



HOB's Adventure

Hands on Biodiversity in a digital era

Handbook for
teachers
of 5-9 year old
children



2020

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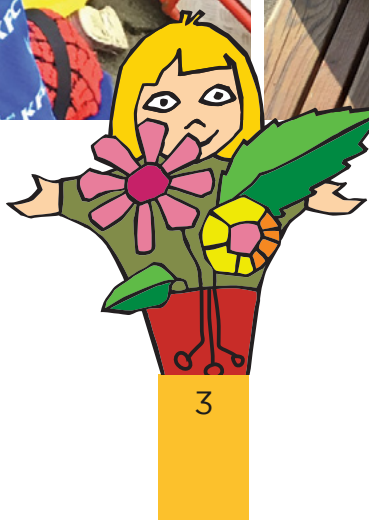
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Foreword

This is a collection of easy to use lesson plans for teaching 5–9-year-old children about biodiversity. The activities incorporate innovative methods such as hands-on learning, digital tools, project-based learning. We also want to increase the physical activeness of children and the time they spend outdoors.

The book is divided into five sections: activities and projects for younger children (sections 1 and 2, respectively) and activities and projects for older children (sections 3 and 4, respectively). The fifth section illustrates how the lesson plans can be adapted to local conditions by adding information about nearby locations and regional plants.

We want the book to be applicable in different learning environments, and we have tested all activities in four countries: Estonia, Iceland, Latvia and Slovenia. Naturally, there are many differences between the local flora, weather and educational systems, so the lesson plans are designed to be easily adaptable. For example, they are designed with 40–45-minute lessons in mind, but they can be easily shortened or lengthened with alternative tasks included below the lessons.

Please be mindful of the changes needed to adapt the activities to your environment. For example, while learning about and with digital tools plays a valuable role in modern education, most activities can be adapted for use without them when needed. The intended age is also just advisory, please make sure it fits into your educational system.

All the lesson plans have been published under a Creative Commons CC BY-NC-SA license which means that you can freely use the activities. You can also copy and adapt the materials as long as you mention Hobs and don't use it for commercial purposes nor try to impose a different license. We want this handbook to be a free resource for everyone who's interested in it.

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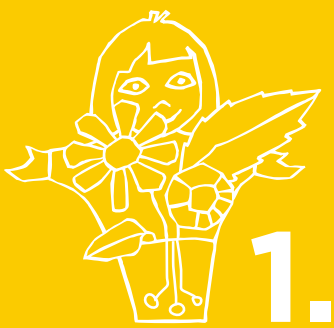
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Activities and games for 5-7 year old children

1.1. Leaves and shapes

Children learn to distinguish between the different shapes of leaves by matching pictures of leaves with indoor plants. The activity can be used to spark discussions with children on a range of topics.

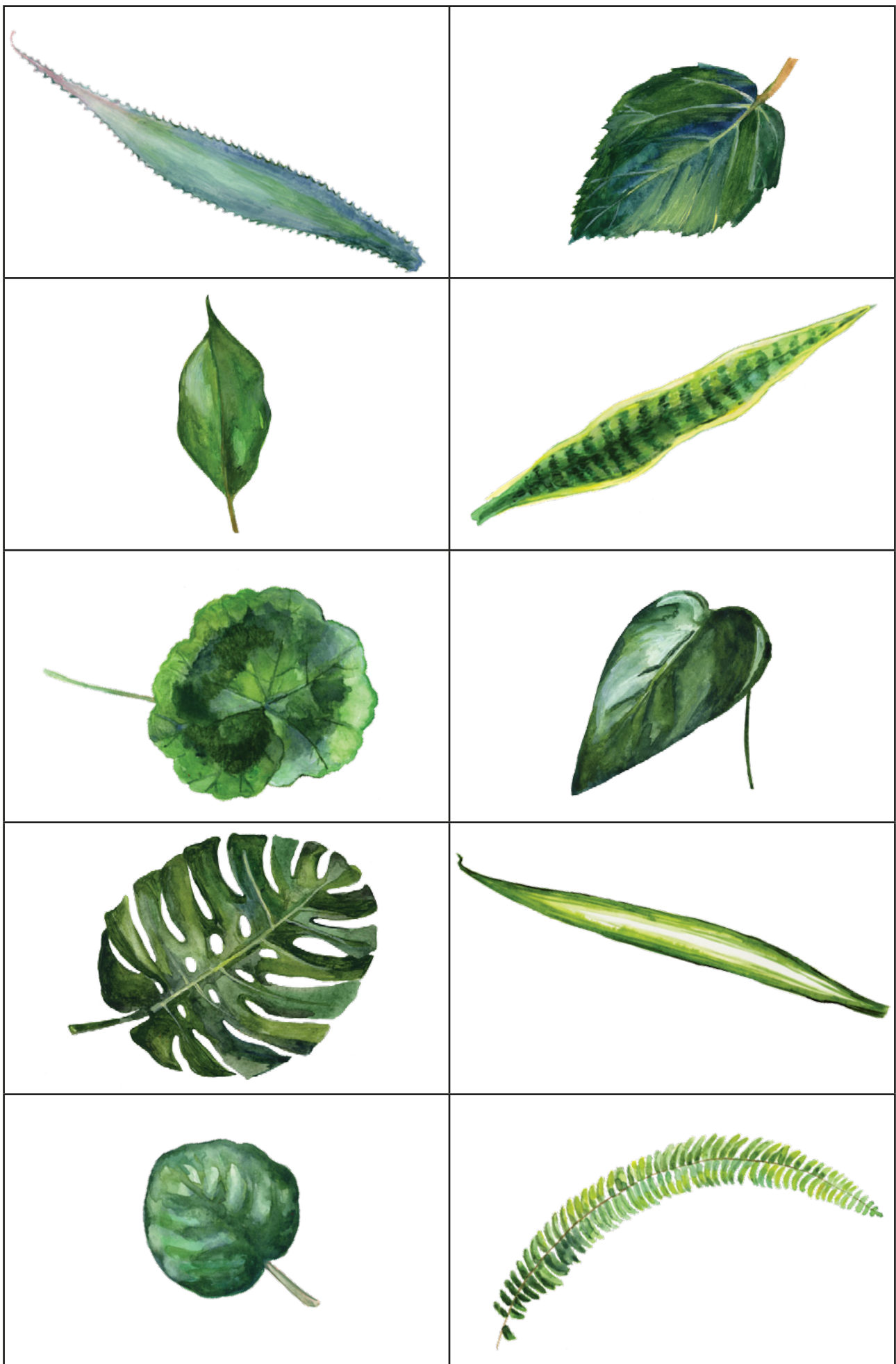
Season:	any
Location:	indoor area with many different potted plants
Duration:	20-30 minutes
Learning aids:	pictures of different leaf shapes
Topic:	shapes, plant leaves, finding similarities and differences
Objectives:	<div>children<ul style="list-style-type: none">● notice various leaf shapes● learn to explore and find similarities and differences between leaves● learn while being physically active</div>

Activities:

1. Start by introducing different shapes of leaves based on the plants in your school. Demonstrate how one can compare pictures and leaves: choose a picture of a leaf, then, together with the children, search for a plant with leaves that match the picture.
2. Distribute leaf shape pictures to children, at least three for each child, ask children to search for a potted plant that has a similar leaf shape as in the picture and, have children place the picture near the plant.
3. Wait for all children to find their plants, then check whether the pictures match the plants.
4. Let each child show you their favourite plant, and let them explain with their own words why they like it.

In case your potted plants are not listed below, take a photo of a leaf to make your own plant cards.

Printable plant cards with leaves of different shapes:



Alternatives:

- After the activity, go to the yard or park to find leaves of trees and bushes. Observe and compare leaves, find similarities and differences.
- Make art using leaves.
- Discuss why different leaf shapes might be needed.
- Discuss the origin of the plants.

1.2. Leaf herbarium

Have children collect and dry leaves for a herbarium, learning about plants around them.

Season:	any
Location:	classroom and the entire building
Duration:	a week or more, depends on how long the leaves dry
Learning aids:	<ul style="list-style-type: none">• potted plants• garden scissors• small buckets• Internet or books about potted plants (especially those with photos and information on your plants)• newspapers for drying leaves• glue• paper• pencils
Topic:	studying potted plant names, observing, writing, movement, cooperation skills (group work)
Objectives:	<p>children</p> <ul style="list-style-type: none">● learn to observe and find similarities (compare leaves in photos with real plants)● learn cooperation skills● practice writing● learn how to dry leaves

Activities:

1. Let children form groups of three.
2. Explain the task: children have to find and collect five different potted plant leaves (have groups pick different leaves). Show how to take leaves from a plant (if possible, have children pick leaves that have already fallen). Hand out tools to groups such as garden scissors and small buckets. Remind children of the principles of group work.
3. Let the groups go and find leaves.

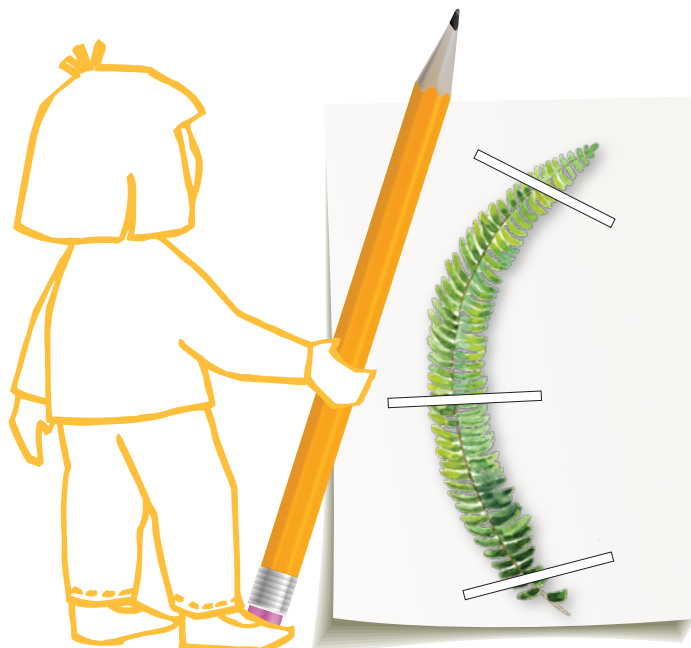
4. Look at the leaves together: see if the groups picked the same leaves, classify leaves, discuss their colours, etc.
5. Show photos of plants with their leaves visible so that children can decide whether the plant in the picture has the same leaf as one of those they picked. Tell them the name of the plant.
6. Show children how to dry leaves and explain that you need to press leaves flat with a weight in order to get straightened leaves.
7. Let children write plant names near each leaf (so that they will later recognise the plant and the leaf), also note down when and where it was found.
8. Have children place leaves between a newspaper and put something heavy on them. Leave them to dry for a week and if they aren't dry by that time, let them dry some more.
9. Once the leaves are dry, look at them again and discuss what has happened and why.
10. Have the children glue the leaves on strong paper, writing down the name of the plant and where and when the leaf was found.
11. Make an exhibition of the newly formed herbarium.

Addition

Play the game "Racing to learn plants" (see 1.3) where the teacher says the name of a plant and shows a drawing or photo of its leaf. Children need to run to the correct potted plant.

Alternatives

The same activity can be done outdoors with the leaves of flowering plants or trees.



1.3. Racing to learn plants

Learning to recognize plants by running to the correct picture, while doing fun actions that make it easier to remember various details.

Season:	any
Location:	classroom or outdoors
Duration:	one hour
Learning aids:	<ul style="list-style-type: none">• plants seeded way before the lesson (sunflower, daisy and rose)• computer• smart phone with camera• USB cable• portable speaker• picture, drawing and/or photo of sunflower, daisy and rose• cards: sunflower, daisy and rose• scotch tape
Topic:	studying plant names, observing, movement, digital skills
Objectives:	<p>children</p> <ul style="list-style-type: none">● will be able to identify the flower (sunflower, daisy and rose) and its parts (stem, leaf, blossom)● are encouraged to talk and communicate● are encouraged to work in pairs or teams to foster teamwork and friendship● are following instructions, understand them and execute them● are developing a motor skill: speed, agility● are developing general muscle strength

Activities:

1. Start with a warm-up with some music to get children to move. For example, ask them to "Say hi with [action]", such as by touching hands, elbows, hips, etc. You can use various movements such as bunny hopping, going down on all fours, jumping on one leg, and much more.
2. Revise what you've learned before: for example, look at flowers that were planted and encourage children to describe them with the help of questions such as what colour is the stem, the blossom, the leaf; what kind of shape is it, how many are there, what does touching them feel like, how do they smell, how large are they, etc.

3. Tape pictures of sunflowers, daisies and roses to three different locations (wall, tree, chairs, etc) so children have enough space to move from one to another. Show them photos or drawings identical to those that are taped and have children run to the correct flower when they recognize it. You can call them back to the centre or have them wait for another picture, but makes sure children don't bump into each other.
4. Mix up the game by adding different pictures of those plants, such as those showing only their stem, leaf, blossom, etc. The pictures can also be black and white, or you can use other senses, such as touch or smell.
5. Add different movements, such as variations of jumping, squatting, crawling, and other actions they've previously learned. Match the number of actions with the characteristics of the plant they're looking at. For example, you can ask children how many yellow blossoms they see and have them jump the corresponding number of times.
6. Divide the children into three groups, giving each of them a simple black and white sketch of either a sunflower, daisy or a rose. Ask the children not to reveal the pictures to others. Instead, have the children say the name of the flower to find others with a picture of the same flower. You should end up with three groups of children, all holding a picture of the same flower.
7. End with a session of human art, asking each group to pose as the flower on their cards. When they are ready, take a picture. Look at the picture together on a large screen for discussion.

