

LCA



EDUCOOT



Basic Horticulture

SAMPLE!

www.educoot.org

Contents

Note to Students
Background Information

PLANT PHYSIOLOGY AND GROWING MEDIA

- A. Main Parts of a Plant & Their Functions
- B. Flowers
- C. Seeds
- D. Roots
- E. Leaves
- F. Stems
- G. Monocots and Dicots
- H. Photosynthesis
- I. Respiration
- J. The Function and Use of Fertilisers
- K. Growing Media
- L. Making Compost
- M. Evaluation

Checklist



PROPAGATION METHODS

- A. Dormancy
- B. Treatments to Overcome Seed Dormancy
- C. Requirements for Seed Germination
- D. Taking Care of Seedlings
- E. Plant Propagation
- F. Other Methods of Propagation
- G. Artificial Methods of Plant Propagation
- H. Propagating a Cutting
- I. Hydroponics
- J. Garden Pests

Checklist



SOIL FORMATION, COMPOSITION AND FERTILITY

- A. Soil
- B. Weathering Agents in the Formation of Soil
- C. Living and Non-living Parts of Soil
- D. Characteristics of a Fertile Soil
- E. Good Soil Management
- F. Irish Soils

Checklist

GARDEN TOOLS & EQUIPMENT

- A. Everyday Garden Tools
- B. Gardening Safety

Checklist



Mapping of Learning Outcomes

Copyright © 2021 Janna T Kearney, Educoot

A. Main Parts of a Plant & Their Functions

1. Read: The basic parts of most land plants are roots, stems, leaves, flowers, fruits, and seeds.

Roots anchor the plants in the soil and absorb nutrients and water that are needed by the rest of the plant.

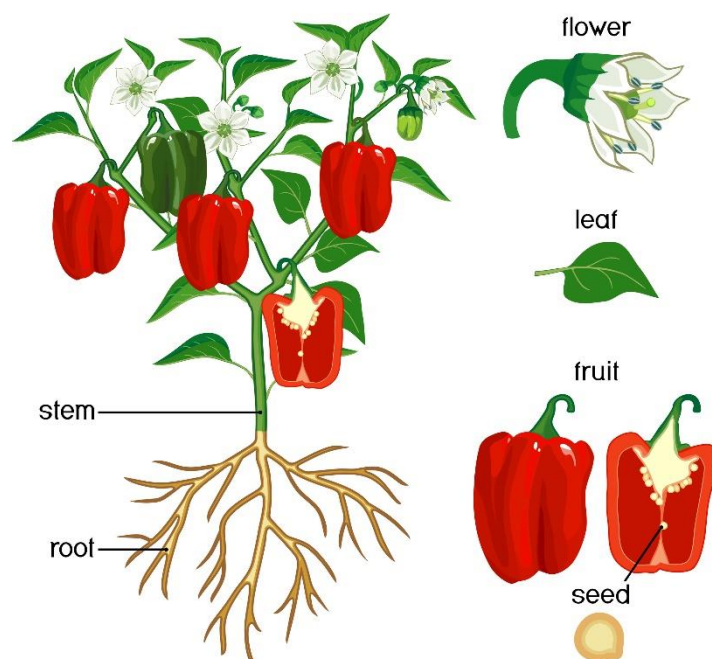
Stems support the upper part of the plant and act as a transport system for nutrients, water, sugar, and starches. Photosynthesis can occur in the stem of some plants such as: cacti, celery, asparagus, and bananas.

Leaves are the parts of the plant where photosynthesis usually occurs—where food for the plant is made. The green substance, chlorophyll, captures light energy and uses it to convert water and carbon dioxide into plant food and oxygen.

Flowers are the reproductive part of plants. They often have showy petals and fragrances to attract pollinators such as birds, bees, and other insects.

Fruits are the fleshy substances that usually surround seeds. They protect the seeds and attract animals to eat them. This helps in seed dispersal.

Seeds contain plant material that can develop into another plant. This plant material is called an embryo. Seeds are covered with a protective seed coat and have one or two cotyledons. Cotyledons are the food for the baby plant until it can make its own food from light and are often the first embryonic leaves of the plant.



