

Lesson plan on investigative science

Ecosystems



Ecosystems

Pupils performed less well in the TIMSS test when assessed on applying their understanding of the interdependence of organisms within different habitats and using reasoning skills in a practical context. Lessons 1 and 2 provide teachers with classroom activities to develop pupils' understanding of ecosystems and the interactions of plants and animals.

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How does the amount of sunlight affect plant growth?

Lesson Objective - To find out how sunlight affects the growth of plants and to be able to link this to the understanding that the leaves of a plant need energy from sunlight to be able to produce their own food.

Skills - Observation and design of a fair test.

Prior knowledge

Understanding

Skills

Definitions

Equipment required

Each group will need:

Definitions

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Lesson 2

How does the amount of sunlight affect plant growth? (part 2)

AND

Why are plants important in a food chain?

Lesson 2 objective - This lesson has two parts. The first is to discuss the results from Lesson 1 and draw a conclusion about the amount of sunlight. In the second part, the objective is to understand that all food chains start with green plants and to be able to explain why plants are important.

Skills - Planning, conducting, evaluating, presenting, comparing patterns and relationships.

Prior knowledge

Understanding

Skills

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Lesson printouts

Ecosystems lesson 1

How does the amount of sunlight affect plant growth?

Aim - To plan and carry out an investigation to find out the effect of light on healthy plant growth.

Links to everyday life

Questions for discussion

What is the function of the leaves of the plant?

What type of trees have their leaves in winter? What have been their leaves of your school? Can you think of any advantages for this? Talk to the person next to you and see if you can come up with a couple of reasons for why trees have leaves, and why trees keep leaves all year round.

Sunlight helps plants to keep healthy. How does plants stay healthy? What evidence do you have to support your thinking?

Gardener often sows seeds in a greenhouse, waiting for the plants to be quite big before planting them outside. Talk to the person next to you and see if you agree on why or how gardeners why gardeners may do this. Can you give an explanation for your reasons? Why do some gardeners put LED lights in their greenhouses?

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Ecosystems lesson 2

How does the amount of sunlight affect plant growth? (part 2)

AND

Why are plants important in a food chain?

Aim - To draw a conclusion for the investigation based on scientific understanding and to explore food chains, recognizing why food chains start with a green plant.

Task - part 1 - Concluding the investigation

Results

Conclusion

My investigation showed that...

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Lesson plans



Lesson 1

How does the amount of sunlight affect plant growth?

Lesson 1 objective - to find out how sunlight affects the growth of plants and to link the evidence to the understanding that the leaves of a plant need energy from sunlight to be able to produce their own food.

Skills - observation and design of a fair test

Prior knowledge

Understanding

For this lesson, pupils should already be familiar with the concept that all plants need light, air and water for growth. They should also have some understanding of the basic structure and function of the parts of a plant e.g. roots (to anchor the plant and take in water), leaves (to absorb energy from sunlight to make food), flowers (for reproduction - pollination and seed formation).

Skills

Pupils are going to be making observations and designing a fair test. In order to do this, they should understand what a fair test is - a test in which only one variable is changed and the other variables are kept the same, in order to compare the results. They should have had some experience at identifying control variables (variables that are kept the same during the investigation) so they are able to apply this understanding to the task.

Definitions

The definitions below may be helpful for this lesson:

Photosynthesis - this is the name given to the process by which plants use sunlight to make their own food. Pupils would not be expected to know this term, however it may come up in discussion when talking about the function of leaves.

Germination - this is when a seed starts to grow. When a seed germinates it is the root that appears first.

Function - we often refer to the function of different parts of a plant. This means their role or job for the plant.

Equipment required

Prior to the lesson, decide on the plants you are going to use for this task. These could be plants you have grown ready for this purpose, such as bean seeds (allow around 5-6 weeks for the seedlings to be ready with some leaves) or cress seeds (these would just need to be grown the week before). Alternatively, you could use a patch of grass outside that the pupils could cover with different materials. Or if you have several alternatives ready, you could give pupils the choice of which plant they test.

1) Printouts of the worksheets, or a way of displaying the worksheets, e.g. on a whiteboard.

2) Each group will need:

- Some plants (e.g. bean plants, cress) or access to grass
- Access to water
- Access to areas that have different amounts of light (e.g. a cupboard, windowsill, corner away from a window) or equipment that could be used to cover the plants (e.g. large cardboard box, translucent plastic box).