Alternatives:

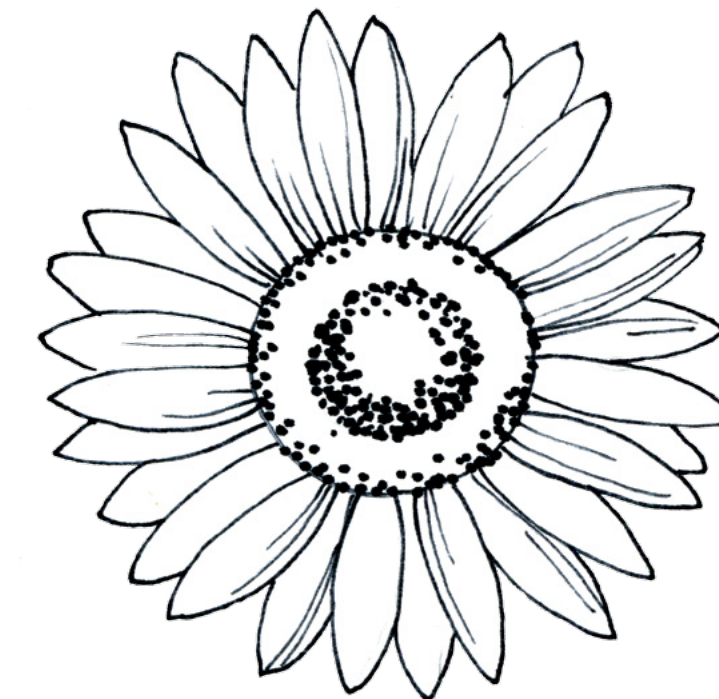
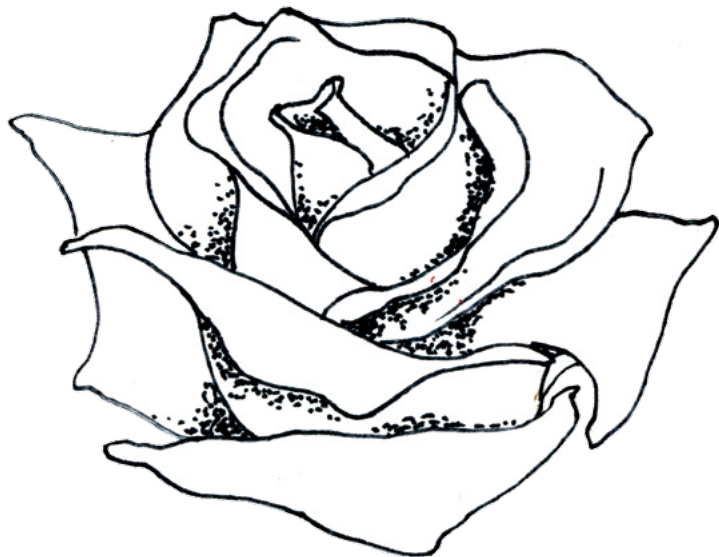
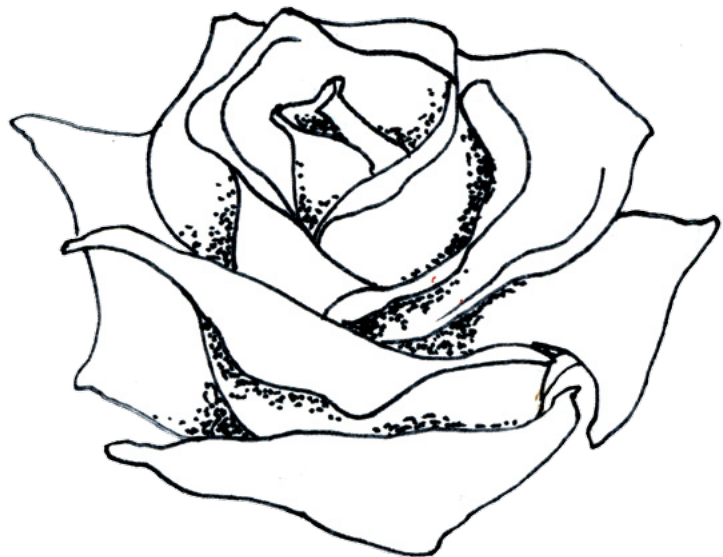
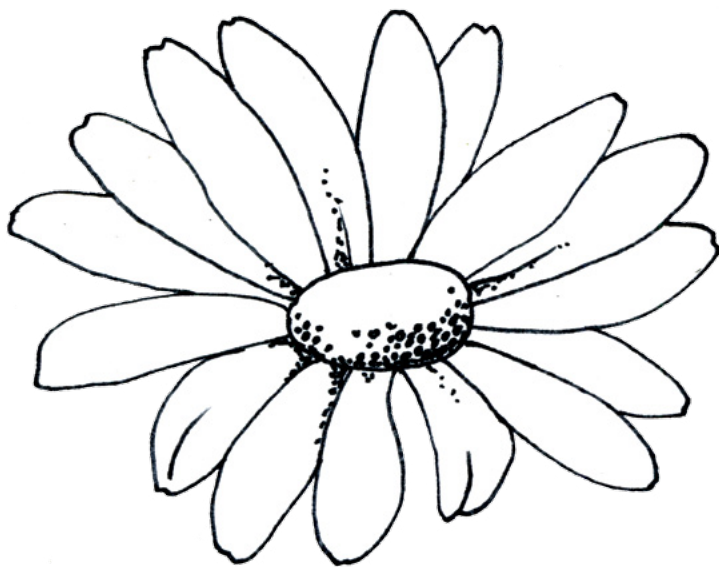
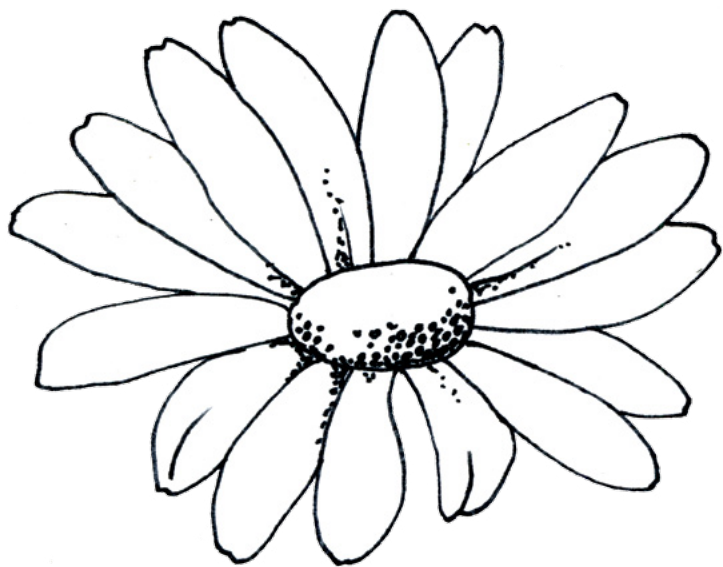
You can learn about trees, bushes, bird species, and other things using the same activity, substituting the pictures for appropriate ones.











1.4. Match up plants

Play memory games with children to remember plant names.

Season:	any
Location:	classroom
Duration:	one session
Learning aids:	<ul style="list-style-type: none">• potted plants picture cards with names• potted plants in the classroom• number cards with letters

See picture cards on links

Poisonous plants A5

Non-poisonous plants A5

Topic:	biodiversity; movement
Objectives:	<ul style="list-style-type: none">children● learn about some potted plants by playing games● cooperative learning

Activities:

1. Form a circle and introduce the aim of the lesson: learning about potted plants in the classroom.
2. Have the children put their hands behind their back, so that the teacher can give each child a picture without the other children seeing it. Let the children look at their card at the same time, for example, by counting to three.
3. Tell the children to find the potted plant depicted on their picture and to sit down next to it (2-4 kids per plant).
4. Ask the children to look at their plant and describe it to their classmates with their own words. Make sure they read out the name of the plant from the card in their hand.
5. Write the name of a plant on a number of pieces of paper, labelling the pieces with numbers in the correct order. For example, a rose would have four pieces of paper, R would have the number 1 on the other side, O would have the number 2, and so on. Hide the pieces of paper near potted plants with the number side showing.
6. Have children find the numbered pieces of paper and place them on the ground with the number side up, in the order of numbers. Then have children turn the cards around and read the name of the plant. This is the plant that you will talk about during this lesson.

7. Play the game "match up potted plants." Divide the kids into two groups standing in a line. Place picture cards face down in front of either column so that each group has exactly two pictures of each plant. The aim of the game is to match up pairs of cards. Have the children race to the cards one at a time, turning around exactly two cards. If they don't find a pair, they need to flip the cards face down again. Encourage the children to communicate with their teammates and let them know which picture is where.

1.5. Around the world with potted plants

Integrated lesson combining mathematics, geography, biology and physical activity, using the digital platform Learning Apps and nearby potted plants.

Season:	any
Location:	classroom and the entire building
Duration:	30 – 45 minutes
Groundwork:	take a picture of the plant; create a mathematical puzzle; find material about the plant and its origin country; hide the task near to the potted plant
Learning aids:	<ul style="list-style-type: none">• LearningApps game• potted plant• information on the plant and its country of origin (blooming time, what it needs are, specific features, brief introduction of the origin country, etc.)• world map• papers• crayons• QR codes
Topic:	mathematics, biodiversity, movement, art
Objectives:	children <ul style="list-style-type: none">● notice various leaf shapes● learn to identify different plants.● get physical exercise during the lesson● learn about different countries

Activities:

1. Before the lesson, make a mathematical puzzle on Learning Apps.

How to use Learning Apps

1.

Open

<https://learningapps.org/>
and log in or register as a user.

2.

Create an app and find
"Group puzzle"

3.

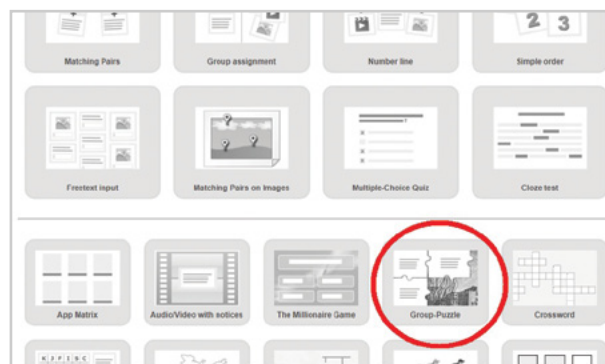
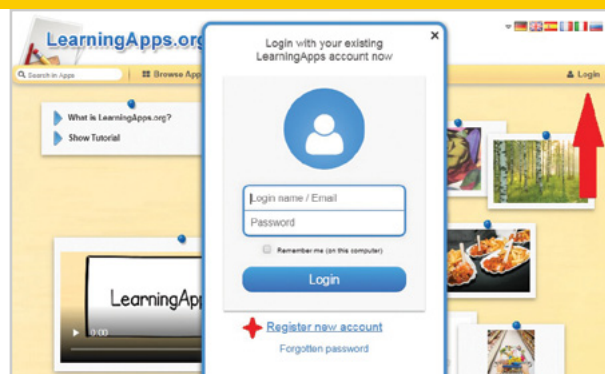
Create a new app. Add a title,
use your potted plant picture as
a background image and write a
suitable mathematical puzzle and give
the answers.

4.

Example:
[click here](#)

5.

Save your app and try it before using it.
You can find previously created apps
in the right corner, in the "My apps" folder.



Background
Behind the puzzle is a picture or a video that is to be uncovered.
Select image Size: 1000 x 562 Edit image

Topics and Terms
Provide up to 6 topic groups. Enter the individual terms that belong to each topic. They are distributed randomly in the puzzle.

Topic 1: 6
Topic 1 Element 1: 3+3
Topic 1 Element 2: 7-1
Add another element

Topic 2: 1
Topic 2 Element 1: 3-2
Topic 2 Element 2: 0+1
Add another element

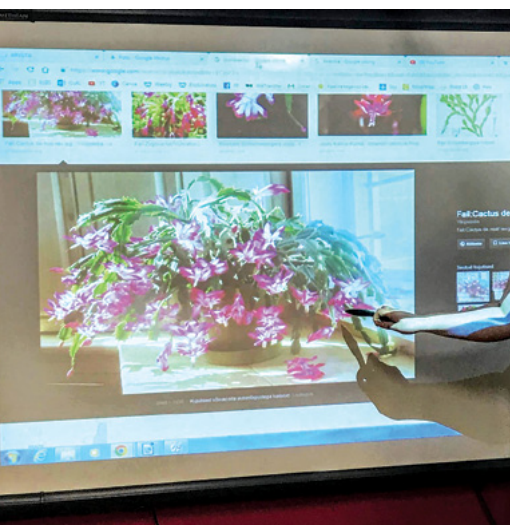
Topic 3: 5
Topic 3 Element 1: 7-2
Topic 3 Element 2: 2+3

2. Talk to the children about what you'll be learning about that day.
3. Open the prepared mathematical app on a smartboard or a tablet and solve it together with the children (either as a group or individually).
4. Look at the picture and have children describe it. Tell them facts about the plant, show pictures of how it looks when it is blooming. Take out a map and find the area the plant is from. Introduce the country: its continent, flag, national flowers, birds and animals, etc.
5. Find the plant in the building. Make a QR code with a puzzle or task and hide it near the plant.

For example: go back to your classroom like the national animal of the plant's origin country. (The national animal of Brazil is the jaguar, so the task would be to sneak back like a big cat. Give children a picture of the plant and have a talk about how to politely enter other classrooms. Ask children to find the plant on the picture and solve the puzzle or task.

6. When the kids have found the plant, repeat what you had learned about it. Let them search for the hidden QR code task near the potted plant.

7. Back in the classroom, repeat what you have learned about the origin country of the potted plant. Have each child draw a picture of the plant (or mold it out of clay/putty) and write down the plant's name or let children find the correct letters for the plant using letter blocks and put them in the right order (with smaller kids you can have the plant name already written down on paper, so they can only find a correct letter and say the letters name).



Alternatives:

- You can do the lesson without using digital tools and make preparations on paper.
- You can make a world map with children and see what kind of plants grow in each country, you can also use it to learn about different cultures.
- You can only do a part of the lesson, or arrange to do it over several days.

1.6. Fantasy plant

Plant a sapling and have children fantasize about what will become of it by discussing and drawing it.

Season:	any
Location:	classroom
Duration:	30 – 45 minutes
Learning aids:	<ul style="list-style-type: none">• plant sapling• paper• colored pencils• (magnifying glass)
Topic:	environmental education, speech and language, arts, mathematics
Objectives:	<p>children</p> <ul style="list-style-type: none">● learn to observe and describe a plant● knows the names of a plant parts● use their imagination:<ul style="list-style-type: none">• notice various leaf shapes,• learn to explore and find similarities and differences of the potted plants leaf shape,• move actively during the study

Activities:

1. Plant a sapling together with the children.
2. Look at the sapling and other plants. Name the parts (stem, leaf, etc.), the colour, note the number of leaves and their shape, touch the leaf carefully to observe its texture (smooth, hairy, veiny, etc.). If you have magnifying glasses, hand them out for a closer look.
3. Ask the children to describe the plant that will grow from the sapling.
4. Ask children to fantasize about what kind of plant will grow from the plant sapling and what the name of such a plant might be (there are no limitations, it can be a fantasy plant, that doesn't even exist).
 - Hand out paper and drawing implements, and ask the children to draw their fantasy plants.
 - Name the plants and write the names next to the drawings.
 - Each child shows their drawing to others and shares the name of the plant and describes its properties.
5. Reveal which plant the sapling actually is and show pictures of a fully grown plant.
6. Make an exhibition of the drawings

1.7. Orienteering with plants

After solving puzzles together, send the children orienteering to find all the indoor plants you've marked on a worksheet.

Season:	any
Location:	classroom and building
Duration:	45 – 90 minutes
Learning aids:	<ul style="list-style-type: none">• pencil for each child• worksheet with photos of indoor plants (see the example sheet, make your own according to the species found in the building)• Smart-board
Topic:	speech and language, environmental education, mathematics, physical education
Objectives:	<p>children</p> <ul style="list-style-type: none">● get acquainted with indoor plants● learn orienteering● practice counting● learn/recall letters

Activities:

1. Play an educational game using LearningApps in which children try to guess the name of various plants, hangman style. Children propose letters in turns, find the letter on a board and press it. Have children count the number of letters in the name first.

You can use [this game](#) as a template and customizing it to fit plants and language.

Replace the photos, add questions and photos of your indoor plants. You can change the game app by going to the page link given above and pressing the [Create similar App](#) at the bottom of the page.





Aloe sp.



Cyclamen



Plectranthus sp



INDOOR PLANTS IN KINDERGARTEN

Find plants, and mark respective
circles as you find them. (X)



Dracaena sp.



Sansevieria



Epipremnum aureum



Saintpaulia ionantha



Pelargonium



2. Before orienteering, make a worksheet for every child (see the example above) by taking photos of your indoor plants and arranging them in a Word document. Have children find the indoor plants shown on the worksheet, marking them as they go along. You can add a couple of dummy plants that you don't have, to make sure that children actually search for them and don't just mark all of them.