2. Complete the sentences:

chlorophyll, seeds, water, Flowers, photosynthesis, anchor

Roots plants in the soil and absorb nutrients and water.

Stems support the upper part of the plant and act as a transport system for nutrients, , sugar, and starches.

Leaves are the parts of the plant where usually occurs—where food for the plant is made.

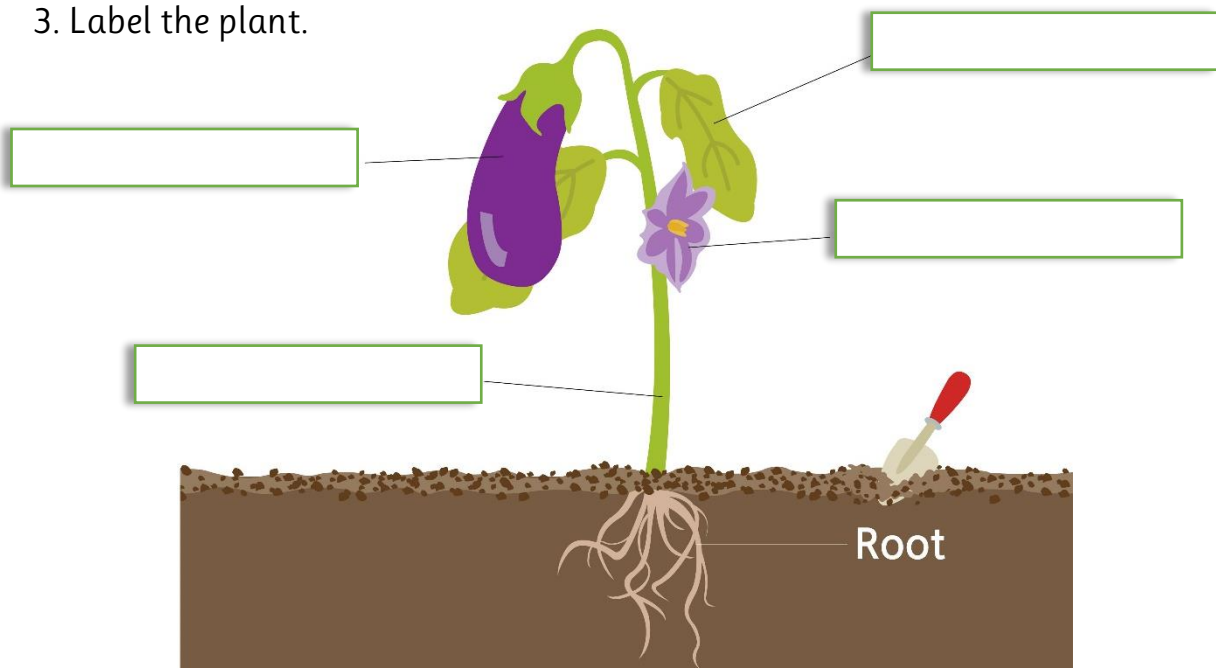
The green substance, , captures light energy and uses it to convert water and carbon dioxide into plant food and oxygen.

are the reproductive part of plants.

Fruits are the fleshy substances that usually surround

.

3. Label the plant.



9. Follow the instructions.

EXPERIMENT: PLANT DISSECTION

Carry out this experiment and fill in the experiment report over the page. Describe the parts of the flower you dissected and any observations you had.

Title: Dissecting a flower

What you need:

● Any flowers with large parts work really well, for example:

- Lily
- Iris
- Daffodil
- Tulip



● Paper plates or sheets of cardboard

● Magnifying glass

● Tweezers

● Scissors



Instructions:

A. Lay your flower out over a paper plate, tray or sheet of cardboard.

B. Label areas of the different parts of a flower on your piece of cardboard or paper plate and place the dissected pieces with the correct label.