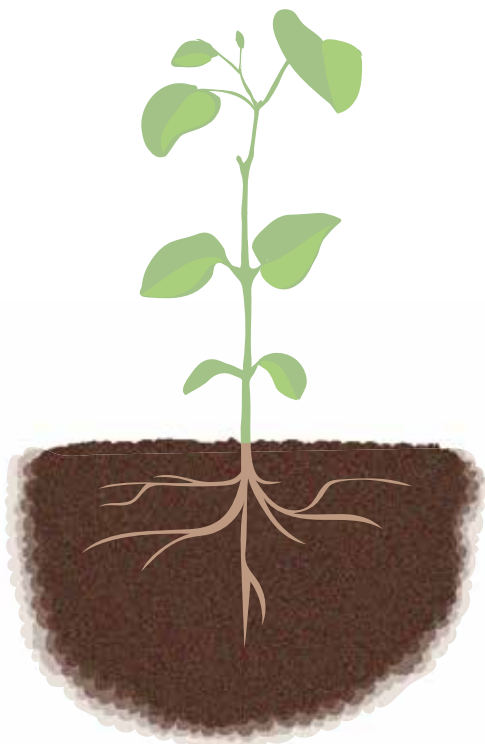
Pupils should work in groups of 3-5. If there are not enough plants for each group to test different light conditions (i.e. dark, light, partial light) the investigation could be a class investigation, with different groups setting up and recording results for plants with one of the light conditions. The results can then be collated in Lesson 2.

Links to everyday life

In this lesson, pupils will be exploring how light affects plant growth. The teacher can use this opportunity to find out what pupils know about plants in their local environment.

Questions to prompt discussion:

- What is the function of the leaves of a plant? (to absorb energy from sunlight, to make food for growth)
- What types of trees lose their leaves in winter? What trees keep their leaves all year round? Can you think of any advantages for this? Talk to the person next to you and see if you can come up with a couple of reasons for why trees lose leaves, and why trees keep leaves all year round. (There is less light in winter as there are fewer daylight hours and the light tends to be less bright, therefore by losing leaves, plants are preserving their energy and waiting to grow again when the hours of daylight increase. Fir trees and pine trees keep their leaves all year round because these trees are originally from northern or southern latitudes where sunlight is scarce. The leaves are often small and able to use very little light and keep growing at a slow rate all year round. In tropical rainforests, the trees also keep their leaves all year round, because sunlight and rain is abundant all year round so then trees can make the most of this.)



- Sunlight helps plants to keep healthy. How else do plants stay healthy? What evidence do you have to support your thinking? (See if pupils can identify that it is the roots of the plant that take in water. Without water a plant would dry up and eventually die. Plants also need minerals and nutrients for healthy growth which they absorb through their roots with the water from the soil. Sometimes we help the plants by adding fertiliser to the soil.)
- Gardeners often grow seeds in a greenhouse, waiting for the plants to be quite big before planting them outside. Turn to the person next to you and see if you can agree on one or two reasons why gardeners may do this. Can you give an explanation for your reasons? Why do some gardeners put LED lights in their greenhouses? (This provides the plants with warmth, and more light, as well as protection from animals and bugs that may eat them or cause disease. It allows the plants to grow faster and become stronger, so when they are planted outside they are more likely to survive. See link for information on using LED lights to help plant growth: www.theguardian.com/lifeandstyle/2017/sep/03/the-brilliant-indoor-benefits-of-led-grow-lights)

Pupils could also be provided with a selection of leaves to encourage observation and discussion. Leaves come in many different shapes, sizes, textures and colours. To really examine leaves can be a lesson in itself, with pupils making detailed observational drawings of what they see and linking features to adaptations to the environment, e.g. large, wide leaves for maximum absorption of sunlight, succulent leaves for storing water, spiky leaves for protection from herbivores.

Questions to develop observation skills:

- What do you notice about the leaves?
- Is there anything the same about all the leaves?
- Is there anything different about the leaves?
- Do the leaves look different under a magnifying glass / microscope? What do you see? Can you draw it?
- What words would you use to describe how they feel, smell?
- Are there any other questions you have about the leaves?

Identifying misconceptions

Pupils may have a misconception about the functions of different parts of the plant. Use these statements to see if pupils can identify which are true and which are false. See if they can give an appropriate explanation. Explanations are provided in brackets.

Both the leaves and roots of a plant absorb water.

(Mainly false – it is the roots that absorb water which is drawn up the stem to the leaves. However, in certain specialised situations, some leaves have the ability to absorb water, but this is rare.)

Plants get their food from the soil.

(False – plants get water and minerals, which help healthy growth, from the soil, but food is obtained through photosynthesis by the leaves.)

The roots suck up water from the ground like a straw.

(False – sucking implies an active action by the plants as humans would suck water up a straw. Water is drawn into the roots and up the stem, but it is a passive process, caused by the amount of salts in the plant cells. It is correct to say the roots take in or absorb water, or water passes into the roots or is drawn into the roots, but it is incorrect to imply a physical action by the plant.)

The leaves take in sunlight.

(True – the leaves absorb sunlight which is used in the process for the leaves to make food.)

All plants need water, air and light.

(True – these are fundamental things needed for plants to grow. Without these things a plant could not make food.)

Seeds need light and water to germinate.

(False – all seeds need water to germinate, but most seeds can germinate in the dark or are more likely to germinate in the dark. That is because seeds grow best in the soil where it is moist and dark. Many seeds also need enough warmth to germinate, which is why lots of seeds start to grow in the spring, but have remained dormant in the soil all over winter.)