3. After children have finished searching, check the answers together, and recall the names of the plants. Have children count how many photos they marked, and count how many plants they missed. Let the groups discuss who found more plants. At the end, go out as a group and find all the missing plants.

Alternatives:

To make the game more challenging, take photos of parts of plants, for example only of a leaf or a blossom.

1.8. What is hiding in the ground?

Children find information about plants and animals in the soil before getting hands-on experience inside the classroom and outside. Have children dig into the soil and identify different plants and animals within it. Discuss the results and show them on a poster.

Season:	all except winter
Location:	playroom and forest
Duration:	half a day, twice
Learning aids:	<ul style="list-style-type: none">• encyclopedias about animals• magazines• poster• scissors• glue• soil• magnifying glass• shovels• sieves• pots• camera• phone app for Plant Snap• portable digital microscopes
Topic:	speech and language, natural sciences, mathematics, physical education, research
Objectives:	<p>children</p> <ul style="list-style-type: none">● develop a favourable, respectful and responsible attitude towards living and inanimate nature● promote different approaches to learning about nature● get to know animals that can be found hidden in the forest and school yard

Activities:

1. Make a book corner:

Prepare different books, encyclopaedias about small ground animals and plants in the forest and garden. Have children look at illustrations, and other easily understandable information and discuss it with each other. Let children describe what's on the pictures and try to guess what they'll find hiding underground.

2. Make a creative corner:

Offer children various magazines from which they can cut out photos of the things that they thought might be found in the soil (small animals, roots, etc.)

Make a poster separating plants and animals above and below the ground, letting children glue photos in the appropriate place. While creating the poster, ask questions such as: have you seen such an animal or plant in the forest or in the garden?

(Write down everything that they say.)

3. Explore soil in the classroom:

Bring some soil into the classroom, preferably some from the forest and another batch from the garden. Spread it over a large area, making sure it's easy to clean up afterwards. Encourage children to use all senses to investigate the soil (touch, smell, sight, etc.). Give them time to explore the soil — let them see what it is hidden inside (sticks, leaves, roots, some small animals, etc).

After a while, distribute magnifying glasses, and portable digital microscopes to take a better look at the things in the soil. Ask additional questions about what they see — what is it?, what does it eat?, how large do you think it will be when it grows up? Encourage them to think about the things they experience and to voice their own personal experiences.

Let children continue exploring the soil with sieves. (You can use that soil later for sowing).

4. Go to the forest

Do the same activity in the forest, if possible, together with a park ranger or some other expert. Give children shovels, pots, sieves, magnifying glasses and portable microscopes, so they can explore the soil. If possible, give the children a camera to take photos of interesting moments, animals or plants that they see. Let them try to identify plants with the phone app **Plant Snap**. You can also do the same activity in the school yard.

5. Discuss what the children learned, what they liked or didn't like, look at the photos that they have taken. Compare different soils. Name animals and plants and write down the names on the poster.

6. Discuss responsible attitudes towards living creatures and inanimate nature.

You can repeat the exploration during different seasons and add more environments such as a beach, a swamp, a meadow, etc.

Alternatives:

Divide children into two or three groups with different research areas: playground, garden and forest. Mark an observation area using string (one square meter is enough). Let children predict what they will find in the soil and record their predictions. Remove the top layer from a small part with a shovel to get to the soil. Have children touch, smell and listen to what's going on in the soil. Distribute magnifying glasses and portable digital microscopes for the children to take a closer look and to learn about the diverse things in the soil. Have children take photographs, draw pictures, and add tags to those.

Return to the classroom and have each group present their predictions and show which soil they explored. Then have children talk about what they found. Children can use photos, drawings and notes in their presentations. Try to answer the question: which environment has greater biodiversity: forest, garden or playground. Have children draw or write down their findings on a poster.



1.9. The seeds of life

Have children plant different seeds, following their progress into plants.
Discuss the role plants play in our lives.

Season: any

Location: playroom

Duration: an hour several times

Learning aids:

- fruits, vegetables, seeds and a knife
- seeds and seed biscuits
- paper (with or without print)
- ice cream sticks and pencils
- egg boxes
- Bee-bot and surface for its operation

Topic: speech and language, natural sciences, research

Objectives: children

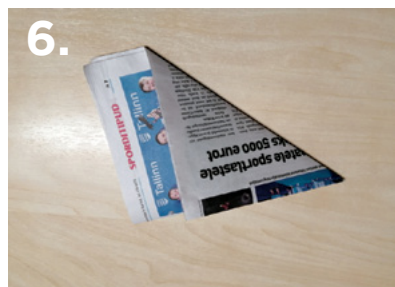
- understand the diversity of plants, their seeds, unifying and different features
- learn about healthy and environment-friendly diet
- learn about efficient use of resources
- learn basics of programming
- learn necessary conditions for plant growth

Activities:

1. Bring seeds of different shapes, sizes and colour into the classroom. Have children take a look at them and learn the names of the plants. Tell the children that despite their differences, all seeds have the same purpose: when they are sown a new plant grows.

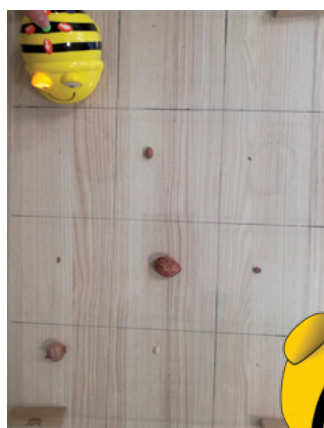


2. Fold paper flower boxes and have children plant seeds.



3. Discuss whether the seedlings will turn into plants and what kind of conditions this takes. Make sure to create favourable conditions. Let children write the names of the sown plants on ice cream sticks (preferably, after children have eaten the ice cream) and stick them next to the appropriate plants.
4. Follow up on the progress of the seedlings periodically, noting their development. If the plants grow edible parts, have the children eat them together.
5. Make a game with Bee-bots where children have to answer questions by programming a Bee-bot to reach the picture of the correct plant.
6. Discuss the role plants play in our lives: let children think about plants in food production, healthcare and more.

Links to galleries



1.10. What do plants need?

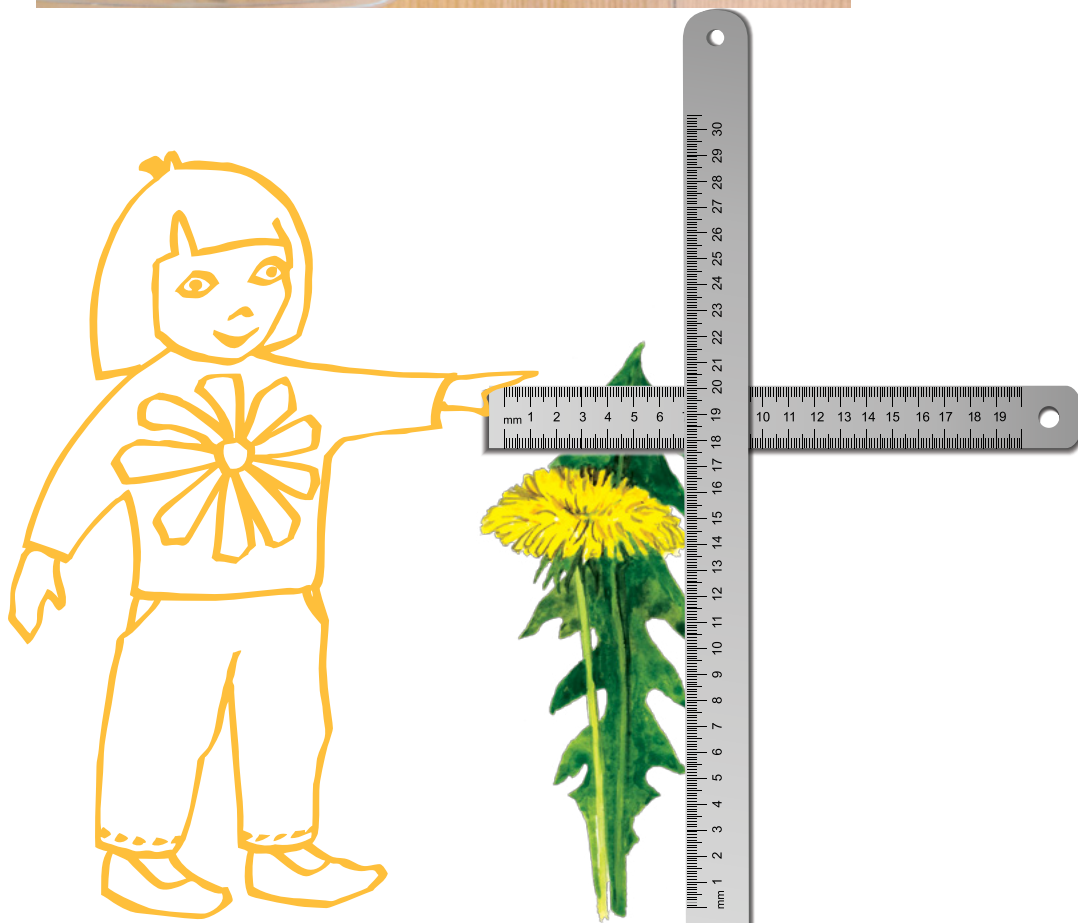
Season:	all except winter
Location:	playroom and yard
Duration:	three sessions
Learning aids:	<ul style="list-style-type: none">• map or model of school yard habitats• pencil• paper• ruler• box for storing soil/ground• spade for gathering soil/ground• portable digital microscopes• camera
Topic:	speech and language, natural sciences, physical education, research
Objectives:	<p>children</p> <ul style="list-style-type: none">● understand plant diversity and necessary conditions for growing them● improve observational and judgmental skills● practice navigation in a model and in a real environment● practice measuring with a ruler● practice using a digital microscope

Activities:

1. Using a map or model of the school yard, help children locate plants growing in the school's territory such as dandelions, ruptureworts, and other common plant species.
2. Have children observe the conditions under which the plants grow: how warm is it? Is it moist? Is there light or shade? Is the soil rich or poor?
3. Pick a common plant species such as dandelion and measure its stem length in the sun and in the shade. Write both measurements down and conclude whether dandelions prefer the sun or the shade. Also look at the moisture, soil richness and temperature. For example, if dandelions are shorter in the sun than in the shade, see if they're lacking moisture in that particular location.

Not all plants desire same conditions. For example, broad leaf plantains choose to grow on paths, ruptureworts grow in sandy soil, nettles and celandines grow in rich soil.

4. Have children find species with different needs from your school yard. Take photos illustrating the different conditions and make a poster showing the different habitats.
5. Gather soil from different areas on your school's territory. Have children look at the soil using magnifying glasses or digital microscopes and find differences.
6. Sow sunflower seeds in different soils and observe their growth.



1.11. Dwarf quest

Children do themed orienteering where they answer questions and do exercises related to plants.

Season:	all
Location:	yard or forest
Duration:	an hour
Learning aids:	<ul style="list-style-type: none">• letter from a dwarf• cards with instructions at every stop• dwarf-like signposts or include parents as task-givers• a bag with tokens for group formation• a bag with things from nature• waste• 5-6 blindfolds• a garbage bag• magnifiers or digital microscopes• rope• small pots• soil• water• seeds• medals and a surprise hidden treasure
Topic:	speech and language, natural sciences, environmental education, physical education, integration of subjects
Objectives:	<ul style="list-style-type: none">● encourage different approaches to learning about nature● children gain experience about interaction with nature and how he/she can actively contribute to protect and preserve the natural environment● encouraging the child's natural playfulness and problem solving● developing motoric and social skills

Activities:

1. Divide children into two groups by having them take blue or red tokens from a bag. The first group goes to posts 1 — 6 and 12, the second group to posts 1 and 7-12.

2.

1st stop: Let children find a greeting letter from the dwarf. Show and read children the dwarven letter.



Dear children!

I am a dwarf living with my friends near your playground. I am so small and fast that you can never see or hear me. I have heard that in your kindergarten (especially your group), you take good care of the environment. We like children who sow seeds and plant seedlings, and don't throw rubbish into the wild, instead collecting and sorting it nicely.

So, today I invite you to become dwarven scientists. You will solve challenging tasks and once your quest is over, you will be appropriately rewarded.

We want you to continue to take good care of nature and our shared planet Earth.



2nd stop: do 10 squats and recall the name of the planet we live on. Hold hands and form the shape of our planet. Name ways in which we can take better care of the planet. Go to the next stop jumping.

3rd stop: look around and find things, which do not belong in nature. Put them in a bag.

4th stop (at a tree): Describe the tree (is it tall, short, big, small, wide, narrow, does it have leaves or needles, what does its bark look and feel like?). What does a tree need to grow? Hug the tree! Go to the next stop pretending you are a bird.

5th stop: (fill a bag with cones, leaves, bark, branches, etc). Without looking, feel around in the bag and try to recognize and name the objects within. Go to the next stop pretending to be a rabbit.

6th stop: (at a box with seeds, soil, water, a small pot). Name the objects and describe or show how they are used. Go to the next stop in pairs, one with their eyes closed, the other guiding.

7th stop: Turn to your right. What do you see? Name five things you see. Go to the next stop singing.

8th stop: (at a compost heap or a picture of it.) What is this? What goes in it? List five things you can put in it. Go to the next stop on your tiptoes.

9th stop: (at a box with accessories for observing animals in nature.) Name the objects and describe or show how they are used. Go to the next stop holding each other's hands.

10th stop: (at a rope attached to several trees at children's waist height) Hold on to the rope and close your eyes. Walk from one end of the rope to the other without letting go of the rope, or you might get tempted into the magical forest and never be seen again. Go to the big tree pretending to be a bear.

11th stop: Wait for your friends from the other group. Talk to your friends — what did you like most about this activity? Find a song about caring about nature and sing it with the children.

12th stop: The teacher passes on a message from the dwarf: Because you managed to successfully solve all the tasks, you've proven that you really are young explorers. Look around and find the treasure that you earned by solving all the tasks. (medals)



1.12. Flower shop

Children play flower shop, practicing cooperation skills, writing, calculating, and learning names of indoor plant species.

Season: all
Location: classroom
Duration: an hour
Learning aids: • pictures of indoor plants

See picture cards on links

Poisonous plants A4 part 1

Poisonous plants A4 part 2

Non-poisonous plants A4 part 1

Non-poisonous plants A4 part 2

Topic: • paper and pencils
speech and language, natural sciences, math
Objectives: children
• develop social skills
• practice reading, writing, and calculating
• learn by playing
• learn to describe
• learn to cooperate
• are physically active

Activities

1. Look at pictures of plants, go over the names of plants with children.
2. Let children prepare a make-believe flower shop by placing the pictures of plants in an accessible and visible location as merchandise. Have each child write the name of a plant on a piece of paper and attach it next to the corresponding picture.
3. Have each child write down at least one calculation task per child and attach it to a picture. For example, say: "Maria, write down $2+5$. Please attach it to the cactus".
4. Choose a child to be the flower shop clerk, while the rest are customers. (Change roles later.)
5. Customers come to the shop and describe what kind of flower they want to buy. The seller recommends a flower and they try to find a plant that matches the description. (Alternatively, give each customer a picture of a plant that's being sold in the shop. The customer has to describe the plant without showing it and the seller must guess which plant it is.)

6. The customer reads the name of the plant and must solve the associated calculation task to buy it. The seller checks whether the answer is correct. If the answer is incorrect, then the buyer must calculate again and must also do physical exercises chosen by the seller. For example, if the correct answer is 5, the customer can be asked to also do five squats.





