K O O O T E S M T I
P O T A S S I U M L A R N N O E R P
L A S P R R E N R H K G O T Q V S H
T C A L C I U M P C N O B R A C R A
R A S I S E H T N Y S O T O H P K T

PLANT
PALISADE
LEAVES
BULB
HAIR
NITROGEN
OXYGEN
MINERALS

PHOTOSYNTHESIS
TAPROOT
STEM
CHLOROPLAST
PHOSPHORUS
CALCIUM
CARBON

CHLOROPHYLL
NUTRIENT
FERTILISER
ROOT
POTASSIUM
IRON
DIOXIDE

Percentages

In this worksheet, we're going to explore the exciting world of percentages in science. Remember, a percentage is a way to express a number as a part of 100. To calculate a percentage, use the formula:

$$\text{Percentage} = (\text{part} \div \text{whole}) \times 100$$

For example, if you have 50 apples and 10 of them are red, the percentage of red apples is

$$\text{Percentage} = (10 \div 50) \times 100 = 20$$

Now, let's apply this to some fun science scenarios!

1. **The Water Bottle:** If 75% of a 100ml water bottle is full, how much water is in the bottle?

2. **Plant Growth:** A plant grew 20% taller over the summer. If it was initially 50cm tall, how tall is it now?

3. **Chemical Solution:** You have a 200ml chemical solution. If 10% of the solution is salt, how much salt is in the solution?

4. **Star Gazing:** Out of 100 stars observed, 25% are red giants. How many red giants were observed?

5. **Recycling:** In a recycling bin, 40% of the items are plastic. If there are 50 items in total, how many are plastic?

6. **Solar Energy:** A solar panel produces 500kWh of energy. If 20% of this energy is used to power a school, how much energy powers the school?

7. **Animal Count:** In a forest, 30% of the animals are birds. If there are 150 animals, how many are birds?

8. **Rain Measurement:** Last week, it rained 60mm. If 25% of this was on Monday, how much did it rain on Monday?

9. **Baking Soda Reaction:** You have 100g of vinegar. If 5% reacts with baking soda, how much vinegar reacts?

10. **Temperature Drop:** The temperature dropped 10% from 30°C. What is the new temperature?

11. **Fossil Findings:** Out of 200 fossils, 35% are of marine animals. How many are marine animal fossils?

Passage

Use the information in the passage to answer the questions.

Type your answers in the boxes provided.



All additives used in foodstuffs must be safe. Many foods go off quickly without the use of preservatives. It is now known that preservatives prevent the growth of micro-organisms, some of which are extremely dangerous.

Most preservatives are simple chemicals and are closely related to natural substances. For example, benzoic acid occurs in several fruits and is widely used in fruit preservation. Sorbic acid, another preservative, is an unsaturated acid found in some plants.

Some preservatives have been used for hundreds of years. For example wood smoke is used to preserve fish. However, wood smoke contains a large number of hydrocarbons, some of which cause cancer.

Adapted from *In the Mix* by Food Additives and Ingredients Association.

(a) Why are preservatives added to food?

(b) Name the unsaturated acid found in some plants.

(c) Which compounds present in wood smoke may cause cancer?

Passage:

Use the information in the passage to answer the questions.

Soil

Different areas of the country have different types of soil. Some areas have clay soil which is heavy to dig, is made of small particles and has a high mineral content. It drains poorly and can easily become waterlogged and it has low air content.



Other areas have sandy soil which has large particles and a low mineral content. It is light to dig, has high air content and drains freely.

Loam soil is also found in some areas. Loam has medium-sized particles, is easy to dig, is rich in organic matter and minerals and has good air content. It doesn't drain too quickly, or become waterlogged.

Use information **in the passage** to answer the following questions.

(i) Complete the table below.

Type of Soil	Ease of Digging	Air Content	
clay		low	small
	easy	good	medium sized
	light		

(ii) Which type of soil becomes easily waterlogged?

(iii) Compare the mineral content of clay soil with that of sandy soil.

The mineral content of sandy soil is

Problem Solving Questions

1. The table below shows information about different varieties of lily.



<i>Variety of lily</i>	<i>Time of first bud appearing</i>	<i>Time of first flower appearing</i>	<i>Time of last flower appearing</i>
Angel's Braid	Mid June	Late June	Early October
Baby Blanket	Mid June	Late June	Mid July
Mexican Siesta	Early June	Early July	Mid July
Milano Maraschin	Early June	Mid June	Early July
Octavian Orchid	Early June	Mid July	Early October

a) In which variety of lily is there one month between the first bud appearing and the first flower appearing?

b) Which variety of lily has flowers for the longest time?

c) How many varieties of lily would be expected to have flowers in late June?

2. The table below shows the number of new plants growing on five spider plants and five Mother of Thousands plants.

<i>Type of plant</i>	<i>Number of new plants</i>				
	<i>Plant 1</i>	<i>Plant 2</i>	<i>Plant 3</i>	<i>Plant 4</i>	<i>Plant 5</i>
Mother of Thousands plant	12	19	15	8	36
Spider plant	2	8	5	3	2

Which of the following shows the **average** number of new plants on each type of plant? (Tick the correct line)

	<i>Average number of new plants</i>	
	<i>Mother of Thousands plant</i>	<i>Spider plant</i>
A	4	18
B	18	4
C	20	90
D	90	20

3. Energy

Nearly all of the energy used in the world comes from burning fossil fuels. Coal provides 31% of the world's energy. The second largest source of energy is oil which provides 26%. Another 19% of the world's energy comes from natural gas. Renewable energy sources provide 20% of the world's energy needs.

- Use the information above to complete this table:

Source of energy	Percentage of the world's energy (%)