Plants stop growing when they reach their full adult size.

(False – plants carry on growing, although the growth rate will be slower.)

The leaves turn sunlight into food.

(False – sunlight does not get turned into food; the leaves use the energy from sunlight which powers the chemical process of producing food. This process is called photosynthesis. The leaves actually turn water and carbon dioxide into food, with oxygen produced as a waste product, but it is the light energy that causes this process to happen.)



Introduction for the task

The aim of the task is for pupils to find out how light affects healthy plant growth and to plan an investigation in which they can gather evidence to show the effects of light on plant growth.

Find out what pupils already know about plants and the function of the leaves and roots. Use the questions in the 'Links to everyday life' section and 'Identifying misconceptions' section on pages 5 and 6 – these are provided for display on the printouts.

Tell the pupils that they are going to be carrying out an investigation to find out how the amount of light affects plant growth. This could be in the context of a gardener wishing to find the most suitable conditions for his / her greenhouse. In this case it would be more appropriate to carry out their investigation indoors so they are able to control the water given and their plants are not at risk from being eaten by animals or bugs.

Then move onto the task.

Task

Tell the pupils they need to plan an investigation to find out what happens if plants receive different amounts of light. Ask pupils to think about how they could vary the light. In a central area, place a selection of equipment they could use for the investigation. You may include words written on cards as needed to give more options, such as 'cupboard', 'table with white sheet', 'grass in the playground'.

The pupils can complete a planning sheet in their groups.

See if the pupils are able to identify the factor they are changing. This is the amount of light, which is a given, however the investigation is fairly open and it is up to the pupils to decide what equipment or resources they use to change this. The pupils should also make a note of what they think may happen here (a prediction). Pupils may suggest the plants will stop growing if they receive limited or no light, they might turn brown / yellow, the leaves may shrivel up. Encourage the pupils to give a reason for their thoughts. Are they able to link back to their scientific understanding - that growth may be affected because the plants without light can no longer make food? If they are growing plants inside, they will need to list the variables they are keeping the same to decide on how they can make sure they do this e.g. by watering each pot the same amount. If they are planning on testing grass outside, the variables will be the same if they are testing grass all in one area, but they should be able to identify what these are. The variables pupils identify should include the amount of water (rain if outside), the soil or growing medium (this could be cotton wool if growing cress), the time they leave the plants for (this will be one week, if recording the results in the following lesson) and the temperature.

Pupils will need to decide how to record their results. This is a qualitative experiment, so there will not be numbers or data to measure; the results will be from observation. Pupils could therefore make descriptive notes, take photographs or a video clip, or a combination. They will need to do this before and after so they can compare the differences. Pupils may decide to measure plant growth, and they could do this, however since the investigation is only running over one or two weeks, they are unlikely to see

any significant changes with this; consequently, they should also be encouraged to take qualitative records to provide them with sufficient evidence to come to a conclusion.

Check the planning sheet for each group. The pupils can then set up their investigation. They will need to leave it for a week. If the plants are indoors, someone may need to check on them regularly to make sure they have enough water.



The aim of the task is for pupils to find out how light affects healthy plant growth

Plenary

After the pupils have set up their investigation ask the groups how they found the planning of the task. Were they able to work well as a team? How did they decide what they were going to do? Did everyone in the group come to an agreement or were there any unresolved issues? Are they confident their test is fair? Did they encounter any difficulties? If the pupils were asked to plan another fair test about plants, is there anything they would do differently?

Refer back to the variables in this investigation. Ask questions to make sure pupils have understood the relevant variables – the variable that is changed (the light), the variables that are kept the same (water, temperature, soil) and the variable that is being measured (the appearance of the plants).

Extension

Each part of the plant has an important function for the whole plant. This lesson has focussed on the leaves. In groups ask the pupils to consider the question – What if the leaves on a plant were missing? See if pupils can identify the impact this would have on the whole plant and why. Give each group time to discuss this and make some notes, and then ask the groups to share their thoughts with the rest of the class. Notice how although each part of the plant has its own individual function, these all enable the plant to function as a whole and that all the functions are interlinked, e.g. the roots absorb water, and water is needed by the leaves to make food using energy from the sun.

If there is time at the end of the lesson, ask pupils to research leaves and habitats. What questions would they like to answer? In groups or pairs pupils can come up with their own question for research using the internet e.g. How does the habitat of a plant affect the type of leaves it has? What type of leaves do desert plants have? Why do some plants keep their leaves all year round and where are they found? Pupils could make a presentation of their findings to share with the class in another lesson.



Lesson 2

How does the amount of sunlight affect plant growth? (results and conclusion)

AND

Why are plants important in a food chain?

Lesson 2 objective – this lesson has two parts. The first is to discuss the results from Lesson 1 and draw a conclusion linking to scientific understanding. In the second part, the objective is to understand that all food chains begin with a green plant because green plants make their own food using energy from sunlight, and to begin to recognise the importance of organisms within an ecosystem.

Skills – drawing conclusions, evaluating information, identifying patterns and relationships

Prior knowledge

Understanding

For this lesson pupils should have a good understanding why plants need light – that light is essential for healthy growth as the leaves of a plant use the sunlight to make its own food. This understanding will have been developed through the discussions in lesson 1. They should also have some basic knowledge of ecosystems and habitats, e.g. that there are many different habitats (rivers, woods, meadow, desert, savannah) and different types of organisms are found in different habitats, and an ecosystem consists of a habitat and the organisms in it.

Skills

Pupils should be familiar with using the results from investigations to draw a conclusion that helps them answer their initial question around which the investigation was based. They will be reinforcing this skill in this lesson and developing the skill of linking their findings to scientific understanding.

Definitions

The definitions below may be helpful for this lesson:

Food chain – a series of organisms each dependent on the next as a source of food

Habitat – an area in which particular living things are found e.g. woodland, meadow, river. A habitat can be very small e.g. under a log, or cover a vast area e.g. a desert.

Ecosystem – all the living things in a habitat and how they interact.

The following terms are not a focus of this lesson, which is to introduce food chains and the direction of the flow of energy, however they may come up in discussion, and may be useful for further lessons on this topic.

Predator – an animal that hunts and eats other animals.

Prey – an animal that is hunted and eaten by other animals.

Herbivore – an animal that eats plants.

Omnivore – an animal that eats plants and animals.

Carnivore – an animal that eats animals.



Equipment required

- 1) Printouts for each of the activities.
- 2) Each group will need their plants, or access to their plants from the previous lesson, and a means of recording the results e.g. with notes or photographs.

Pupils will need to be in the same groups as for the previous lesson to conclude their investigation. They should remain in groups for the second part of the lesson.

Links to everyday life

The following links to part 2 of the lesson on food chains.

Background information

An ecosystem is a habitat and all the organisms in it. All the organisms within an ecosystem are interdependent and changes in the numbers of one organism, e.g. due to pollution or introduction of a new organism, will have a knock on effect on others. The most obvious way in which organisms are interdependent is in a food chain.

Nearly all food chains (except those that begin with decomposing material) start with a green plant. The first animal in the food chain will be an animal that eats plants or plants and animals since the first organism will be a green plant. The next animal will eat the first animal and so on. The animals generally get bigger higher up the food chain. At the top is the animal that has no predators.

The following can be used as prompts for discussion:

Prompts for introducing part 2

Tell the pupils that all the plants and animals in a habitat make up an ecosystem.

See if pupils can name some habitats. What types of habitat are local to them? What types of habitat can be found further afield? Can they name any of the plants or animals found in the habitats they name?

Ask the pupils if they know what a food chain is. See if anyone recognises that a food chain shows what animal eats what in a habitat. See if pupils have any ideas why all food chains start with a green plant. Note down any thoughts and come back to these at the end of the lesson.

Ask pupils which animals they think are the most important in a habitat – the bigger animals or the smaller animals? Ask them to name some small animals they may see in a garden or park, e.g. ladybirds, ants, worms, snails. What would happen if there were suddenly no worms, if they all died out? Encourage pupils to recognise that all the animals in a habitat are equally important, and if one was suddenly gone this would affect the whole ecosystem and all the plants and other animals in it.

Prompts for discussion after the extension activity

Ask the pupils if they can think of any examples where humans have had an impact on an ecosystem or a food chain. What do they think happens if fertilisers from farming are washed into rivers? What happens when all the trees are cut down or cleared from a forest? What will happen if we overfish areas of the sea? What happens if we leave rubbish in the countryside? See if pupils can identify the effects this can have on different animals. Then see if they can make the link how this can affect other animals in an ecosystem. For example, a fish in a river becomes poisoned by fertiliser. If a bird eats the fish the toxins will then also affect the bird and anything that eats that. If all the trees in a forest are cut down a whole habitat is destroyed and the animals that lived there will need to find new homes if they are to survive. There may be nowhere for the animals to go, and some animals may be under risk of extinction.

Identifying misconceptions

Pupils often have misunderstandings about the direction of the energy flow in a food chain. Many pupils get confused by the directions of the arrows in the food chain, thinking they should go in reverse to point to each animal another eats.

Emphasise the words 'is eaten by' could be written on each arrow.



If they remember this, the arrows do not make sense to go the other way round. You may explain that energy from the grass is going into the rabbit. The arrows show the direction the energy is going. The rabbit is not giving the grass energy, but the grass is giving the rabbit energy.

Introduction

Tell the pupils that there are going to be two parts to this lesson. In the first part of the lesson they are going to review the results of their investigation from the previous week.

They are then going to be thinking about why plants are important in an ecosystem and finding out about food chains.