Projects for 5-7 year old children

2.1. Growing bell peppers

Children grow a bell pepper from a seed, observe and learn about the process and combine it with recycling, art and creativity, use of digital tools, physical activity and outdoor learning.

Season:	spring
Location:	classroom and yard
Duration:	up to five months
Learning aids:	<ul style="list-style-type: none">• bell peppers• a world map• a kitchen knife• paper towels• two bowls• water (warm and cold)• a blender• a spoon or a ladle• a mesh frame• a cookie mold (for shaped seed paper)• a sponge to dry the paper mixture• cardboard for making a card• art supplies to make and decorate the card• an awl or some other sharp tool for making holes• a ribbon to attach the seed paper to the card• scissors to cut cardboard• plastic bottles• a transparent plastic bag• soil• a watering can• a ruler• pen and a paper (or a computer/tablet/phone)• a computer/tablet/phone to find information, look at pictures and watch videos• a phone or a camera to take pictures• a USB microscope to take a closer look• a printer• magnetic sheets• a laminator and sheets for it

Topic: natural sciences, environmental education, physical education, art and crafts, integration of subjects

Objectives:

- learning about the life cycle of plants
- developing creative and art skills
- using digital tools as learning aids
- being physically active during learning
- learning about recycling

Activities:

1. Have children learn about bell peppers by showing them written materials, pictures, videos and letting the children study them. Ask children whether they like bell peppers, either as plants or as food. Take a map and look at where bell peppers grow, to find out what kind of conditions they might like.
2. Buy a bell pepper.
3. Together with the children, cut open the bell pepper and take the seeds out. Set them to dry on a piece of paper.



4. Make seed paper: take some paper towels (can be used), cut them into little pieces, put the pieces into a bowl and add warm water, use a blender to blend the pieces into a paper mixture, take a mesh frame and place it on a bowl or a box, then take a mould and place it on a mesh frame. Put some paper mixture into the mould (use a spoon or a ladle), dry it carefully with a sponge, put some bell pepper seeds on it and leave it to dry. Seed paper can also be coloured with food colours - just put some food colouring into the paper mixture. Don't use old newspapers because of the risk of harmful ink getting into the food.
5. Make a seed card:
Children make a card (on any topic), decorate it as they wish and finally attach a self-made seed paper to the card. If available, use cardboard made from recycled waste paper. A seed card is a clever gift — it combines a card and flowers.



6. Have children exchange cards among each other.
7. Let children make flower pots from old plastic bottles by cutting a plastic bottle in half, poking some small holes in the bottom and decorating it in any way the children want.
8. Help children plant the seed papers into the soil. To observe the development of the roots as well, plant them in transparent plastic bags.
9. Have children water the plants regularly. Perhaps make a schedule and take turns doing it.



10. Observe the process of the plants regularly, taking notes and photos (use a USB microscope if possible. Pictures taken using a microscope are often a favourite among children.)



Alternatives:

The project can be run with different plants, for example, calendula were planted alongside bell peppers in the illustrating project.

Add the following activities:

- Tell a story about the plants life cycle where children use their bodies to show how the seed or the plant is acting according to the story. This is best played outdoors.
- Have children stand in a circle. Tell each child one word that they will use in the story about bell peppers and how they grow. Every time a child hears their word in the story, they have to run a circle around the other children. The storytelling continues while the children run and several children can run at the same time.
- Let children put cards or themselves in the correct order. When you are explaining something, assign to each child a card or a role, then have them rearrange the cards or themselves in the correct order. For example, if you're teaching them a plant name, give each child a card with a letter, and have them stand in a line such that together they spell the name.
- Memory-run is like a classical memory game, but with more movement. Children are divided into two groups and standing in two parallel lines behind each other. Each team gets an equal number of paired picture cards which are laid on the ground face down as far away from children as you wish. When the game begins, the first child of each team runs to the cards, turns over two cards and shows them also to his/her team. If the two cards match, they are put aside, if they don't, they are turned back over. After that the child runs back to his/her team and gives a turn over to the next player. Game continues as long as both teams have found all the correct pairs, the faster one wins.

- Have children stand in a circle. Each child gets one picture of a pair with a plant on it and places it in front of him/her. Shout out the names of the plants and let the children with the right card. For example, if the teacher says „Sprout“, then the two children who have a picture of sprout in their cards, with the right card run around the circle and return to their places. The game continues as long as you wish.

2.2. Bean marathon

Children learn about plants and food by planting a bean and following its growth into maturity.

Season:	winter and spring
Location:	classroom
Duration:	four to five months
Learning aids:	<ul style="list-style-type: none">• several transparent plastic bags, paper pots• a space for hanging the bags• markers for the names on the bags and pots• plenty of soil for planting (school compost, preferably)• beans for planting• a table of bean life cycle stages
Topic:	natural sciences, environmental education, digital education, integration of subjects
Objectives:	<ul style="list-style-type: none">● to explore plant life cycle● find out about the needs of plants● basic skills of growing food in home● taking care of plants● develop analytic skills and making conclusions

Activities:

1. Find information on the internet about beans. The children can search for it together or the teacher can find it and relay it to the children. Ask questions such as how many different species of beans are there? What are the benefits of eating beans? What are the disadvantages? How long does it take to grow some beans?

Watch some videos about beans such as:

[video 1](#)
[video 2](#)
[video 3](#)

2. Taste some food made with beans. Ask children whether they like the taste of beans and count the number of likes and dislikes.
4. Make a mind map together with the children about the needs of beans, so that children will know how to care about their plants. You can make a mind map on paper or use one of the many free mindmapping apps available on the internet.
5. Prepare everything needed for the project and help children set up their beans for sowing.
6. Help children take care of the beans and record the growth of their beans.

Let them mark the dates, when

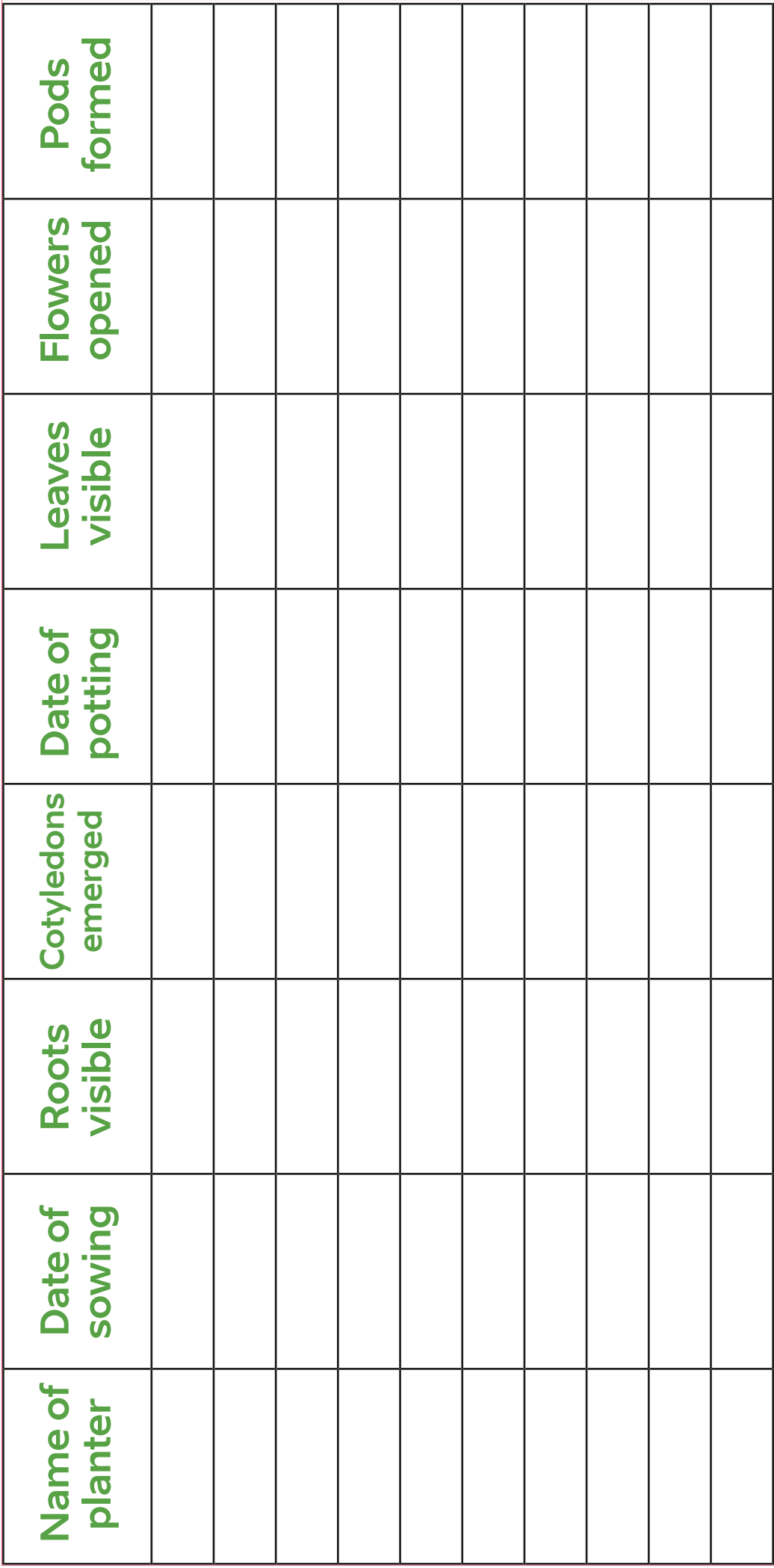
- the bean was sown,
- the roots became visible,
- cotyledons (seed leaves) were seen emerging from the soil,
- the sprout was potted,
- first real leaves were seen,
- flower buds opened,
- when bean pods formed and matured.

Measure the growth once a week, and note how long flowering and bean pod growth lasted.

7. Have children analyze the results, thinking about optimal factors for plant growth (be careful not to water too much, the bean may die.)

Links to galleries





Alternatives:

- 1.** Have children investigate the effects of different types of soil on plant growth. Acquire batches of different soil, e.g., buy some soil, take some from the school compost, take fertilized soil, etc. Ask the children to look at samples of the soil and note their colour, smell, structure and other features. Then have them use a digital microscope to take a closer look and try to differentiate between organic and inorganic mass. Plant seeds in different soils and note down the differences in growth time and size at the end. Discuss why some soils might be better for plants than others, and which soils are better for growing food.
- 2.** Have children investigate the different growth patterns of species by providing them with different plant seeds (at least 10 per child, minding that each plant receives enough room for growth) and having them write down the names of each plant next to the pot. Throughout the growth period, note down the differences in growth time and size between the species. Discuss the reasons for differences with the children.



2.3. Everchanging nature

Season:	fall to spring
Location:	nearby parks or gardens, classroom
Duration:	two sessions a month during the project period
Learning aids:	<ul style="list-style-type: none">• camera• data projector• planting pots or containers• markers for names• soil for planting• bulbs, onions, etc. for planting
Topic:	natural sciences, environmental education
Objectives:	<ul style="list-style-type: none">● get to know how plants grow from autumn to spring● examine the plants that survive the winter● observation, which plants are the first to emerge from the earth● observation, what is needed for plants to grow and thrive



Activities:

1. Take regular trips to a nearby park or garden to look at plants and see how they grow and change season by season. (if they, in fact, do). It is best to take these trips every second week to see differences in plant development. Take pictures with a camera and show them on a screen in the classroom. Let children discuss what they saw: what kind of plants were there? Which colours did they see? Were they young or mature? Note down the results every second week. For example, have children draw a picture or make a model of the changes they observed.

2. Have children plant autumn bulbs, spring bulbs and onions like garlic, red onion or scarlet onion in the classroom (old plastic bottles, cut in half, make for great flower pots). Also, plant the same bulbs in the garden, if possible. Follow the progress of the plants regularly and write down when you see the first signs of them emerging from the soil. Take pictures and write down the exact time when each plant sprouted. Discuss the reasons why some of them might have developed faster or slower.

3. Gather the children and take stock of the development of the plants by looking at pictures across the entire time in order and discussing the changes both in the park or garden and with the plants now growing in the classroom. Discuss how different conditions affected the growing process by comparing plants that grew indoors and outdoors, and in different locations. Discuss the different uses of plants.

2.4. Flowers and insects

Children learn about both plants and insects and their interaction doing various activities over time. The project culminates in a theatre performance where children put their new information to use.

Season:	any
Location:	classroom and a park or forest nearby
Duration:	a month or two depending of the frequency of activities
Learning aids:	<ul style="list-style-type: none">• seeds• large sheet of paper for a mindmap• glue• markers or pencils• planting pots or containers• soil for planting• smartboard or similar equipment• scissors• yarn• the story E. Carle „The very hungry caterpillar“• app MonkeyJam

monkeyjam.org

Topic:	<ul style="list-style-type: none">• jars, breathing fabric and a rubber band• colored paper, double sided tape, party blowout• stones, black and red acrylic paint speech and language, environmental education, mathematics, physical education, art and crafts
Objectives:	children <ul style="list-style-type: none">● acquire knowledge about plant growing process from seed to plant● observe growth and development of the plants● know the names of a plant parts● learn about usefulness of flowers for different insects● acquire knowledge about butterflies, ladybugs and greenflies● know a butterfly's life cycle and what they eat

Activities:

1. Growing plants

1.1. Make a Learning Apps game where children can match pictures of plant parts (stem, leaf, etc.) to words. One can use the following App as a template where you need to translate it into your own language.

Example App (in Estonian)

To change the app, click the button **Create similar App** at the bottom. Additionally or alternatively, have children cut out pictures of plant parts (or have children draw them), and write the names of plant parts on separate pieces of paper. Have the children match the two.

1.2. Buy seeds (e.g., sunflower, marigold, calendula) and look at them together with children. Discuss their shape, size, colour etc. Create a mindmap by glueing different seeds on a large piece of paper, then have children add the name of the plant, pictures and descriptions to it.

1.3. Have children plant the seeds into small pots with soil in them and take care of them together, under the supervision of a teacher. For more detailed instructions and, alternatively, a longer project, see chapters 2.1 and 2.2.

1.4. When the seeds have sprouted and the plants start to run out of space to grow, have the children transplant the seedlings. Discuss with children why transplanting is necessary. Also host a discussion session where children can talk about the usefulness of plants and the role they play in our lives.

1.5. Have children take regular notes about the development of the plants. Pick one plant from each species that is measured at regular intervals (discuss the period with children, but two weeks is a good starting point). Have children cut a piece of yarn to the length of the measured plant, then glue it to a large piece of paper with the date written underneath it. Over time, the children will see a chart showing how the plant grew emerge.

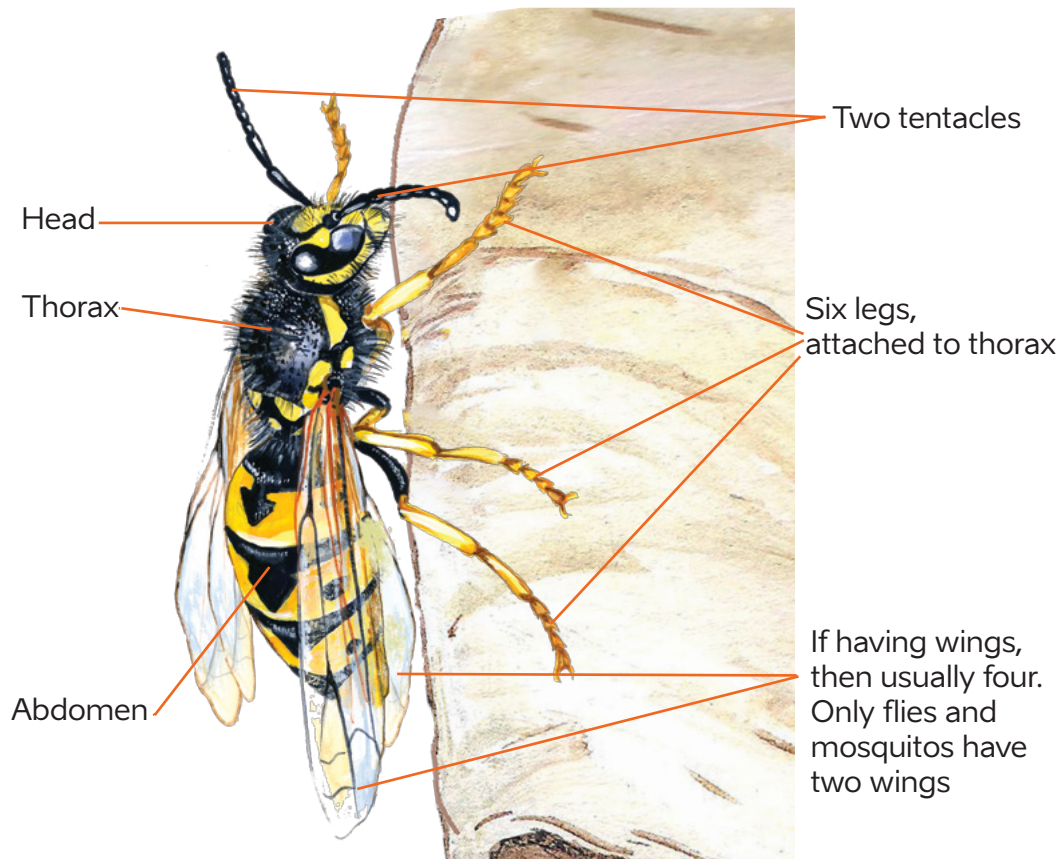
1.6. If the conditions allow, transplant the flowers into the garden and continue observing their development there.

2. Introducing insects

2.1. Create a mind map of different insects that the children know. Have children spell the names of the insects and write them on a board. Ask them to say whether each insect is neutral, beneficial or harmful towards plants (they can be both). For example, insects such as aphids are harmful because they feed on plants, but they also secrete honeydew which is nutritious for animals such as ants, and ants will defend the plant with aphids on it from other creatures that might want to eat it.

2.2. Introduce new insects that play an important role in the interaction between plants and insects such as butterflies, greenflies, ladybugs, bees, etc. Create mind maps to see what children already know about these insects. Find additional information by looking at books and on the internet and add this to the mind maps.

2.3. Make a Learning Apps game where children can match pictures of insect body parts (head, wings, legs, etc.) to words. Additionally or alternatively, have children cut out pictures of plant parts (or have children draw them), and write the names of plant parts on separate pieces of paper. Have the children match the two.



3. Create an artwork of model insects out of flower petals, stems and leaves by gluing them onto cardboard or paper.

4. Play a game of tag where one child pretends to be a jumping spider who catches insects. If the spider touches someone, they are wrapped in silk and cannot move until other insects rescue them (this can be a simple touch or a special action such as crawling between their legs).

5. Read or retell E. Carle's story „The very hungry caterpillar“. Make an animation based on the story using **MonkeyJam** or some other animation program or app. Model the characters of the story from playdough, film the scenes and put the animation together.

6. Take the children to an outdoor area with greenery and look for caterpillars on leaves. If you find one, place it in a jar with a breathing fabric on top, held fast by a rubber band. It is important to look up which plants that species of butterfly caterpillar eats and to make sure to provide some regularly. Observe the development of the caterpillar with children. Take pictures of other insects, print them out in the classroom, add names to them, and make a collage to be hung on a wall.

7. Talk to children about how butterflies drink tree sap and nectar from flowering plants. Link the discussion with the plants that the children planted earlier. Mention that butterflies also require salts, which is why they are often seen drinking from a puddle or sometimes land on bare skin in the summer to drink salty sweat. The long narrow tube in their mouth is called a proboscis and it acts as a straw.

8. Create a butterfly with a proboscis to visualize how butterflies eat. Have children cut the shape of a butterfly from heavy paper and decorate it (optional). Then attach it to a party blowout using double-sided tape. Demonstrate how blowing into the party blowout mimics a butterfly's proboscis.



9. Make a model ladybug using a stone and red and black paint.

10. Play "Ladybugs and greenflies". Divide the group evenly into butterflies and greenflies. Mark a base for both sides, about 15m apart from each other. Children cannot be captured inside a base. Yell out a statement about insects or plants. If it's a correct statement, the ladybugs chase the greenflies. If the statement is false, the greenflies chase the ladybugs instead. If a child is captured by the other group, they switch sides.

11. Put on a theatre performance with the knowledge acquired during the project. Have children be different flowers, ladybugs, butterflies, greenflies, spiders, etc. Make costumes together during arts and crafts sessions and write the story together with the children.

2.5. Indoor compost with earthworms

Build an indoor compost with earthworms (*Eisenia fetida*), learning about the cycle of life by feeding them food scraps and other organic waste and monitoring the decomposition process.

Season:	any
Location:	classroom
Duration:	during the school year
Learning aids:	<ul style="list-style-type: none">• camera• plastic container (at least 40-60 litres) with a lid and something under the box to catch water spills• earthworms (e.g., red wiggler worms)• shredded paper, newspapers or unbleached brown cardboard• magnifying glass, experiment tube
Topic:	natural sciences, environmental education
Objectives:	<ul style="list-style-type: none">• children• gain knowledge about earthworms• learn how worms help turn food scraps into compost• learn and understand the important role worms play in nature

Preparations:

1. Use information in books and on the Internet to tell children about earthworms (**for example, see this**). Focus on identifying them (use a magnifying glass or digital microscope to take a closer look) and explaining their role in the cycle of life.
2. Prepare the container for an indoors compost bin with earthworms. Make sure there are air holes in the bottom, sides and the lid. Line the bottom and sides with old newspapers and add soil. Finally, add earthworms.
3. Feed worms regularly using leftovers from the kitchen such as vegetable peels, breadcrumbs, eggshells, coffee grounds, etc. You can also add leaves, grass clippings, paper, and cardboard. Avoid feeding them food such as meat, fish, grains, and dairy products. Or too much at once, as this also feeds flies that will quickly multiply.
4. Monitor the progress of the earthworms often (at least once a week) and take regular pictures. Write down the dates of feeding and pictures of the container before and after. Try to figure out what kind of food the worms prefer.
5. Make sure to keep the earthworm container sufficiently moist.

6. Evaluate progress by:

- Making a concept map with the children before and after the project to gauge the development in the understanding regarding the cycle of life and the role of creatures such as earthworms within it.
- Ask children what they enjoyed and did not enjoy about the project. To make it more vivid, you can make a mind map with a smiley face and an unhappy face, with positive and negative reactions added next to the respective image.



2.6. Growing tulips – jewels of the spring garden

Research tulips and grow them from bulb to blossom, telling children about the Netherlands and other stories associated with tulips.

Season:	autumn to spring
Location:	classroom
Groundwork:	tulip bulbs (it is important to choose early flowering tulip varieties and keep the bulbs in the refrigerator in the lower drawer inside a paper bag for 12 weeks before you put bulbs into the soil)
Learning aids:	<ul style="list-style-type: none">• soil• pots• magnifiers• drawing of tulip bulb parts

- **tulip growth video**

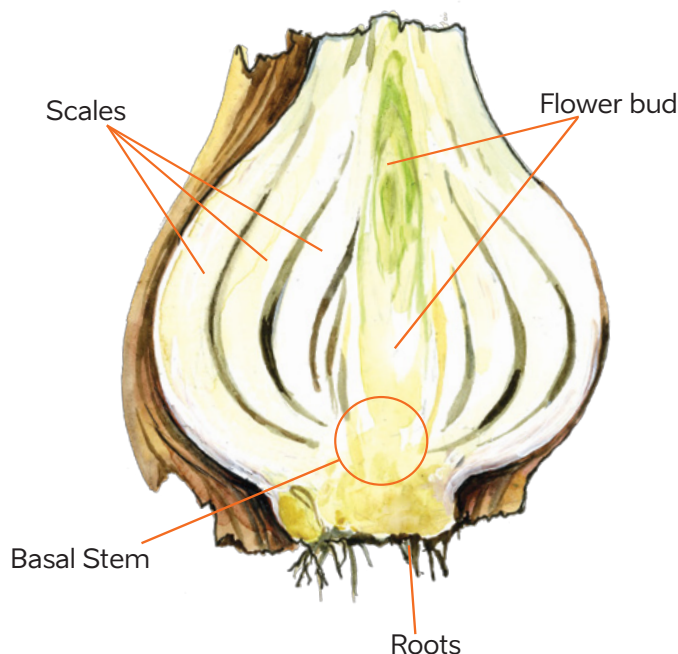
	<ul style="list-style-type: none">• paper• pencils and gouache colors• a measuring tape• pictures or videos of different tulips and real tulips• children need a camera to take photos at home
Topic:	speech and language, environmental education, mathematics, physical education, art and crafts
Objectives:	<ul style="list-style-type: none">children learn● how to plant a tulip bulb and take care of the plant● to observe, explore and measure● about different tulips (names, appearance, tulip bulb)● creativity● writing● cooperation and participating in a discussion● to present their work

Activities:

Tell children a story:

„400 years ago, in the Netherlands, people started to cherish tulips for their beauty, and tulip bulbs became very sought after. People made fortunes growing and selling tulip bulbs. The tulip Semper Augustus was one of the most expensive flowers in history – it was desired for its beauty and rarity. In 1637, one bulb of Semper August allegedly cost 10 000 Gulden, the price of a great house in the center of the capital Amsterdam, by the canals.“

1. Have children look up the Netherlands and Amsterdam on a map of Europe. Look at pictures of the country and its plants.
2. Show children a tulip bulb. Cut the bulb in half. Also show this drawing of tulip bulb parts. Let children investigate the bulb with a magnifier, finding and naming tulip bulb parts. Afterwards, have children draw a tulip bulb with pencils.



3. Give each child a flower pot, some soil and a tulip bulb. Show children how to plant a tulip bulb. Let each student plant their tulip bulbs and write their name on the pot. Discuss what a plant needs to grow.
4. Show the tulip growth video. Discuss what causes tulip blossoms to open in the morning and close again for the night. The children should mention light changes, warmth and humidity.
5. Measure tulip growth weekly using a piece of yarn. Glue the pieces of yarn on a piece of paper or cardboard, with dates. Once you have data from several weeks of observations, discuss what causes some plants to grow faster and taller than others.
6. Go look at different tulips in a garden or park, and let children read about interesting tulip names such as 'Ruby Red', 'Merry Widow', 'Queen of the Night', etc). Discuss why tulips are called jewels of the spring garden. Write the thoughts on a poster, add pictures and hang it up in a visible location.
7. Let children paint tulips with gouache colours and name them as they want. Write the made-up names next to the pictures. Have children introduce their work to other kids.
8. Wait until the tulips mature. Once they have emerged from the soil and have green leaves, have children take them home to grow there. For example, children can give tulips as Women's Day or Mother's Day gifts. Tell the children that there's saying that tulips planted in the garden or on a balcony drives away poverty and sadness. That's why tulips received as a gift should be nurtured as it will bring love and money.
9. Ask children to take a photo of the blossoms of a tulip. Collect the photos and look at them together in the classroom.

2.7. Bird food

Children investigate birds and their nutrition, and also discuss food waste at home and in school. Have children make their own bird food from leftovers and place it outside in winter.

Season:	autumn, winter
Location:	classroom, schoolyard
Duration:	half a day several times
Learning aids:	<ul style="list-style-type: none">• flowerpots• soil• bird feeders• seeds (e.g. sunflower, thistle, peanuts (not salted), white proso, corn, millet, flax etc)• lard
Topic:	speech and language, cooperation, community, environmental education, research
Objectives:	<p>children</p> <ul style="list-style-type: none">● learn about local birds● learn about food waste● use leftovers and seeds to make birdfood● use digital tools to find information● present their findings in front of others

Activities:

1. Organize a brainstorming session with children about what birds eat:
 - What do birds eat?
 - Do all birds eat similar food?
 - Do they eat the same food during all seasons?
 - How do birds survive winter?
 - Can we help birds who do not migrate to survive winter?
 - Can birds eat all human food?
 - Can we make food for birds?
 - What kind of food can be dangerous for birds? (salty, spicy, poisonous things, etc. Note that even bread can be dangerous in large quantities as it creates nutritional deficiencies.)
2. Give pairs of children a bird to research. Have them look up information online and in books. Encourage talking to their parents and friends to learn more. Ask the children to draw the bird and write or draw what they've learned about their bird next to the picture. Pairs present their findings to the rest of the children.

3. Organize a brainstorming session with children about food waste and leftovers.
 - What is usually left over at school or at home?
 - Why is food waste harmful?
 - How to reduce food waste?
 - How can one use leftovers?
 - Which leftovers can be used for making bird food?
(Compare with the list from the previous brainstorming session.)
4. Collect ingredients to make bird food.
 - Send an email to parents asking them to help children collect seeds from fruits and vegetables and leftover food that's appropriate for birds.
 - Visit the school canteen with the children to see if there are suitable leftovers for bird food.
 - Take the children outdoors to collect autumn food such as thistle seeds.
 - Take stock of what has been collected and see whether birds can eat all of it. Decide together which kind of food to make.
5. Have a session to prepare bird food. Take a walk outside the school. Find safe places where to place bird food. For example, do not place bird food so low that cats get reach the birds, nor near windows so that startled bird fly into glass. Birds seem to like secluded locations such as within branches of bushes where they are hidden from potential predatory birds.

Alternatives:

If you have leftover seeds, plant them in flowerpots in the classroom. Discuss how long it will take to generate new seeds in this way.



2.8. Planting trees

Children learn that trees can reproduce via cuttings, and nurture them from a cutting into a planted bush or tree in the classroom.

Season:	spring (March, April) to autumn
Location:	classroom, schoolyard, forest
Learning aids:	• educational material from the Internet on cultivation of trees with cuttings, e.g.

Video: Greenhouse Notes: Rooting Fruit Tree Cuttings

Topic:	<ul style="list-style-type: none">• practical instructions, clips, clear jars, plant pots, labels, plant soil, water, clear plantbox, shovel etc.• trees and bushes you want to propagate: e.g. willows, poplars, red or black currants, viburnum, or forsythias natural sciences, speech and language, environmental education, research
Objectives:	children <ul style="list-style-type: none">• see the plant prepare for rooting and growing of leaves and realize what it is that plants need to grow and thrive.• understand the life cycle of the vegetation and compare with their own life cycle with the aim of respecting all living things

Activities:

1. Start the project in the early spring months, before buds have opened. Explain the project to the children. Discuss the life cycle of trees and bushes, focusing on how they can reproduce by growing from clippings.
2. Have children cut off clippings from suitable trees or bushes at the school grounds. Make sure the buds are still dormant. One can easily propagate willows, poplars, red and black currants, viburnum and forsythias. Have the children cut a branch with three to four buds.
3. Willow and poplar cuttings can be put in jars with water, and their development monitored. For example, look at root formation and record changes and have children make drawings of the progress.
4. If possible, acquire soil produced by a farmer in the vicinity of the school. Blend the soil with compost created in the school. Go through the production process of the plant soil and the compost with the children.

5. After two to four weeks, have children plant the cuttings in flowerpots filled with soil. If you plant some of the clippings in a transparent box, you can continue following the development of roots. Have children water the soil regularly and continue to record progress with drawings.
6. In the spring or fall, once the cuttings have reached a viable level of maturity, organize a trip where children help plant new trees and bushes. If you wait until autumn, the children need to transplant the cuttings into larger pots.
7. Discuss the project with the children. Ask them what they liked and what they did not like, and what they'd like to be done better.





Activities for 7-9 year old children

3.1. Plant passport

Season: any
Location: classroom
Duration: two sessions
Learning aids:

- laptop/PC/tablet
- worksheet for each child
- world map (Google maps)
- paper and pencils

Worksheet:

Needs of potted plants

Topic: needs of potted plants, natural sciences, writing, digital skills, geography

Objectives:

- finding information about the needs of potted plants
- learning decision-making and prioritization
- learning cooperative skills
- physical activity
- learning arts and crafts
- learning digital skills

Activities:

1. Divide the children into as many groups as you have plants that need care. Assign a plant to each group, and have children learn the name of the species and give it a nickname.

2. Each group finds information about the needs of the plant on the Internet and fills out a worksheet.

In Estonian there is a web page about potted plants www.toataimed.eu.

in English see

Ambius.com: Guide to indoor plants

Ourhouseplants.com: How to propagate house plants

3. Discuss what determines whether a plant needs a lot of water or not so much. Also discuss warmth, sunlight, and other needs.

4. Have children study a world map and mark the places of origin of their plants. Discuss whether the countries have warm or cool climates, is there much moisture, is there much sun where the plants grow, etc.

5. Discuss whether it is more environment friendly to buy house plants grown in tropics and shipped to your country, or to propagate houseplants that grow nearby - in a school or friend's home.

6. Act out the needs of plants. For example:

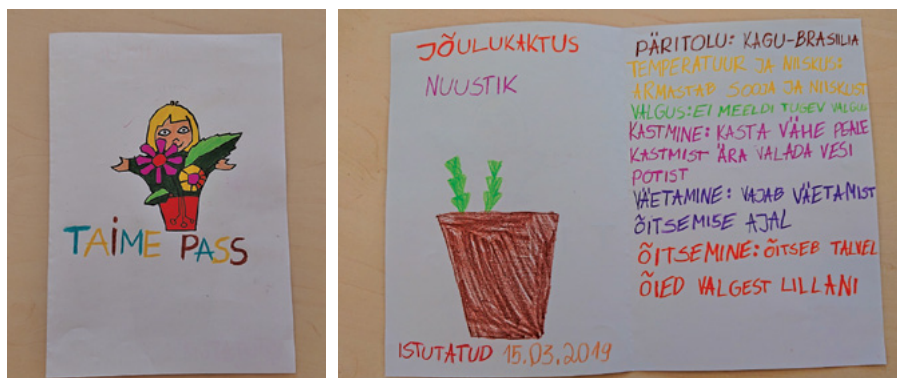
- If the plant needs a lot of sunlight, move close to the window. If it doesn't, move away from the window.
- If the plant needs a great deal of water, stand on top of a chair, if it does not, hide underneath it.
- If the plant needs a warm climate, run in circles, if it does not, do squats.

7. Discuss passports. Ask who has them and why.

8. Have each child make a passport for their potted plant using a sheet of A4 paper, folded in half. Draw or print a picture of the corresponding plant on the cover. Have the children write the name of the plant (both species name and the nickname) and the time of planting on the left, and the origin, and needs on the right (temperature, light, water, time of fertilization, flowering). **NB!** Children often need help positioning text.

9. Make an exhibition of the passports.

10. Ask children to take the passport home and tell their parents about the needs of the plant.



Alternatives:

Make QR codes with the information about each plant (see 3.2).

3.2. QR plant passports

Season: any
Location: classroom
Duration: one session
Learning aids: laptop/PC
• a completed worksheet about the needs of the plant
• i-pad/tablet/phone with QRcode reader

Worksheet:

Needs of potted plants

Topic: Needs of potted plants, natural sciences, writing, digital skills
Objectives: Children practice how to
• compile a Word document
• attach a picture to the document
• save a Word document
• use a QR code generator



Activities:

1. In 3.1, children filled worksheets on plant requirements for temperature, sunlight, water, times of fertilization, flowering. Have each child compile a Word document with the information from the worksheet (adding pictures of the plant is possible as well).
2. Let them go to a QR code generator on the internet, such as:

<https://www.qr-code-generator.com/>

and make a QR code with the information (either by uploading the word document or copying the information).

3. Have the children check the generated QR code with a phone or tablet.
4. Print out the QR codes, cut them out and attach them next to the corresponding plant.

3.3. Collecting pictures of plants

Season:	any
Location:	classroom
Duration:	a week to gather photos and two sessions to talk about plants, making graphs and the rest
Learning aids:	<ul style="list-style-type: none">• camera or smartphone• e-mail addresses of parents• computers or tablets with access to the internet and photo editing programs• colour printer
Topic:	diversity of potted plants, natural sciences, research, digital skills
Objectives:	<ul style="list-style-type: none">● collaboration with parents (taking photos at home and sending them to the teacher digitally)● learning about the diversity of potted plants

Activities:

1. Ask children and their parents to take photos of the potted plants they have at home. Have them name the plants if they can. The photos should be sent to the teacher digitally via email. If the files are too large, one can use a file transferring service such as **WeTransfer**, **Dropbox**, **Google Drive**, **OneDrive** or one of the many other similar providers.

2. Print the photos (in colour, if possible), make a poster with the children and add names to all plants.
3. Make graphs showing which types of plants were most popular using a spreadsheet program such as **Excel**, **OpenOffice Calc**, **LibreOffice Calc**, **Google Sheets**, or one of the many other similar programs.
For example, plot how often pictures showed a Christmas cactus, Aloe vera, etc.



Alternatives:

1. Make the poster entirely digitally by using a painting app such as MS Paint, **Artweaver**, **GIMP** or one of the many other similar programs. Or use a web based app such as **Canva**, **Stencil**, **Snappa**, etc.
2. Have children make a presentation about their plant or their favourite plant using **Powerpoint**, **Google Slides** or another slide-making program.
3. Use the photos of plants to make cards and use them in games like memory run etc.
4. Use a map (**Google maps**, **Apple maps**, etc) to find the origin countries of each plant. Write down the names of the countries and find information on the internet about their climate, geography and culture.

3.4. Fishy plants

Children use magnetic fishing rods to select pictures of plants and then determine whether the plants are poisonous or not using QR codes.

Season:	any
Location:	classroom and school yard
Duration:	one session
Learning aids:	<ul style="list-style-type: none">• two hula hoops (or something else that can represent a lake)• 2 long sticks with magnets on a string• metal paper clips• fish-shaped pictures of plants with QR codes• two tablets or smart phones• four envelopes (two labelled "poisonous")

See picture cards on links:

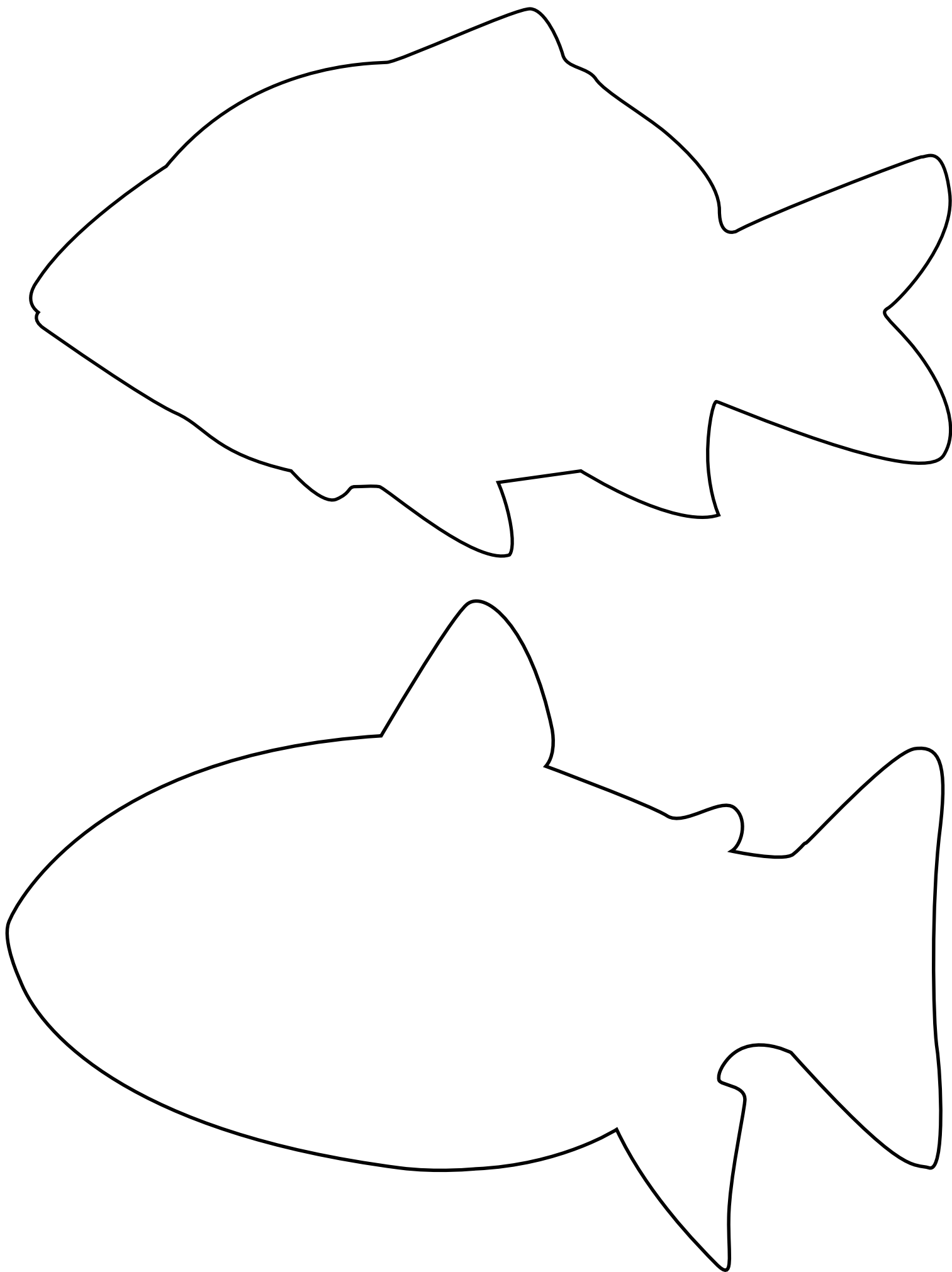
Poisonous plants A5

Non-poisonous plants A5

Topic:	plants, poison, language, co-operation
Objectives:	<p>children</p> <ul style="list-style-type: none">● learn about (poisonous) plants● improve reading● practice group work● improve digital skills

Activities:

1. Place two hula hoops on the ground to represent lakes, attach paper clips to pairs of pictures of plants and put a picture from each pair inside each hula hoop.
2. Ask the children to form two equal columns. Explain that there are poisonous plants, and it is important to recognize them. Give each group a tablet or smart phone and two envelopes - one labelled "poisonous", the other one plain.
3. Have the first child from each column take a magnetic fishing rod and go fishing in the lake (hula hoop). Once they catch a plant, ask them to take it back to the group and use the tablet to scan the QR code on it to find out its name and whether it is poisonous or not. Have children place pictures of poisonous plants in the envelope labelled "poisonous" and the rest in the plain one.
4. When all plants have been fished out and identified, check whether they have been placed in the correct envelopes.



3.5. Memory Run - houseplants

Season: any
Location: school yard or sports hall, hallway, stadium
Duration: one session
Learning aids: • two identical packs of cards with pictures of plants and their names

See picture cards on link

Poisonous plants A5 Non-poisonous plants

Topic: physical activity, house plants
Objectives: children

- medium sized sport cones (equalling the number of cards in one pack)
- learn to identify plants
- practice reading
- improve coordination, speed, attention
- feel joy from being active



Activities:

1. Place traffic cones as far as possible from each other in the yard, so that children have enough room to run. Then hide one card from each pair of plant pictures face-up underneath a traffic cone.
2. Divide the children into two relay columns and give each team one card. Have one child run to the cones, check underneath exactly one of them to see if have found a card that matches their own. If the cards match, the team gets a point and a new card. If they

do not, the child replaces the cone, runs to the back of the column and gives the card to the next child who will run to check the cones. Encourage communication as to which card was underneath the cone.

3. Continue the game until one team collects the cards from underneath all their cones, upon which declare them victorious.

4. Collect the cards and ask the children how many plants they remember and where they've seen real life versions of them.



Alternatives:

1. To make the game more challenging for older children, remove one picture from each pair and replace it with a written name of the same plant. This develops reading skills.

2. To speed up the game, have children bring the cone together with the picture so that the next child has fewer cones to consider.

3.6. Create an e-book about plants

Have children photograph plant parts in the autumn and spring and compile an e-book with explanations of the role of the different parts.

Season:	autumn to spring
Location:	classroom and school yard
Duration:	five sessions
Learning aids:	<ul style="list-style-type: none">• bags, boxes or trays• smartphones or tablets• computers• paper• access to the Internet
Topic:	plants, science, digital education, environmental education
Objectives:	<p>children</p> <ul style="list-style-type: none">● learn different plant parts● learn the role of flowering and seeds● study different varieties of flowers and seeds

Activities:

This lesson plan is divided into four sessions:

1. First session (2x 45 minutes)

- Prepare to take the children for an autumn walk near the school and take bags, boxes or trays into which they can collect plant matter.
- Have children look at plants and trees and try to collect different parts of each plant. They might pick up leaves, fruits and nuts, seeds, roots, twigs, bark, etc.
- Take pictures of plants and have children keep track of which plant part goes with which plant by keeping the parts for each in separate bags or boxes.
- Ask leading questions to encourage children to figure out what the different plants parts are meant for and what happens to them in the life cycle of plants. For example, fruits do not remain attached to the plant, instead there might be signs of them being eaten by animals.



2. Second session (45 minutes)

- Before the session, print photos of plants taken during the first session and identify the plants. Start an e-book on **BookCreator** or a similar app and generate an invitation for the children. For ease of use, generate a QR code of the invite. Create a cover for the e-book by setting a photo of a plant on the first page and writing down its name.
- Have the children look at the different bags and boxes of plant matter and ask them what they have gathered. Ask the children whether they have found many blossoms, and repeat the question about leaves, seeds and other parts.

Try to guide them to connect the season with the frequency of different parts. For example, observe that blossoms are rarer in the autumn than seeds, and discuss why this is. (The walk can be repeated during different seasons with different results and topics).

- Have a conversation about seeds — their role, variety, and potential as food for animals and humans. Discuss poisonous seeds, and mention that what is poisonous to humans does not need to be poisonous for insects, birds, etc.
- Optional: bring a box of plums, apples, coconuts, turnips, dandelions and other plants with varied methods of spreading their seeds. Discuss the different ways in which plants distribute their progenies.
- Show pupils the photos from the walk and ask them to pair the photos with boxes of plant parts. If there are fewer plants than children, form groups.
- Explain how to join your library of e-books using the invite you generated before the session and how to add pictures of plant parts to the e-book. Encourage taking and adding many pictures — of different parts and from different angles. Encourage making experiments such as seeing whether the seeds are carried by the wind or not. Once the initial pictures have been added, ask the children to break apart the plant parts and take pictures of the insides.

3. Third session (45 minutes)

- Before the session, find general descriptions of the plants children are making e-books about and print them out for them.
- Give pupils the descriptions of their plants and ask them to add an explanation of each photo based on the description. The children can add it in writing or as audio. For example, children can explain how a particular seed is meant to be spread around — by being eaten, or by being carried by winds.

4. Fourth session (45 minutes)

- Check all e-books for substantial errors, such as describing a poisonous seed as safe for eating. Make sure that the invites are still valid.
- Take a walk in the spring, focusing on flowering and photographing blossoms. Discuss the purpose of blossoms and pollinators. You can provide children smartphones or tablets to take photos of flowering plants outside.
- Ask children to edit their e-books by adding pictures and explanations of the flowering process of their plants. Have children correct any mistakes from before.
- Let all children read all e-books. Also, send the e-books to the teacher who will take over teaching the children next.

3.7. Eat the flowers!

Discuss the difference between edible and dangerous plants, collect blossoms of various plants outdoors or buy them from a trusted local store, then taste test them with the children.

Season:	any
Location:	classroom, outdoors, shop or market place
Duration:	two sessions
Learning aids:	<ul style="list-style-type: none">• previously prepared flowers, either indoors or find them in nature• Information about edible and poisonous plants, e.g.

Matteroftrust.org: Wild plants you can eat

Topic:	<ul style="list-style-type: none">• tablets or computers edible and poisonous plant species, natural sciences, outdoor education
Objectives:	<ul style="list-style-type: none">● increasing knowledge of plant life cycle and their diversity● reminding about poisonous and edible plants

Activities:

- 1.** Explain to children that some plants can be poisonous and others create allergic reactions. Emphasize that one must be certain that the plant is not poisonous before placing it on a plate. (Do not use plants bought from a flower-shop as they can be treated with harmful substances to maintain their appearance. Only use self-grown or wild flowers that you know to be safe.)
- 2.** Show pictures and talk about poisonous plants in the area. Also explain why some plants are protected and should not be picked for eating or other reasons. For example, there might be lily of the valley, aconite and other *Ranunculaceae*, etc.
- 3.** Prepare for a gourmet testing session by buying flowering plants from a safe source or collecting them in the wild. Examples of plants with edible blossoms include: radish, onion, pansies, gladiolus, cucumber, pumpkin, jasmine, marigolds, cress, chrysanthemum, lavenders, peonies, dandelions, cornflowers, sage, clover, violets, peas and garlic. Take the children to a trusted local store, the school yard or on a trip to a meadow to collect edible flowers.
- 4.** Taste test the collected flowers together. If possible, use them to add flare to school lunches. Discuss the different flavours.



Links to galleries, more info:

[Facebook gallery](#)
[Exposure gallery](#)

3.8. Some well-known houseplants in the classroom

Have children solve math puzzles to figure out the latin name of plants and fill out the attached worksheets. At the end, have children present about their plant.

- Season:** any
- Location:** classroom, hall, hallway or school yard
- Duration:** two sessions
- Topic:** math, physical activity, house plants
- Objectives:** children
- find information about houseplants (needs, other names, origin)
 - learn cooperative skills (groupwork)
 - practice multiplication and the order of calculus
 - learn to use digital tools
 - having children be active during lessons
- Learning aids:**
- letters printed on coloured paper (can be also laminated)
 - removable adhesive pads (to attach the letters to the walls)
 - printed worksheets
 - internet (phone or tablet) and a QR-reader

Worksheets:

Plants in the classroom Letter key

- plants or plant pictures:
 1. *Tradescantia zebrina*
 2. *Chlorophytum comosum*
 3. *Schlumbergera buckleyi*
 4. *Kalanchoe blossfeldiana*
 5. *Saintpaulia ionantha*
 6. *Crassula ovata* or *Aloe vera*
- 22 letters:

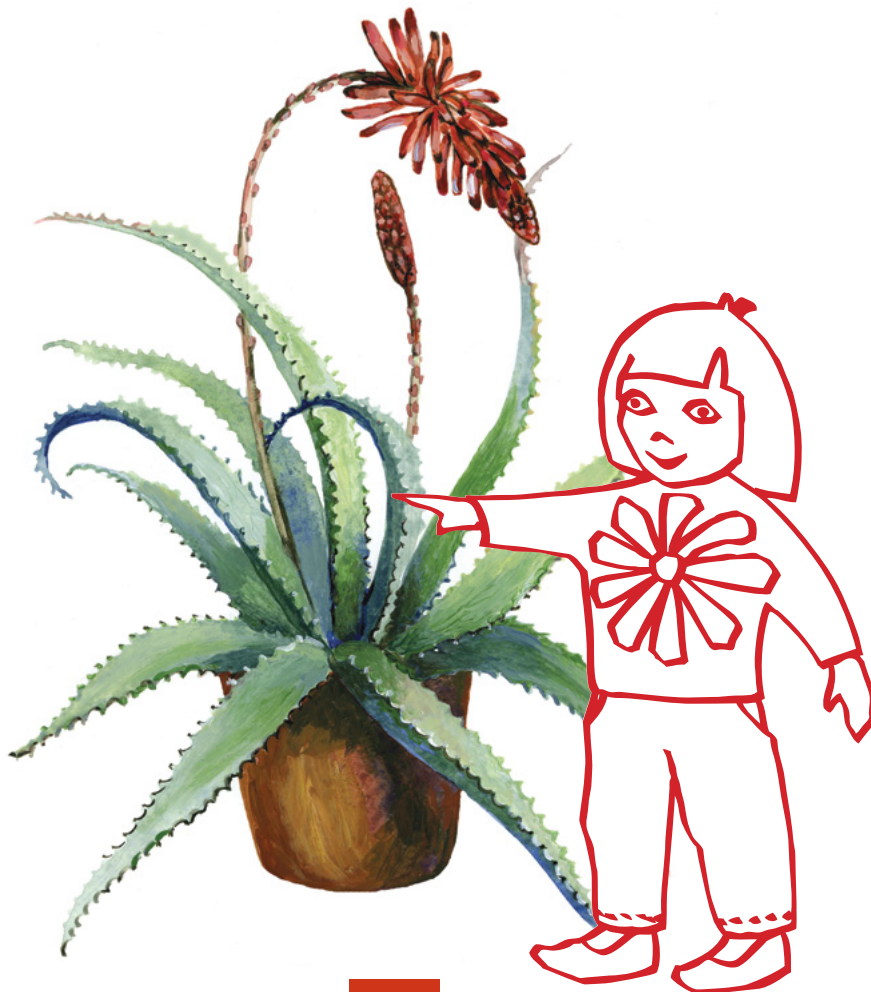
T = 12	R = 14	A = 89	D = 24	E = 5	S = 27	C = 18
N = 36	I = 32	Z = 54	B = 10	H = 23	L = 35	O = 40
P = 74	Y = 8	U = 42	M = 7	G = 51	K = 1	F = 6
V = 16						

Activities:

1. Print out six sets of worksheets and attach letter-number pairs to a wall (space them out, allowing children to move freely). Divide the children into six groups, assign to each group a different plant and hand out worksheets to each child.
2. Have each child fill out their own worksheet, while working with their group to find answers to the calculation puzzles. Correct answers correspond to letters, so have children find matching letters, and combine them into plant names.
3. After a group figures out the latin name of their plant, have them check their work using the QR code on their worksheet. Using the website from the QR code, have children fill the mind map on the other side of the worksheet.
4. Ask children to find the matching plant in the classroom (if you do not have some of the plants, place pictures of those plants in the classroom instead).
5. Have each group make a presentation about their plant to the other children. Encourage the use of slides (Google Slides, Powerpoint, or any other similar application).

Alternatives:

1. One can combine this activity with Plant Passport (3.1).
2. Have the children draw the plants and label their parts.
3. Use the **jigsaw technique** to present about the plant.



3.9. Trail of pearls

Groups of children solve tasks outside, running from puzzle to puzzle in the order of coloured pearls. This way children do not have to wait behind other groups as long as they solve tasks at the same pace.

Season:	autumn, spring
Location:	school yard or sports hall
Duration:	one session + 15 minutes for discussion
Learning aids:	<ul style="list-style-type: none">• necessities for carrying out the lesson• pearl cards• printed (and laminated) assignments• access to the Internet (phone or tablet)• printed pictures of plants• clothespins (can be replaced)• jumping-ladder (can be drawn on asphalt)• ball and cards• candy• markers• laminated sheets for writing• paper plates• egg carton• natural material outside

All printable materials can be found here:

Poisonous plants A5

Non-poisonous plants A5

Topic:	integration of subjects, physical activity, house plants
Objectives:	<ul style="list-style-type: none">● integration of different subjects● finding information about potted plants● teamwork● physical activity● working outdoors

Activities:

1. Find places outdoors where you can set up eight stations using printed activities such that children would need to move the longest possible distance between the stations.
2. Divide the children into eight groups (for example by distributing coloured marbles).

Give each group a coloured pearl card and explain that the children need to solve puzzles at each station. The order of stations is given on their pearl card (the order is the same on each card, but they start with a different colour. So, for example, the first group has pink first, blue second and green third. The second group starts with blue and continues to green, etc.)

List of stations:

- 1 Is the plant poisonous or not?

Google the Latin name and attach the correct sign.

Checklist for teachers

- | | |
|------------------------------|----------------------------------|
| 1. <i>Spathiphyllum</i> | 1. <i>Schlumbergera truncata</i> |
| 2. <i>Epipremnum aureum</i> | 2. <i>Nefrolepis exaltata</i> |
| 3. <i>Cycas revoluta</i> | 3. <i>Tradescantia</i> |
| 4. <i>Hoya</i> | 4. <i>Crassula portulacea</i> |
| 5. <i>Monstera deliciosa</i> | 5. <i>Chlorophytum</i> |

- 2 Make a self-portrait using natural materials.

Take one paper plate. Make a self-portrait using natural material. Be gentle to nature, use materials found on the ground.

- 3 Find natural objects and fill your egg carton.

Take the egg carton and find items from nature. Turn over the hour-glass, you have 5 minutes. Take a photo of your egg carton.



- 4 Use the letters in the word BIODIVERSITY to form as many other words as you can.

Use the letters in the word BIODIVERSITY and write other words that you can make using these letters.

For example: very, rise ...

Write the words on laminated paper using a marker. When you have finished, please clean the paper.

5 You found treasure! Eat up to two pieces of candy and enjoy being outside.
Take two pieces of candy and just enjoy being here!

6 Connect plant pictures with their Latin names. Google the names.
Read the latin name attached to a clothespin, google it, attach the name to the correct picture.
When your group has finished, please put the clothespins back into the box.

CYCLAMEN
PLECTRANTHUS
DRACAENA
PHALAENOPSIS
POINSETTIA
FICUS ELASTICA
ZAMIOCULCAS
ALOE
SAINTPAULIA
BEGONIA

7 Follow jumping instructions.
Look carefully at the jumping instructions. Have fun!

Jumping instructions can be found here

The instructions are in Estonian, but you can follow the pictures which show where you should place your right and left foot (Green/V for left, Orange/P for right). It also sometimes asks you to bounce a ball or change direction. The latter is designated with arrows.

Instructions for the pearl trail

Create stations by affixing different coloured bases in the forest, yard or in the park, and each group of children receives sequence cards with colored beads. Children move from station to station in the order of bead colours on their card (if your beads are yellow, blue, red, then go to the yellow station first, then blue and red last) and solve tasks.



Equipment Required: Coloured bases of the same color as the beads (at least A4) to be attached to trees. Task cards that are attached to colored bases. Laminated motion cards with beads. To ensure that groups are scattered, each card has a row of beads with a different order. For example:



You might want to add additional worksheets on the ground so that children don't need to wait for others empty handed. The worksheets can be games or additional bonus tasks.

Instructions: Hang 8 different colored dot markers / task card bases (eg: red, green, blue, yellow, brown, black, pink and orange) on trees in the forest, park or yard. Each station has a task for the children (attached, for example, with blue tac). Try to ensure that each group spends a similar amount of time at each station. However, if a group completes their task earlier, the group will need to quietly wait until the previous group at their next point completes their task. If available, they can do the bonus worksheet during this time.

If necessary, include equipment required to finish the task at the station. Students are divided into groups of 4-5 members. Each group has its own movement card with beads attached to it. The movement is done according to the color of the beads (Example: if the first bead is blue, the point with blue markings is first found, the next is yellow - moves to the point with yellow markings, etc.). The station has a description of the task and the children are supposed to complete the task before moving to the next station. Once the task is complete, push the respective coloured pearl through the hole and go to the next point. When all the beads are on the back of the card, the track is complete.

3. Make a summary (could be done in the classroom).
4. Collect feedback from the children about each group.

3.10. Photosynthesis

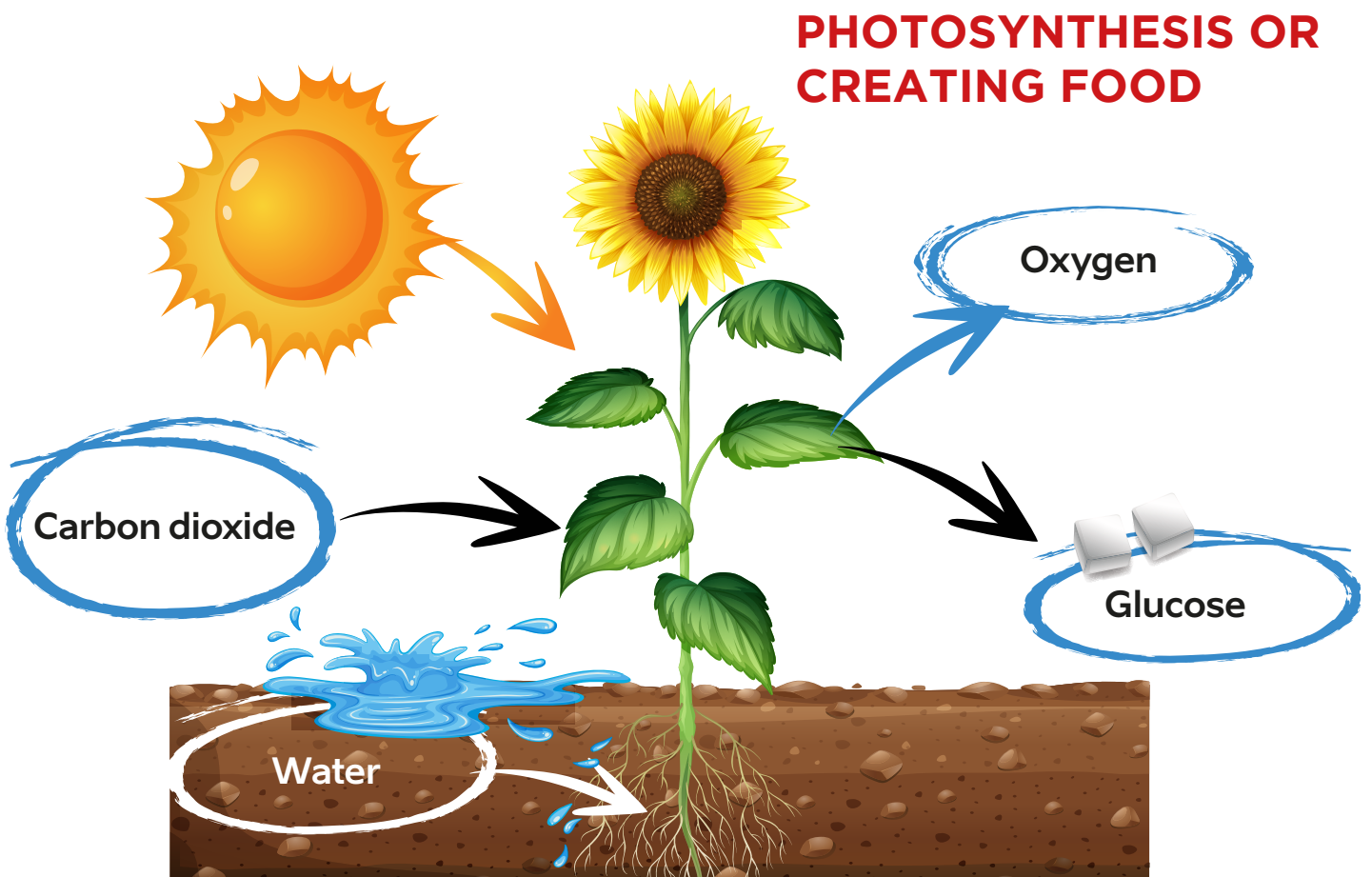
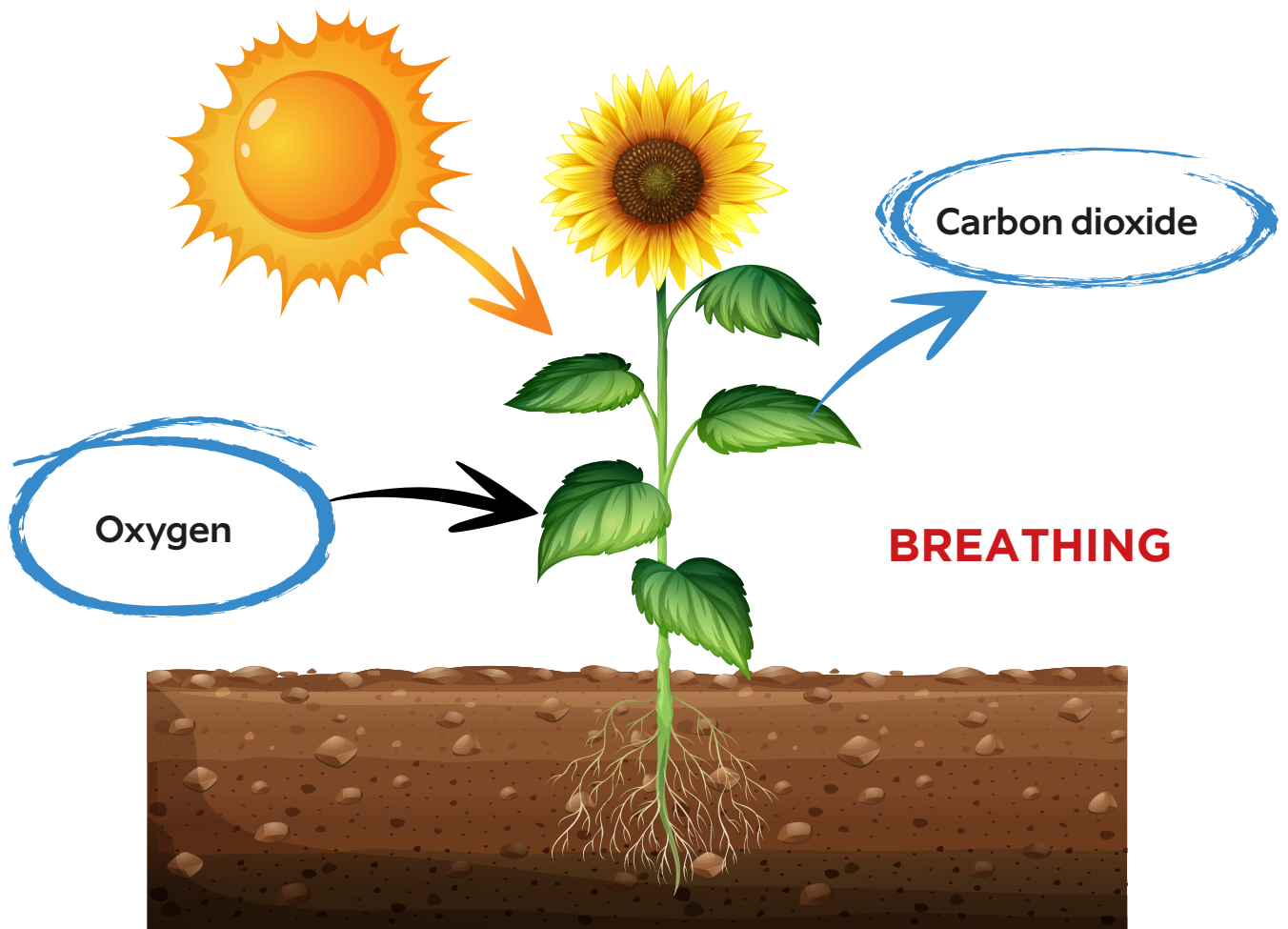
Children learn about photosynthesis via playing two games that illustrate the process.

Season:	all year, as long as the weather allows
Location:	classroom, school yard
Duration:	two sessions
Learning aids:	<ul style="list-style-type: none">• computer and beamer• 20 m of rope or string• cloth markers: 5 white, 5 blue, 6 red, 4 green• two large dice (10cm x 10cm or larger)• 18 laminated exercise cards that can be hung on branches
Topic:	integration of subjects, physical activity, potted plants
Objectives:	<ul style="list-style-type: none">● photosynthesis● integration of different subjects● mathematics● biology● teamwork● physical activity● working outdoors,

Activities:

1. Present a few slides on photosynthesis, emphasizing the way in which plants both require oxygen and produce carbon dioxide like humans and other animals, but they produce more oxygen than they consume because they produce energy storing glucose from carbon dioxide and water, which produces oxygen. Optionally, provide glucose pills or candy so children can taste the sweetness of glucose. Crucially, plants require sunlight for this process.

- Plants breathe the same as animals. This includes moss, lichen, grasses, trees, etc.
- Plants feed themselves using water, carbon dioxide and sunlight. By the process called photosynthesis, they produce glucose.
- If plants do not have sunlight, they feed themselves by consuming the glucose they produced earlier. (Optionally keep some seedlings in the dark and show that they are withered compared to seedlings growing in sunlight. Remind children of when they saw something covering grass for a few days, it turned yellow.)
- The production of food (photosynthesis) occurs in the green parts of plants — mostly leaves and stem, but sometimes even in green roots such as with some orchids.



2. Have children sketch the process of photosynthesis and take it home to tell their family about it. Let children discuss it in groups first.

3. Play a game of photosynthesis outdoors, in the school yard or somewhere else with enough room.

- Draw the outline of a leaf on the ground using the 20m rope. Place the red and green markers in the middle.
- Assign five children to be droplets of water with blue markers and assign five children to be carbon dioxide with white markers. The remaining children stand outside of the leaf.
- First send in the five water droplets. They move around inside the leaf freely. Secondly, send in the carbon dioxide children. Tell them to pair up with one of the water droplets by taking their hand. The pair crouches down on the ground and stays there. Finally, send in the rays of light. Tell them to choose a water-CO₂ pair and recite the spell:

Slurp water from earth,
suck gasses from air,
feed using the sun!
Give back lifegiving air,
green leaves to eat and share,
lest the Earth ends up bare!

- At the end of the conjuring, the water droplet puts down its marker and picks up a red marker to signify the transformation into glucose (food), while the child pretending to be CO₂ drops his or her white marker and picks up a green marker signifying oxygen. Have the oxygen children leave the leaf, but the last two need to return to the leaf as the plant needs oxygen too.

4. Play a dice game with exercises:

- Form groups of two or three children.
- Have each group roll a die and run to find the exercise card with the corresponding number. Ask the children to return to you every time they solve the exercise at the back of the card to check the answer. If the answer is correct, have the children roll again but this time they add the result to their previous number and find that exercise card.
(If the sum is greater than 18, go to 18 instead.)
- There is no winner, so if some children are quicker than others or there's time left over, have the groups play the game from 18 to 1 instead, subtracting instead of adding.

Questions for the photosynthesis dice game.

1. Which of these makes its own food or, in other words, photosynthesises?



2. Which of these plant parts do photosynthesis?



3. Which of these do not photosynthesize?



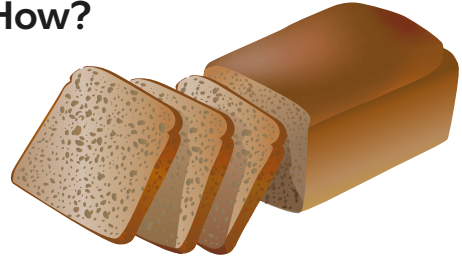
4.

Which of these are necessary for photosynthesis?

Water, dirt, CO₂, lightning, sunlight, wind, oxygen

5.

Is bread related to photosynthesis? How?



6.

How do plants benefit from photosynthesis?

7.

How do people and other animals benefit from the fact that plants photosynthesize?

8.

Do plants breathe?

9.

Do plants breathe CO₂ or oxygen?

10.

What kind of energy does a plant need to power photosynthesis? Wind power, electric energy, solar energy?

11.

In which leaves do plants do photosynthesis?



12.

How many vowels does the word "photosynthesis" include?

13.

How many syllables does the word "photosynthesis" include?

14.

Form three new words from the letters in the word "photosynthesis".

15.

How does one call the food produced via photosynthesis?
Is it syrup, glucose, fruit?

16.

What's the sum of the letters in the word "photosynthesis" if the value of the letters is:

P = 1, **H** = 2, **O** = 0, **T** = 3, **S** = 4, **Y** = 5, **N** = 6, **E** = 7, **I** = 8

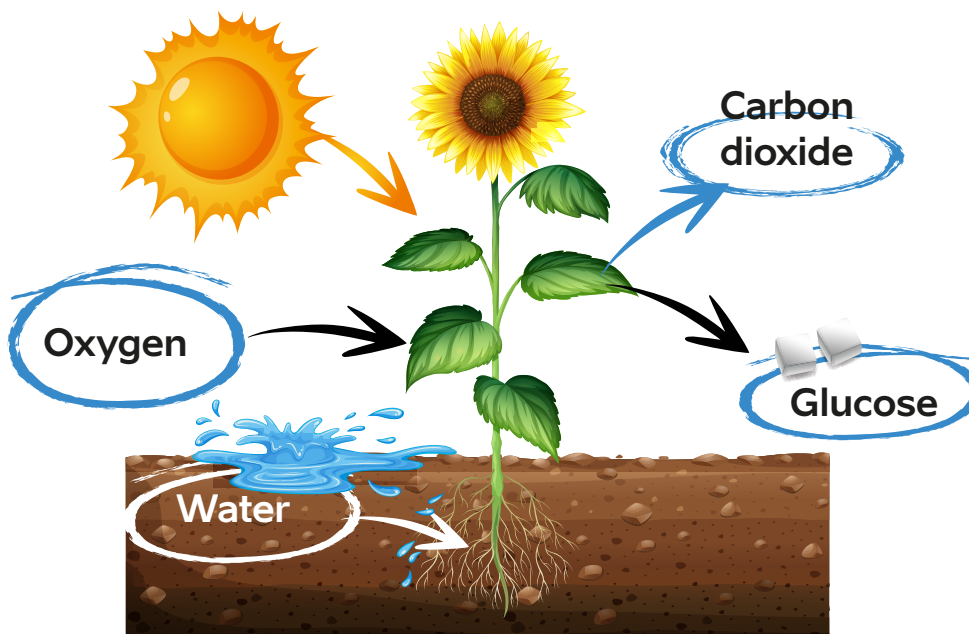
17.

This is an old phone with numbers corresponding to three letters. Which number keys would you need to press to spell "oxygen"?



18.

What's wrong with this picture?



Answers:

1. Seaweed, bushes, trees and rhubarb
2. Leaves and stems
3. Frog and swallow
4. Water, CO₂, sunlight
5. Bread is made from flour that's made from grains that photosynthesize.
6. Plants feed themselves with photosynthesis.
7. Oxygen, food.
8. Yes
9. Oxygen
10. Solar energy.
11. All of them, including the needles.
12. The word "photosynthesis" includes four different vowels, five in total.
13. The word "photosynthesis" has five syllables.
14. You can form many words, including: pot, sent, hint, hope, honey, spoon, stone, tiptoe, python, typhoon, hypnotise, etc.
15. Glucose.
16. The sum of the values of the letters is 49.
17. 699436
18. The plant is shown to release CO₂, but it releases oxygen instead.



Projects for 7-9 year old children

4.1. From a vegetable garden to a canteen

Build a vegetable garden in the classroom.

Season:	March-June , or August-October
Location:	classroom and school yard
Duration:	two sessions
Learning aids:	<ul style="list-style-type: none">• QR code reader• seeds• soil or compost• rulers and other measurement tools• pots (or plastic bottles cut in half)• trays• shovels• smartphones or tablets

<http://bitsboard.com/>
<https://www.playosmo.com/>

Topic:	Environmental education, integration of subjects in which both literacy work using the methods of " Beginning Literacy " and mathematics, social and natural sciences interweave under one whole with an emphasis on biodiversity. The basis of the work is the books The Flowers on the Roof and Come and check out the circuits.
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Objectives:	<p>children</p> <ul style="list-style-type: none">● learn to sow seeds and pre-cultivate before planting● understand that some plant needs cannot be met outside due to the weather● share what they learn about plant and conservation with their families● translates his knowledge of the type of food and herb garden from the book "The Flowers on the Roof", by Ingibjörg Sigurðardóttir● know the concepts perennial and annual
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Activities:

1. If possible, read "The Flowers on the Roof" by Ingibjörg Sigurðardóttir with the children. The book tells the story of an old Icelandic lady who is used to living in a cottage where she could grow food on the roof. When she moves into the city, she works hard to build a garden on the roof, so she would still have a garden. Ask children whether they would also like a beautiful garden that grows them food.
2. Discuss with the children to decide which plants to grow in the classroom. For example: tomatoes, bell peppers, apples, yellow melons, lemon. Discuss the different growth times.
3. Collect seeds by having children bring some from home, preferably by extracting them from food they eat. Also organize a visit to the canteen with the children and extract seeds there together with the staff. You can also take the children to collect seeds outdoors, if the location allows.
4. Acquire soil, preferably by making compost out of food waste at school. (E.g., see lesson plan 2.5) Reserve an area in the classroom for the plants.
5. Sow the seeds into small pots (if they are transparent, such as halves of plastic bottles, then you can follow root growth as well). Label every plant and take photos of the process. Upload the photos to a shared account, such as **Bitsboard**. (Optional: let children explore Bitsboard for additional educational games.)
6. Discuss the needs of plants: water, light, temperature, and enough room to grow. Compile a schedule by which children can keep track of the watering, transferral to a larger pot and other needs. Continue to take photos of the progress and measure the plants (and conditions).
7. If the species and weather allow, transfer the plants to the school yard in spring, and take care of them there.
8. Harvest the plants together and take them to the school canteen (inform them well in beforehand) for use to enhance school meals with fresh produce. Freeze the surplus for later. