



airfield
a gift of nature

Ecology Workbook

Leaving Certificate Biology





Airfield in Dundrum is Dublin's only working farm that is open to the public. Airfield is now a charitable organisation, established by the Overend family in 1974, for educational and recreational purposes.

Our farm, gardens, café and heritage experience in the Overend family home, offers visitors a wonderful opportunity to enjoy and learn about food, farming and the natural world in a unique and relaxed urban environment.

Airfield's Mission is to inspire people to refresh their connection with food and the land it comes from. We aim to do this by using our farm, gardens and natural surroundings to provide a range of enjoyable experiences and opportunities for active learning.

Airfield – our history informs our future

The Overends were a comfortable middle class Dublin family. Trevor Overend a solicitor, brought Airfield as a summer house in 1894 but decided to make it his family's permanent home several years later.

Both his daughters Letitia and Naomi grew up and remained here until they died. They both were actively involved in the farm and their extensive gardens as well as their many charitable pursuits. As a family they had always been concerned with the welfare of others and as far back as the early 1900s. Naomi, then aged eight, organised a fund-raising fete at Airfield in aid of the National Society for Prevention of Cruelty to Children.



Airfield's story

The Overends were instrumental in establishing the Children's Sunshine Home in 1924 (now the Laura Lynn Foundation) which was then a convalescent home for children suffering from rickets and other diseases caused by malnutrition and poor housing.

Airfield – the new future

Airfield is a charitable organisation, established by the Overend family in 1974, for educational and recreational purposes. With this remit from our benefactors in mind Airfield has been re-designed to facilitate active learning focusing on food, farming and the land.



For example our new food gardens with their pathways through espaliered fruit trees and vegetables are designed to be places of discovery, education and fun. The formal gardens contain ornamental farmstead plans (oregano/artichoke/parsley) where children can share the passion for planting, growing and cooking local seasonal home grown food.

Our food beds have been planted to excite and enthuse children/visitors to grow food and also to show them how our food is grown and what it looks like before we see it on our plate. The same ethos has been applied to the new farmyard.

Here children can see at first hand the animals that provide us with dairy products, meat and clothing materials.



Name _____

Date _____

School _____

Ecosystem _____

Location _____

Introduction

The Ecology of the Farm Ecosystem

(Hedgerow and Grassland)

In your study of Ecology you will have come across the terms *ecosystem* and *habitat*. In this fieldwork you will be studying a Hedgerow habitat which is in a Farm ecosystem. You will identify various flora and fauna which live in this habitat and the factors which influence their occurrence and their ability to survive. The particular hedgerow which you will be investigating borders on a field. So you might find some organisms which are more typical of an open grassland habitat as well.



In the modern world Ecology is becoming one of the most important fields of scientific study. Global warming, climate change and pollution are three threats to maintaining healthy life on earth. Studies of specific habitats such as a hedgerow all contribute to the scientific knowledge that is needed to cope with these threats.

Hedgerows have played a vital role in Ireland. Most natural hedgerows were established about 300 years ago to fence in farm animals and divide fields. Many are still used for these purposes today. They also provide food, shelter and breeding sites for many different species acting as wildlife corridors, and make good windbreaks as they filter the wind rather than block it completely.

Hedgerows consist of four layers – ground layer, field layer, shrub layer and canopy layer. Each layer has a large number of organisms forming a variety of food chains and webs. These illustrate the flow of energy from the sun by photosynthesis in green plants to herbivores and then to carnivores.

You will learn how to use simple keys to identify organisms, some sampling techniques and how to report quantitative measurements that you will record during the investigation.

Use your powers of observation to the full while doing this fieldwork, and be curious to find out as much as you can about the habitat!



Activity I Description of Site (Map and Orientation)

Give a brief description of the site including

Location _____

Weather _____

Ecosystem _____

Habitat _____

Draw a rough sketch map of the site in the space here.

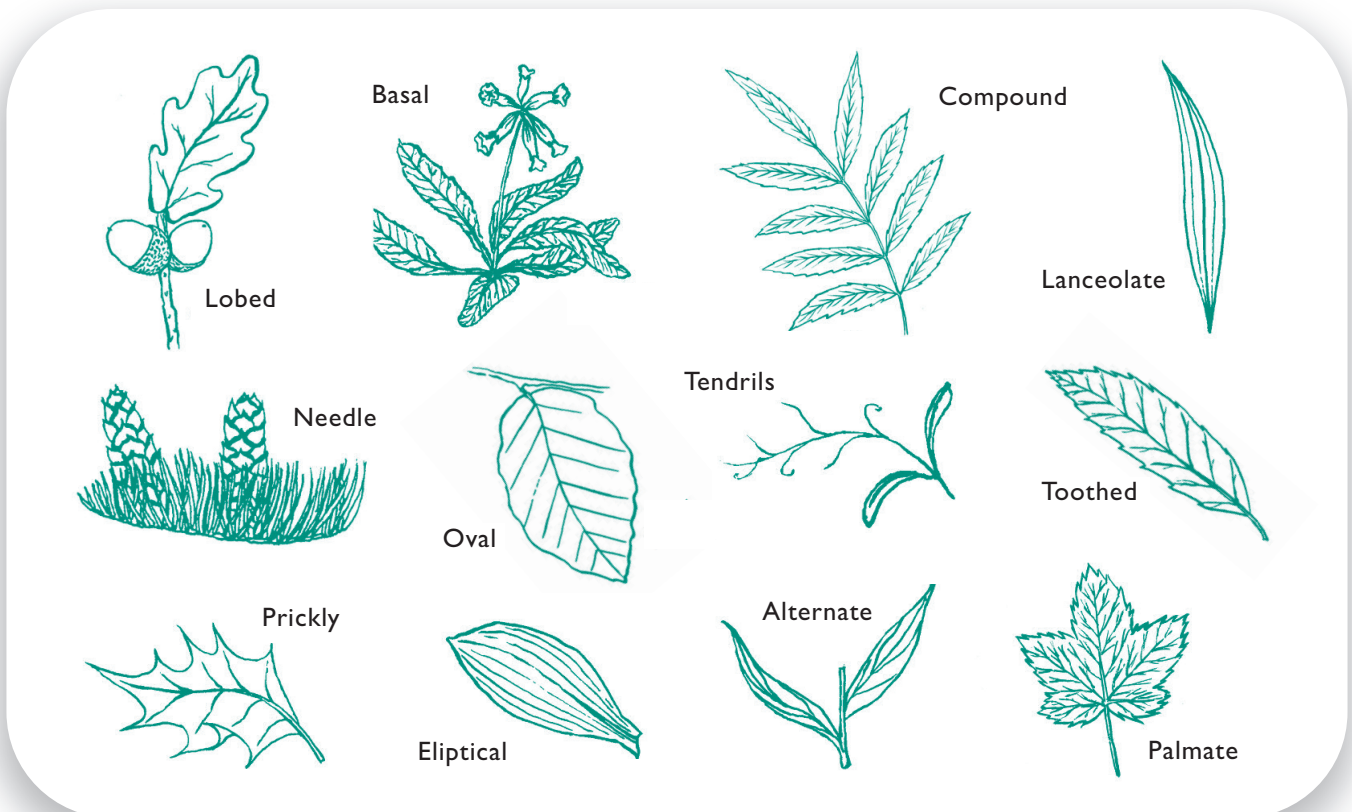
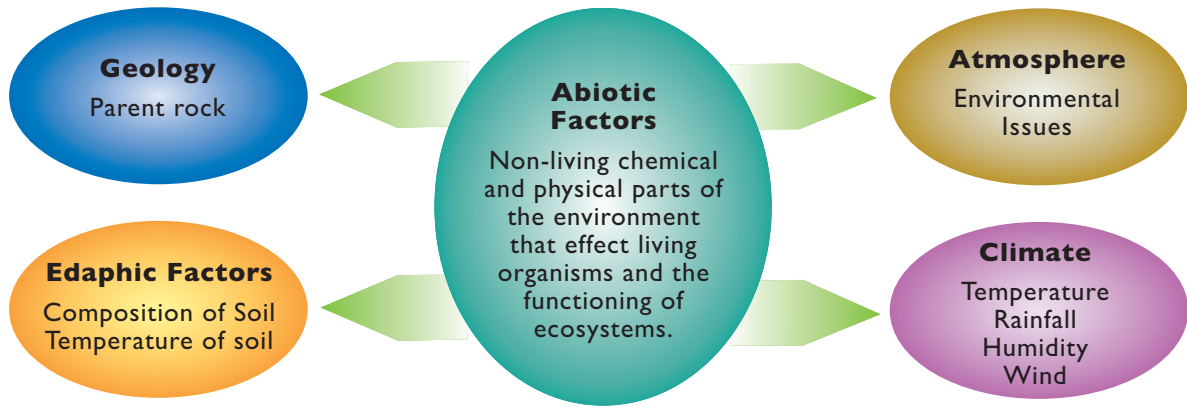
Draw in the boundaries, important features (stones, trees, gates, troughs etc.) and the compass points.



Activity 2 Plant Study

Use the plant identification keys to discover **5** different plants growing in this habitat. Identify one way in which they are adapted for the abiotic factors in this environment.

Number	Flora	A Type of Adaption
1		
2		
3		
4		
5		



Activity 3 Quadrat Study - % Frequency

1. Select the sample area to be studied
2. Select the plants to be counted and list them in the table below
3. Throw your pencil over your shoulder and place the quadrat where it lands
4. Record the presence (or absence) of the selected plant within the quadrat (disregard the internal squares)
5. Repeat steps 3 and 4 at least 10 times across the selected area
6. Calculate the frequency and plot a bar chart of them
7. Comment on your results

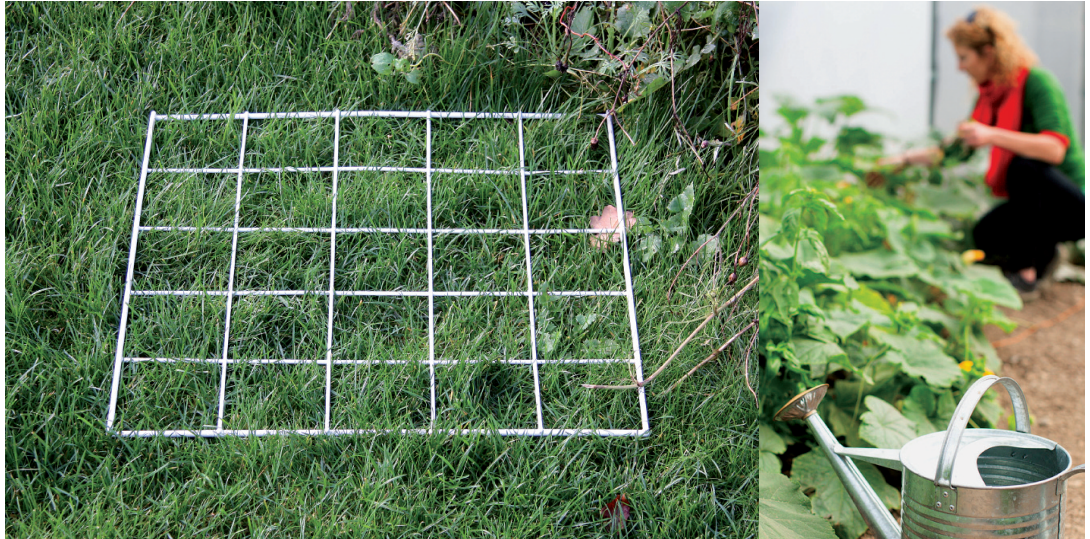
% Frequency:

Total number of hits

Total number of quadrats thrown
x 100

Right: A quadrat being used to measure out the area to be surveyed.

Far right: Airfield's comprehensive growing programme means much time is spent cultivating crops for the coming year.



Quadrat Throws

Organism	1	2	3	4	5	6	7	8	9	10	Total	% Frequency

Turn the page to graph your results and comment on your findings.



Activity 3 Data Analysis

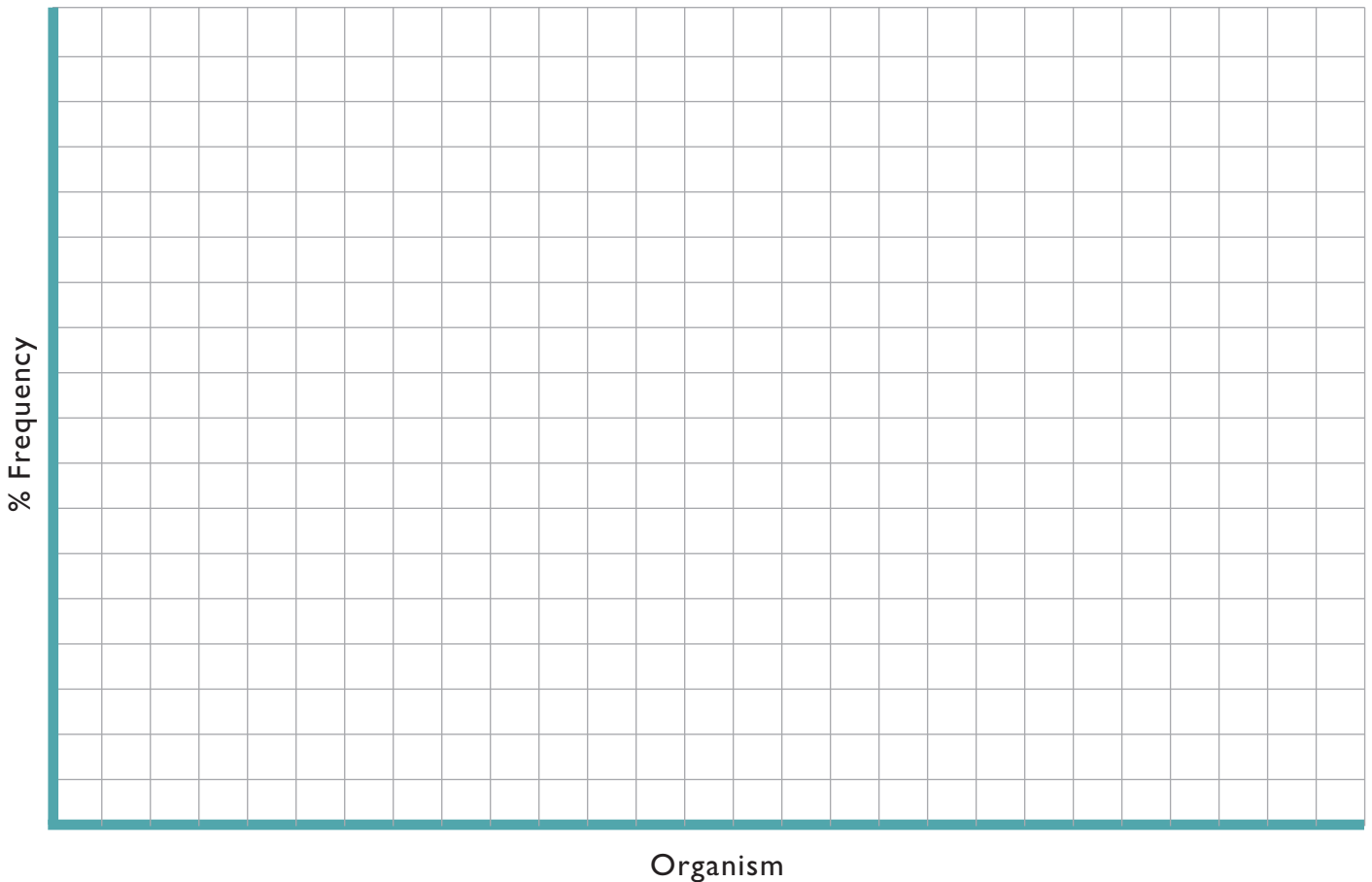
Which plants have the highest frequency? _____

What abiotic and biotic factors influence this finding? _____

Which plants have the lowest frequency? _____

What abiotic and biotic factors influence this finding? _____

What could be a source of error in this experiment _____



Activity 4 Quadrat Study - % Cover

1. Select the sample area to be studied
2. Select the plants to be counted and list them in the table below
3. Throw your pencil over your shoulder and place the quadrat where it lands
4. Look at each sampling point (the crosses of the grid in the quadrat) and note what plants are touching it
5. Count and record the number of hits for each plant
6. Repeat steps 3, 4 and 5 at least 10 times across the selected area
7. Calculate the % cover of the plant and plot this information on a graph

Quadrat Throws

Organism	1	2	3	4	5	6	7	8	9	10	Total Hits	Total Points	% Cover
												360	
												360	
												360	
												360	
												360	
												360	
												360	
												360	
												360	
												360	

36
intersection points
on the quadrat

Total Points:
 $36 \times 10 \text{ throws} = 360$

% Cover:
$$\frac{\text{Total number of hits}}{\text{Total number of points} \times 100}$$





Activity 4 Data Analysis

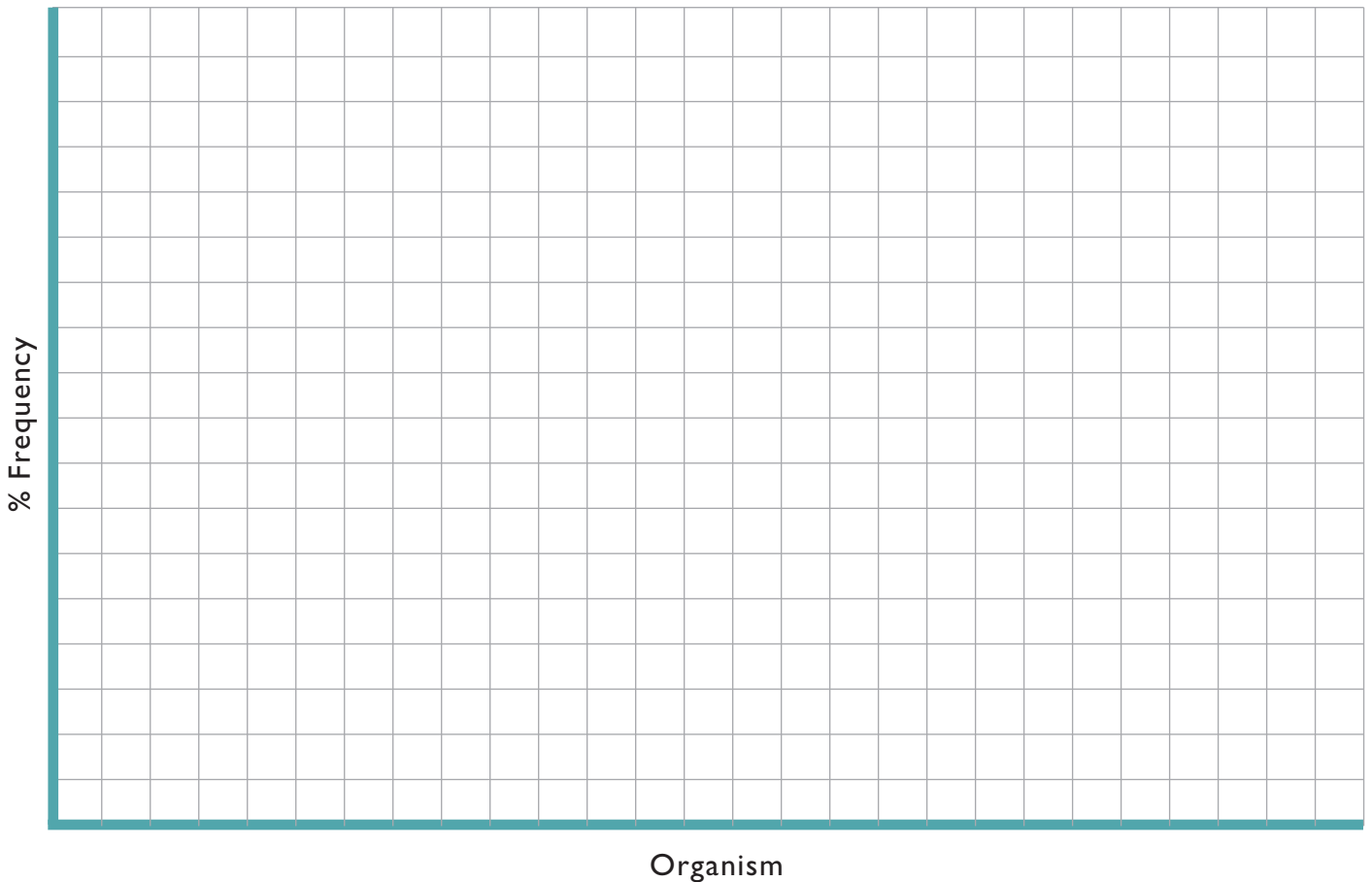
Which plants have the highest cover? _____

What abiotic and biotic factors influence this finding? _____

Which plants have the lowest cover? _____

What abiotic and biotic factors influence this finding? _____

What could be a source of error in this experiment _____



Activity 5 Animal Study

Use the animal identification keys to discover 5 different animals living in this habitat. Identify one way in which they are adapted for the abiotic factors in this environment.

Number	Fauna	A Type of Adaption	Is the organism herbivore, carnivore or omnivore, detritivore
1			
2			
3			
4			
5			



Name and describe some of the equipment used and what they are used for:

Name _____

Use _____

DIAGRAM

Name _____

Use _____

DIAGRAM

Name _____

Use _____

DIAGRAM

Name _____

Use _____

DIAGRAM



Activity 6 Data Analysis

What happens to the light along the transect line? Why? _____

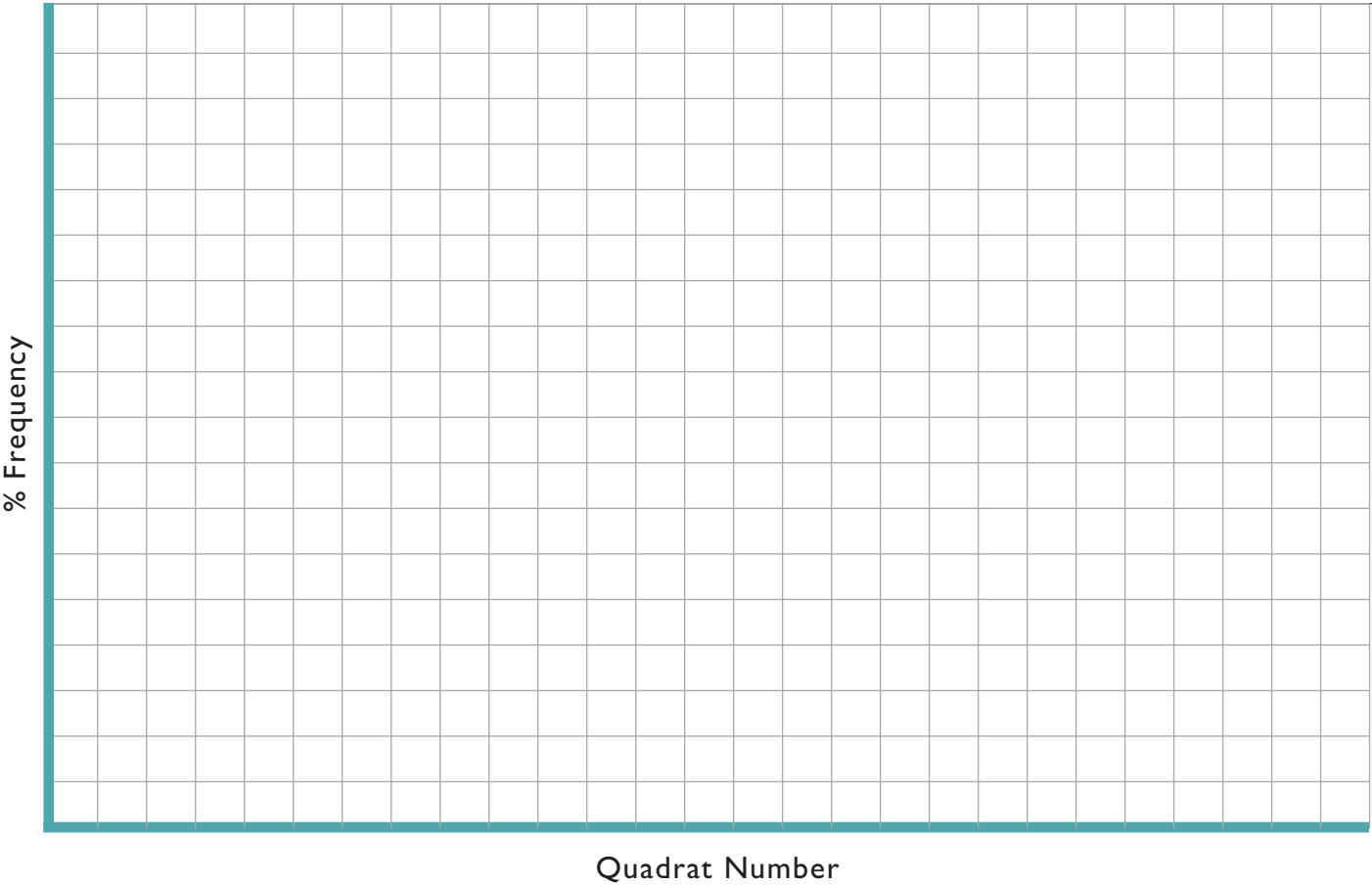
What happens to the soil temperature along the transect line? Why? _____

What happens to the air temperature along the transect line? Why? _____

What happens to the plants along the transect line? _____
Why does this happen? _____

Give an example in relation to a specific plant as to its appearance
or disappearance in relation to the transect line and why this is so.

What could be a source of error in this experiment?

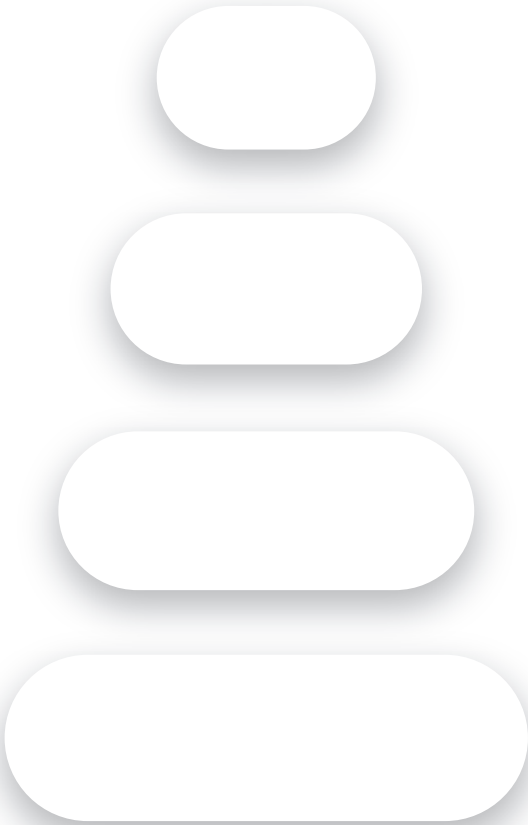




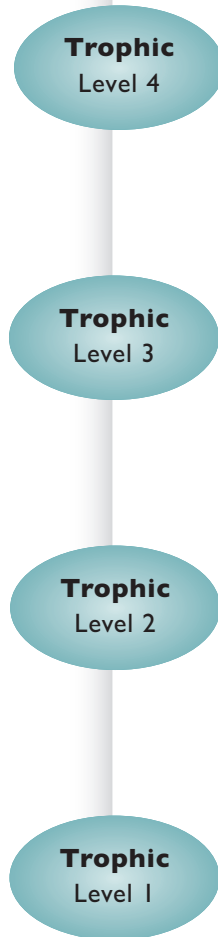
Activity 7 Energy Transfer within the Ecosystem

1. Identify one food chain within this ecosystem
2. Identify a food web within this ecosystem
3. Create a pyramid of numbers for this ecosystem

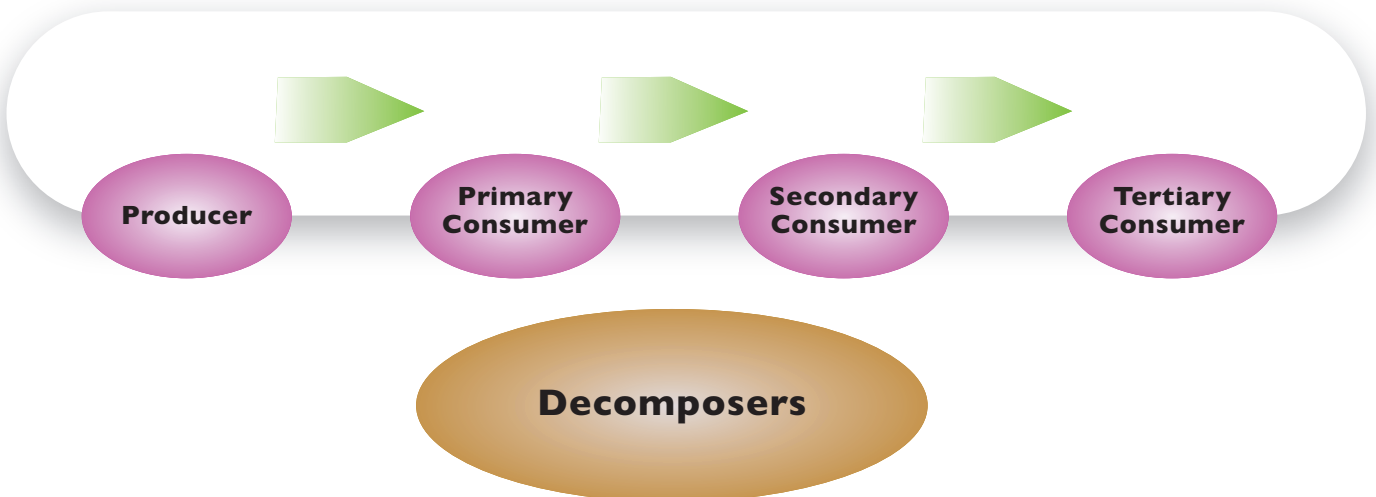
Pyramid of Numbers:



Food Web:



Food Chain:



Glossary

- Abiotic Factors:** Non-living factors affecting organisms in a habitat.
- Adaptation:** Structures and habits that help an organism to survive in their habitat, e.g. primrose flower in Spring before the leaves come back on the trees and cut out light.
- Biosphere:** The parts (NB plural) in and around the earth capable of being colonized by living organisms.
- Biotic Factors:** Living factors affecting organisms in a habitat.
- Community:** The different species interacting with each other and with the environment in an ecosystem.
- Competition:** Organisms compete with each other for a resource that is in short supply ie light, food, water
- Decomposers:** Bacteria and fungi, mainly, who break down and recycle dead organic matter.
- Detritivore:** An organism that that obtains nutrients by consuming detritus (decomposing plant and animal parts as well as feces) e.g. Earthworm
- Ecosystem:** A community of organisms interacting with each other and with the abiotic environment (e.g. woodland, farm, seashore)
- Energy Flow:** The transfer of energy from the sun to an ecosystem and from one trophic level to the next.
- Food Chain:** The series of organisms through which energy and materials pass in an ecosystem. The direction of the arrows is important as it demonstrates the flow of energy in the environment. E.g. Dock leaves → Caterpillar → Blue Tit → Sparrow Hawk.
- Food Web:** A diagram depicting the feeding relationship of all organisms in an ecosystem. It is a series of two or more interlocking food chains.
- Habitat:** A specific area where an organism lives.
- Niche:** The functional role of an organism in the ecosystem i.e. what it eats, what it is eaten by, and how it competes for resources.
- Omnivore:** An organism which feeds at two or more trophic levels e.g. a badger, a rat.
- Population:** A group of the same species interacting with each other and with the environment in an ecosystem.
- Predator:** An animal which kills its prey for food.
- Primary Consumer:** An herbivore – eats plants, e.g. a rabbit, a caterpillar.
- Producer:** A green photosynthetic organism (e.g. plant).
- Pyramid of Numbers:** A diagram showing the numbers of individuals in each trophic level.
- Secondary Consumer:** A carnivore eats animals, e.g. a fox, stoat, thrush.
- Symbiosis:** A close association / relationship between two species where at least one benefits
- Trophic level:** Each feeding stage in a food chain is a trophic level.