Task

Part 1 – Concluding the investigation

Each group first needs to look at their plants they set up the week before and then record their results. As before, this could be by observation and notes, photographic evidence or both. Ask the groups to then write a conclusion for their investigation. The conclusion should summarise their results to explain if they have found whether the amount of light affects healthy growth. Ask the groups if they can also write a sentence to link this with what they know about how plants use light – their scientific knowledge. If the groups have each investigated only one light condition, gather their results and display the class findings on a screen or whiteboard. The groups can then use the class results to formulate a conclusion.

Groups could then read out their conclusions to the class to see how similar they are. Or, if there are differences, they can discuss why these may have happened.

A conclusion may look something like this with a variety of descriptions:

My investigation showed that plants with plenty of light were the healthiest. They had (green leaves / strong stems / had grown a bit from last week). The plants with no light had (yellow leaves / were shrivelled / had become brown). The plants with some light looked (not as healthy as the ones with lots of light / a bit paler / the same). This shows that plants do need light for healthy growth which supports the fact that the leaves use sunlight to make food for growth because without sunlight they cannot do this and they start to look less healthy.

In an investigation the results do not always turn out as you want or expect. The plants with partial light may look as healthy as the ones with lots of light. This may be because partial light is sufficient for these plants, or one week is too soon to see an effect. Did any groups encounter any problems with their investigation, or were there any aspects they would have changed or improved? For example, if they used grass outside, did the covering stay on the grass? Did they leave a plant in a room with curtains / blinds pulled only to find someone had opened the curtains / blinds during the week?

Part 2 – Food chains

You may like to discuss the information in ‘Links to everyday life’ on page 10.

Give out cards with a selection of local plants and animals to each group. Ask each group to try and make two food chains. Allow a few minutes for the groups to discuss their cards, choose the organisms and arrange how they think a food chain should look. Then display the same cards on a PowerPoint, or stick on a whiteboard, and ask if anyone can give one of their examples. Once you have the order of a plant followed by a couple of animals correctly displayed see if anyone can tell you what is missing – the arrows. Ask which direction the arrows should go. Give out the arrow cards, and arrange your display with arrows. Make it clear the arrows show the flow

of energy, so what is giving energy / food to what (see 'Identifying misconceptions' on page 10). The first arrow points from the green plant to the first animal, because the green plant is providing food / energy for this animal. The next arrow points from the first animal to the second animal. To help pupils remember the arrow direction, tell the pupils they can think of the arrows as meaning 'is eaten by'. The green plant 'is eaten by' the first animal. The arrows always point up the food chain to the top predator.

Go back to the question of why all food chains start with a green plant. If pupils were not sure before, see if anyone can now give a reason. You may like to discuss how green plants are the first organism in a food chain because they make their food using the sun. The sun is the energy source for our planet, and green plants are able to use this to provide energy for all other animals.



Think about why plants are important in an ecosystem and find out about food chains

Extension

Tell the pupils they are going to research food chains in different habitats. For this activity the printouts can be used for the desert and arctic habitats. Alternatively, or in addition, further pictures can be used from magazines or the internet to cover a wider range of habitats. Different groups could each research a different habitat. If there is access to a computer, pupils could research the food chains on the internet. When each group has identified two or three food chains for their researched habitat the groups could be given time to rotate around the classroom to see the food chains other groups have made. If time allows, ask pupils to look at similarities between the food chains from the different habitats - notice how often foxes and hawks come up near the top of a food chain. Notice how the animals in the middle of a food chain are often small mammals.

Back in their groups, ask pupils to think about the impact of humans on food chains. Discuss the points in 'Links to everyday life' and see if pupils can identify any major impacts on the food chains they have researched. The last two links in the Resources box on page 13 provide further resources for discussion of the human impact on ecosystems. See Figure 1 on page 13 for some of the possible food chains with the printouts provided.

Plenary

Ensure pupils are confident with the understanding that light is essential for plant growth and that it is the leaves that use the light to make food. Discuss what happened when plants, in their investigation, were deprived of light.

Check that pupils recognise food chains start with a green plant, and that the energy provided by the green plant travels up the food chain. Ask pupils to give a couple of examples of different food chains. Make sure pupils know the direction of the arrows, and can remember the words 'is eaten by'. Check pupils recognise that all the organisms in a food chain are important, and a change to one organism will affect all the others in the food chain.

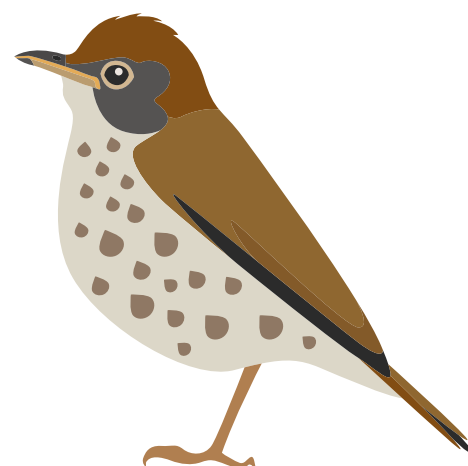
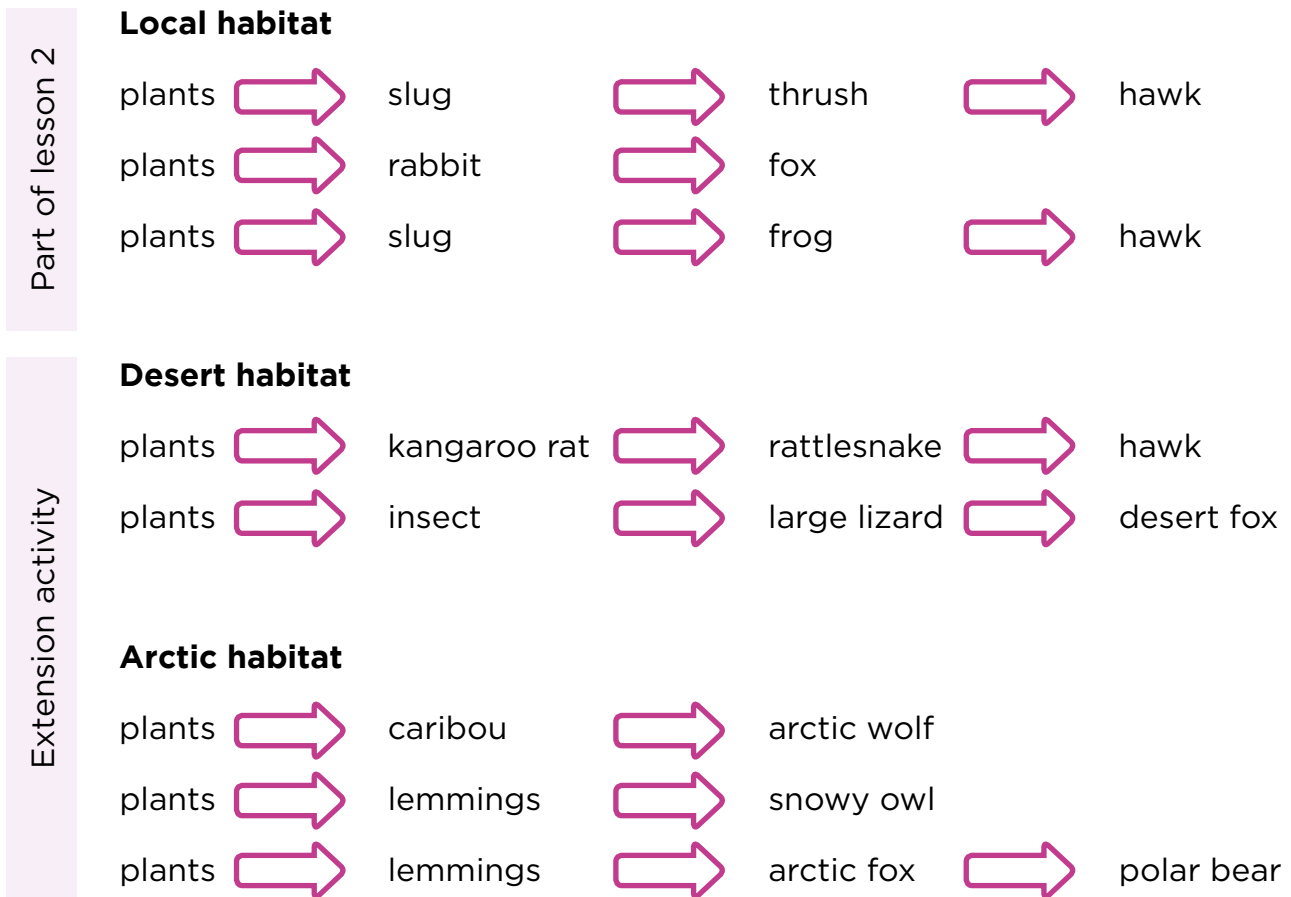


Figure 1 possible food chains



Resources

The link below for BBC Bitesize has information on plants, food chains and habitats in the topic 'The living world'.

www.bbc.com/education/subjects/z2pfb9q

This link has basic information on the structure of plants and a simple quiz on the factors needed for plant growth.

www.bbc.co.uk/guides/zcmtk2p#zt48fcw

News story highlighting human impact on habitats. Article focuses on the decline in farmland birds such as corn bunting and turtle doves as a result of changing agricultural practices such as clearing hedgerows.

www.theguardian.com/environment/2017/nov/23/farmland-bird-decline-prompts-renewed-calls-for-agriculture-overhaul

Facts from the Woodland Trust on the introduction of grey squirrels and how they have affected red squirrels:

www.woodlandtrust.org.uk/blog/2016/09/red-squirrel-facts/



Lesson printouts



Ecosystems lesson 1

How does the amount of sunlight affect plant growth?

Aim: To plan and carry out an investigation to find out the effect of light on healthy plant growth.

Links to everyday life

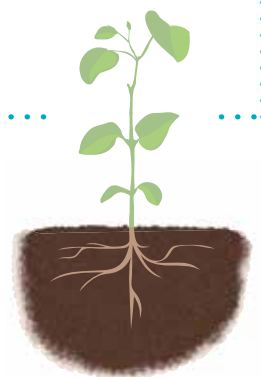
Questions for discussion

What is the function of the leaves of the plant?

What types of trees lose their leaves in winter? What trees keep their leaves all year round? Can you think of any advantages for this? Talk to the person next to you and see if you can come up with a couple of reasons for why trees lose leaves, and why trees keep leaves all year round.

Sunlight helps plants to keep healthy. How else do plants stay healthy? What evidence do you have to support your thinking?

Gardeners often grow seeds in a greenhouse, waiting for the plants to be quite big before planting them outside. Turn to the person next to you and see if you can agree on one or two reasons why gardeners may do this. Can you give an explanation for your reasons? Why do some gardeners put LED lights in their greenhouses?



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Identifying misconceptions

Both the leaves and roots of a plant absorb water.

Plants get their food from the soil.

The roots suck up water from the ground like a straw.

The leaves take in sunlight.

All plants need water, air and light.

Seeds need light and water to germinate.

Plants stop growing when they reach their full adult size.

The leaves turn sunlight into food.



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Task planning sheet

Investigation to find out if the amount of light affects plant growth.

Variable to change: amount of light

We are going to change the amount of light by...

What we think will happen:

Equipment we will need:

Variables to keep the same:

How we are going to record / measure the results:



Ecosystems lesson 2

How does the amount of sunlight affect plant growth? (results and conclusion)

AND

Why are plants important in a food chain?

Aim: to draw a conclusion for the investigation based on scientific understanding and to explore food chains, recognising why food chains start with a green plant.

Task - part 1 - Concluding the investigation

Results

Conclusion:

My investigation showed that ...

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Identifying misconceptions



Task - part 2 - Food chains

You may use this space to write your own food chains.