C. Try to find / label the following flower parts:

- Root - carries water and nutrients from the soil to the plant and keeps it anchored in the ground.
- Petal - often brightly coloured to attract insects
- Leaf - uses energy from sunlight to photosynthesise creating oxygen and sugars for the plant to use for energy
- Pollen - pollen is a fine powdery substance which contains the male reproductive cells. It is produced by the anthers of seed bearing plants.
- Stem - a plant stem transports water and nutrients from the soil to the



rest of the plant. The stem supports the leaves and flowers allowing them to be raised above the ground to be in the light.

D. Challenge: Can you find a stigma and anther and an ovule and ovary?



Science Experiment

Title: _____

Date: _____

1	PURPOSE

4	RESULTS

2	MATERIALS

5	CONCLUSION

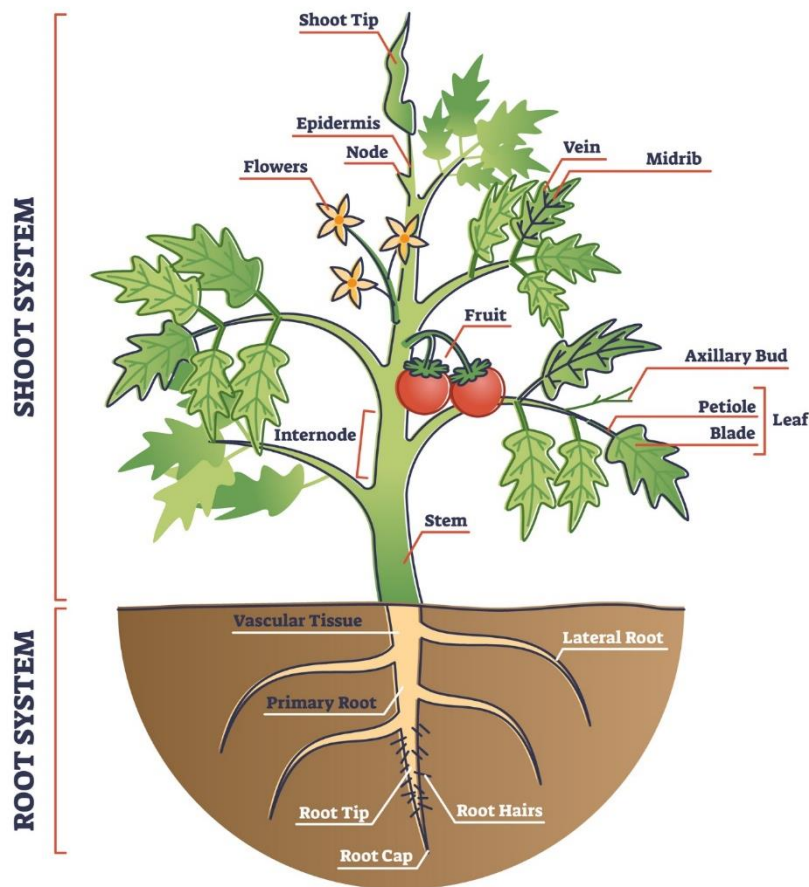
3	PROCEDURE

6	YOUR COMMENT/S

Rate the success of your experiment.



4. Read the labels on the diagram.



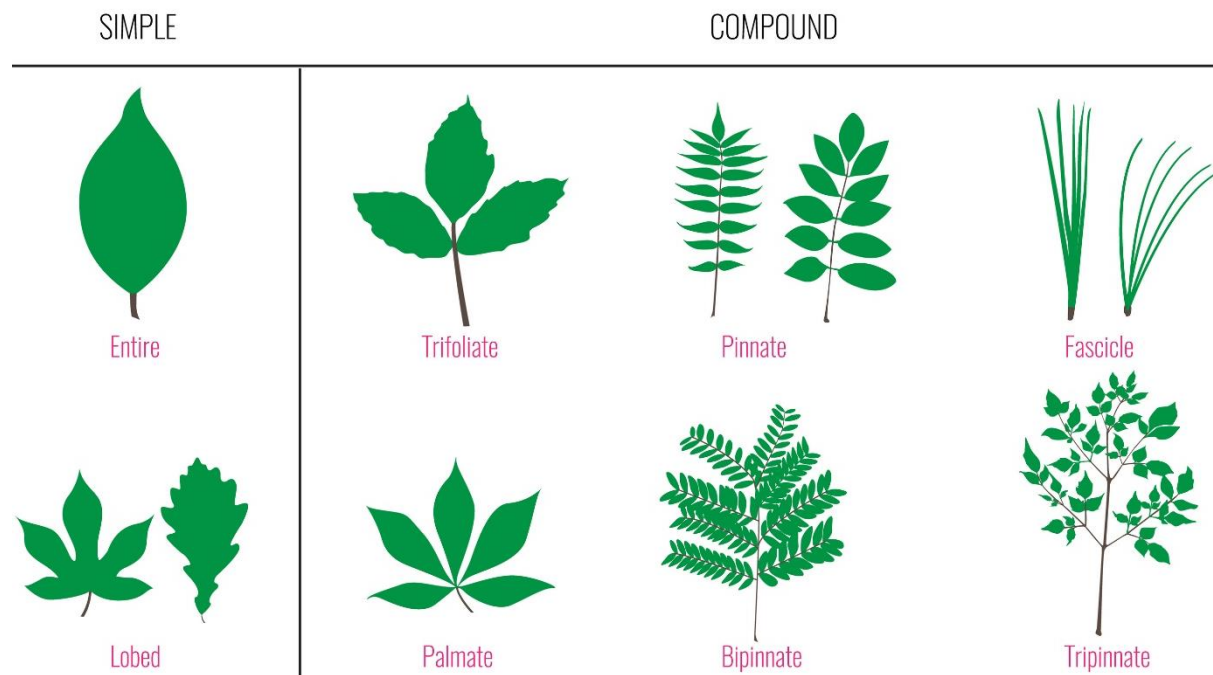
5. Read: The roots of many plants can be eaten. Many of these edible roots are known as root vegetables. They are full of nutrients, such as vitamins, protein, and fibre. Root vegetables include carrots, beets, turnips, radishes, and sweet potatoes.

6. What is a root tip?

7. What protects the root as it pushes through the soil?

8. For how long do roots grow?

8. Look at the types of leaves.



9. Are these leaves simple or compound?



J. The Function and Use of Fertilisers

1. Read: A fertiliser is a chemical or natural substance added to soil or land to increase its fertility.

WHAT IS FERTILISER?

There are 17 elements that are known to be essential for plant growth and development.

Fertilisers (also called plant food elements) are materials produced to supply these elements in a readily available form for plant use.



WHY FERTILISE?

Soils need fertility maintenance. Soil is a natural body of finely divided rocks, minerals and organic matter. Sand, silt, clay and organic matter help provide tilth, necessary aeration and favourable water intake rates, but they seldom maintain adequate plant food to sustain continuous healthy plant growth.

2. Answer the questions:

a) What is fertiliser added to?

b) How many elements are essential for plant growth and development?

c) Why is it often necessary to use fertiliser?

3. Research:

Name 2 types of fertiliser available in Ireland.

SOURCE

4. Write the chemical symbols for the ingredients.

AIR AND WATER	Symbol	SOIL & FERTILISER	Symbol
Carbon		Magnesium	
Oxygen		Phosphorus	
Hydrogen		Potassium	
		Molybdenum	
		Sulphur	
		Copper	
		Zinc	
		Iron	
		Chlorine	
		Calcium	
		Boron	
		Nickle	
		Nitrogen	
		Manganese	

5. Read:

FUNCTIONS OF THE 14 ELEMENTS

Nitrogen (N)

- Promotes rapid vegetative growth (leaf and stems), quickening recovery after mowing
- A vital element in the formation and function of chlorophyll - the key ingredient causing the green colour
- Synthesises amino acids which in turn form protein
- Regulates the uptake of other nutrients
- Basic ingredient of vital compounds - Nucleic acid and enzymes

Phosphorus (P)

Stimulates early root formation and growth - gets plants off to a good start and forms a root filter



6. Follow the instructions.

EXPERIMENT: EVALUATING GARDEN COMPOST

Carry out this experiment and fill in the experiment report over the page. Only write up the report once the compost is ready to use. This experiment could be carried out over a few months.

Title: Evaluating garden compost

What you need:

(All available from your garden or kitchen)

- Greens (wet), fruit and vegetable peelings, grass clippings, coffee grounds, green plant cuttings, annual weeds
- Browns (dry), leaves, hay and straw, paper and cardboard, cut up woody prunings, eggshells, teabags, sawdust
- Composting bin/s (optional) or suitable containers
- Seedlings or small plants



Don't add these - cooked meat and bones, fatty food waste, whole eggs, dairy products, treated wood, ash from coal fires

Instructions:

- Find a space in the garden where you can make a heap, on soil rather than paving if possible. Or you could buy a ready-made composting bin or use suitable containers.
- Whenever you have any garden waste, or uncooked kitchen waste throw it on top. (Ideally there'll be a mixture of layers of green and brown)
- Check occasionally to make sure it's not too wet or dry. It should be damp but not dripping. If it's too wet fork in some dry browns, if it's too dry turn the hosepipe on it.
- After about 6 months the pile should have rotted down to a brown crumbly mixture that can be added to the soil in the garden/plant pots. If it isn't rotting down, it may need more air so try poking and lifting the compost with a garden fork to introduce oxygen into the mix.
- Plant your seedlings or small plants, using your own compost.
- At the same time, use three other growing media and plant the same seedlings or small plants.
- Take care of all your plants and test the growing mediums to see which are the best.



Science Experiment

Title: _____

Date: _____

1	PURPOSE

4	RESULTS

2	MATERIALS

5	CONCLUSION

3	PROCEDURE

6	YOUR COMMENT/S

Rate the success of your experiment.



6. Follow the instructions.

EXPERIMENT: EVALUATING GARDEN COMPOST

Carry out this experiment and fill in the experiment report over the page. Only write up the report once the compost is ready to use. This experiment could be carried out over a few months.

Title: Evaluating garden compost

What you need:

(All available from your garden or kitchen)

- Greens (wet), fruit and vegetable peelings, grass clippings, coffee grounds, green plant cuttings, annual weeds
- Browns (dry), leaves, hay and straw, paper and cardboard, cut up woody prunings, eggshells, teabags, sawdust
- Composting bin/s (optional) or suitable containers
- Seedlings or small plants



Don't add these - cooked meat and bones, fatty food waste, whole eggs, dairy products, treated wood, ash from coal fires

Instructions:

- H. Find a space in the garden where you can make a heap, on soil rather than paving if possible. Or you could buy a ready-made composting bin or use suitable containers.
- I. Whenever you have any garden waste, or uncooked kitchen waste throw it on top. (Ideally there'll be a mixture of layers of green and brown)
- J. Check occasionally to make sure it's not too wet or dry. It should be damp but not dripping. If it's too wet fork in some dry browns, if it's too dry turn the hosepipe on it.
- K. After about 6 months the pile should have rotted down to a brown crumbly mixture that can be added to the soil in the garden/plant pots. If it isn't rotting down, it may need more air so try poking and lifting the compost with a garden fork to introduce oxygen into the mix.
- L. Plant your seedlings or small plants, using your own compost.
- M. At the same time, use three other growing media and plant the same seedlings or small plants.
- N. Take care of all your plants and test the growing mediums to see which are the best.



Science Experiment

Title: _____

Date: _____

1	PURPOSE

4	RESULTS

2	MATERIALS

5	CONCLUSION

3	PROCEDURE

6	YOUR COMMENT/S

Rate the success of your experiment.



A. Other Methods of Propagation

1. Follow the instructions.

EXPERIMENT: GROWING CARROT TOPS

Carry out this experiment and fill in the experiment report over the page. Only write up the report after a given amount of time – ask the teacher.

Title: Growing from carrot tops

What you need:

- Carrots with green on the top
- Saucer
- Water



Instructions:

- Select fresh carrots (not baby carrots) that have a little green on the top.
- Cut off the top 5 cm from the crown of one or more carrots.
- Place the tops in a shallow saucer, cut side down.
- Add water so that half of the carrot top is submerged in the water.
- Place the saucer on a windowsill where it will get light.
- Add water to the saucer as needed to keep the tops from drying out.
- The carrot tops will sprout in about 1-2 weeks.
- Also: You can grow celery and spring onions. Cut the celery off near the base and the spring onions just near the green line and sit the bottoms in water.
- Also: You can grow sweet potato and avocado. Both should be suspended in water using toothpicks.



*Growing
spring onions
from scraps
and an
avocado
from seed*



Science Experiment

Title: _____

Date: _____

1	PURPOSE

4	RESULTS

2	MATERIALS

5	CONCLUSION

3	PROCEDURE

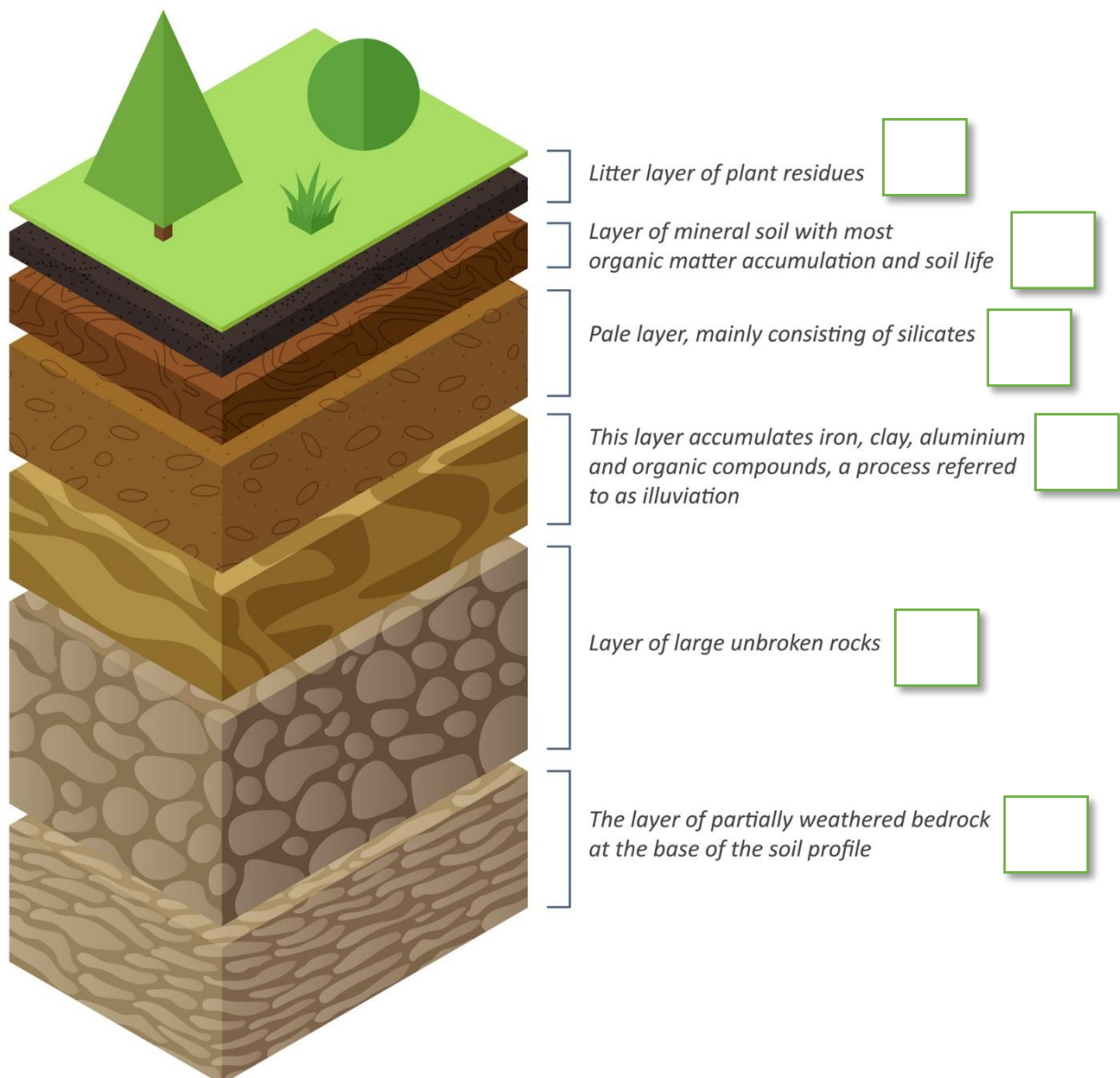
6	YOUR COMMENT/S

Rate the success of your experiment.



A soil horizon is a layer parallel to the soil surface whose physical, chemical and biological characteristics differ from the layers above and beneath. Horizons are defined in many cases by obvious physical features, mainly colour and texture.

2. Label the horizons. Write the letters.



3. Read:

WHAT SOIL IS MADE OF

Soil is made of four things:

- It has rock pieces and the rocks are made of minerals,
- It has dead and living things (organic matter, humus).
- It has water.
- It has air.



4. Complete the sentences:

living, roots, rain, plant, air, water, minerals, left,

- a) Soil has rock pieces made small by wind, , sun and snow.
- b) The rocks are made of minerals and some of the minerals dissolve in water. Some of the dissolved in water can be used as food by plants.
- c) Soil also has dead and things (organic matter) in it.
- d) When a plant dies, it is eaten by animals including bacteria in the soil. When the bacteria are done eating, what is behind is called humus.
- e) When the bacteria die, the food (minerals) goes back into the soil. A food for plants is called a "plant nutrient".
- f) Soil has many empty spaces. Half of the soil is space. The spaces are filled with water and . Water can enter the spaces in the soil.
- g) Plants 'drink' the water and the minerals in the .
- h) Plant roots need air to live. If plant roots do not have air, the roots will die. If the plant die, the plant will die. A plant that dies is eaten by bacteria and becomes plant nutrients again.

B. Gardening Safety

1. Read these gardening safety tips:

- Before use, always inspect garden tools for defects or damage (e.g., splintered, loose, bent, or cracked tool handles, worn tool teeth, etc.). If a tool fails your inspection, remove it from use.
- If you are a first-time gardener, take instruction from more experienced gardeners on how to use various tools.
- Wear personal protective equipment (PPE) to suit the gardening task and weather conditions, e.g. hat, long-sleeved shirt, long pants, gloves, sunglasses, closed-toed shoes, and sunscreen.
- Use eye protection when the tool makes flying, crumbling, chipping, sparking, or splintering debris.
- Make sure you keep yourself hydrated.
- When gardening in warm weather, take frequent breaks in the shade.
- Keep the cutting edges of garden hand tools sharp. When cutting, always cut away from the body.
- Always use the proper tool for the job.
- Follow all product label instructions, including those for PPE use, e.g. when using pesticides or fertilisers.
- Rotate gardening tasks frequently to reduce repetitive motions, which can cause Repetitive Strain Injury. (RSI)
- Stand with your back straight when using long-handled garden tools such as hoes, rakes, and spades.
- Protect your back when picking up heavy items by using the correct lifting method, by maintaining a straight back, bending your knees, firmly grasping the object, and slowly lifting with your legs.
- Avoid using tools above your shoulder height.
- Use an insect repellent when biting or stinging insects are present in the garden.
- Do not fool around with garden tools.
- Dig with a hand trowel or other tool and gloves instead of using your bare hands.
- When finished, clean garden tools and store in their proper locations.



2. Answer the questions:

a) Describe PPE that might be used when gardening.

b) Describe 2 safety tips for when you use sharp tools in the garden.

c) What is RSI and how can it be prevented?

d) Why should you inspect tools before using them?

e) What should you do with garden tools when you have finished using them?



Mapping of Learning Outcomes

- Unit 1: Plant physiology and growing media

1. Identify the main parts of the plant and their functions Pages 8 to 12 (main parts of a flower and their functions), Pages 13 to 18 (flowers), Pages 19 to 22 (seeds), Pages 23 to 27 (roots), Pages 28 to 33 (leaves), Pages 34 to 35 (stems), Pages 36 to 39 (monocots and dicots)
2. Investigate photosynthesis by carrying out a suitable scientific test Pages 40 to 55 (photosynthesis and experiments), Pages 56 to 57 (respiration)
3. Identify the function and use of fertilisers Pages 58 to 64 (function and use of fertilisers)
4. Identify a range of growing media in use today Pages 65 to 72 (growing media)
5. Investigate four different growing media Pages 68 and 69 (investigating growing media)
6. Assemble a growing medium specifically used for the growing of seeds Pages 70 to 72 (making a growing medium), Pages 73 to 81 (making compost) *OR students make alternative media and write their own information and/or experiments, Page 82 (evaluation of own growing media)*
7. Evaluate the various methods of making garden compost from garden and household waste Pages 73 to 81 (making and evaluating compost)

- Unit 2: Propagation methods

1. Outline three methods used to overcome dormancy Pages 86 to 87 (dormancy), Pages 88 to 92 (treatments to overcome seed dormancy)
2. Demonstrate the general requirements for seed germination Pages 93 to 99 (requirements for seed germination, experiments)
3. Select an appropriate sowing technique suitable for a chosen seed type Page 94 (research, rough template, demonstration, presentation)
4. Test a chosen seed for % germination Pages 95 to 97 (germination test)
5. Care for seedlings using appropriate techniques Pages 98 to 99 (growing a bean), Pages 100 to 106 (taking care of seedlings)

6. Name two artificial methods of plant propagation Pages 107 to 108 (plant propagation), Pages 109 to 111 (other methods of propagation), Pages 112 to 113 (artificial methods of propagation), Pages 119 to 121 (hydroponics)
7. List three plants from which cuttings can be taken Page 113 (plants from which cuttings can be taken)
8. Propagate a named cutting Pages 114 to 118 (propagating a cutting)
9. List the safety precautions to be taken when using rooting powders Page 115 (precautions when using rooting powder, creating a flyer)
10. Pot up and care for a rooted cutting Pages 116 to 118 (propagating a cutting and maintaining it until ready for transplant) *OR students can pot up and care for other rooted cuttings*
11. Suggest how two plant structures could be used as a natural method of propagation Page 115 (describing 2 plant structures)

Extra: Pages 122 to 128 (garden pests)

- Unit 3: Soil formation, composition and fertility

1. State the role of weathering agents in the formation of soil Page 132 (soil), Pages 133 to 140 (weathering agents in formation of soil)
2. List the living and non-living parts of soil Pages 141 to 151 (living and non-living parts of soil, experiments)
3. State the characteristics of a fertile soil Pages 152 to 154 (characteristics of a fertile soil)
4. Name four activities associated with good soil management and demonstrate any one of these Pages 155 to 158 (good soil management)
5. Identify the major Irish soil types and the types of plants they support Pages 159 to 161 (Irish soils)
6. Carry out one scientific investigation related to soil. Pages 147 to 151 (experiments / scientific investigations) *OR students can carry out an alternative investigation given by the teacher*

● Unit 4: Garden Tools and equipment

1. Compile a list of everyday garden tools **Pages 166 to 171 (everyday garden tools)**
2. Demonstrate the safe use of two garden tools **Pages 172 to 176 (gardening safety, storing / cleaning / using a tool safely)**
3. Demonstrate the cleaning and storing of one garden tool **Page 176 to 181 (storing / cleaning / using 2 tools safely)**
4. Identify one motor/electric tool **Page 177 (power tools)**
5. Design a poster highlighting the safe use and storage of a motor/electric tool **Page 177 (power tools, poster)**
6. Draw up a chart on the maintenance of one garden tool. **Page 176 to 181 (storing / cleaning / using 2 tools safely)**