Local Habitat



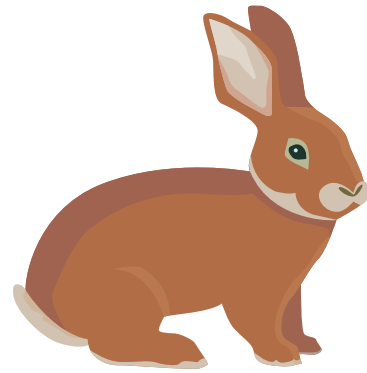
Plants



Plants



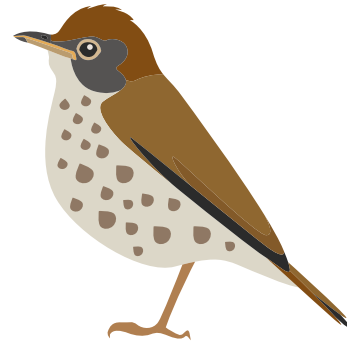
Slug



Rabbit



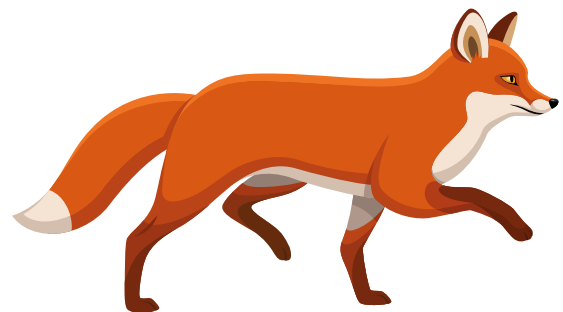
Frog



Thrush



Hawk

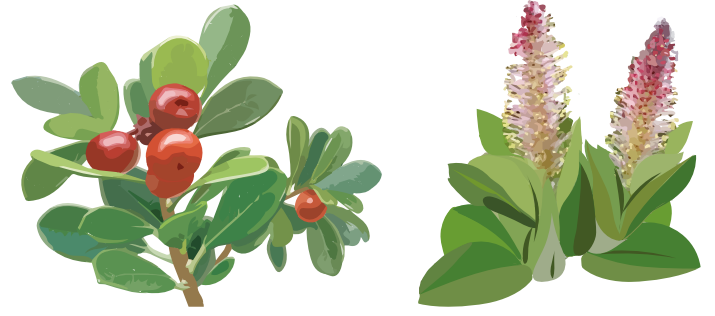


Fox

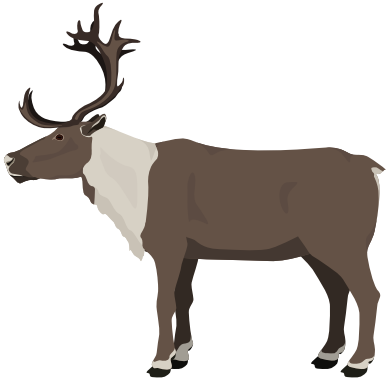
Arctic Habitat



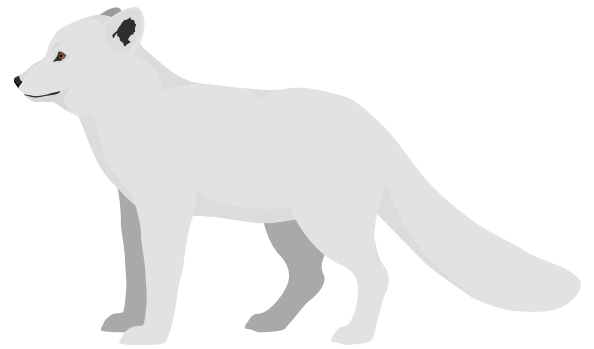
Arctic plants



Arctic plants



Caribou



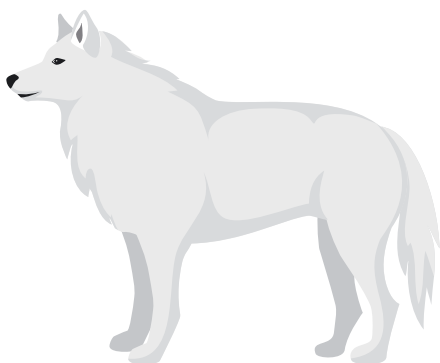
Arctic Fox



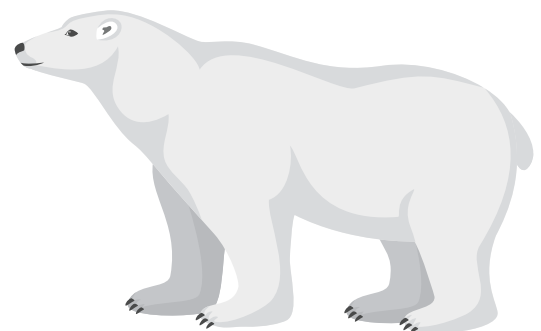
Lemming



Snowy Owl

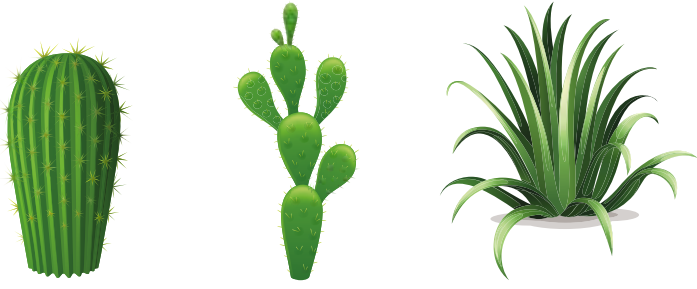


Arctic Wolf

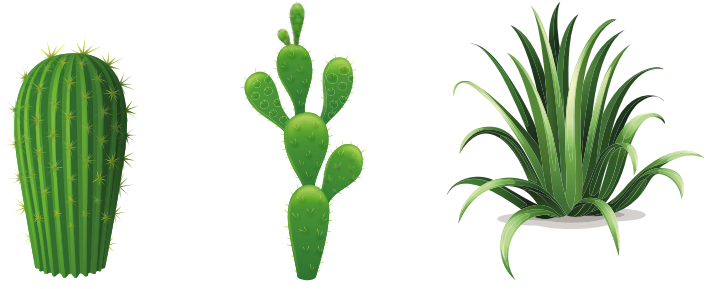


Polar Bear

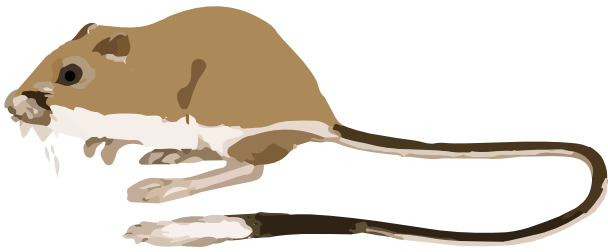
Desert Habitat



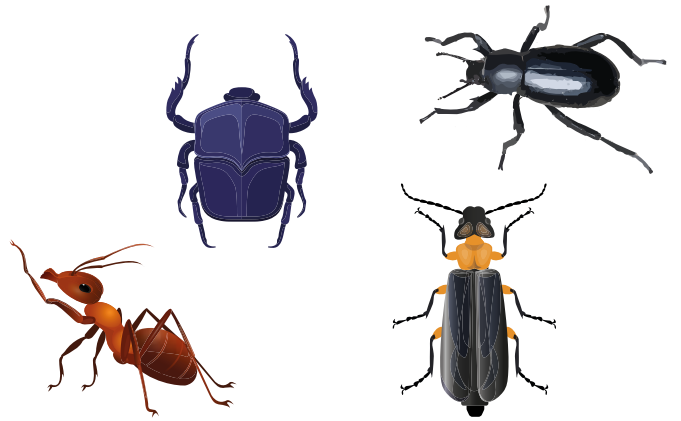
Desert plants



Desert plants



Kangaroo Rat



Insects



Lizard



Rattlesnake



Hawk



Desert Fox

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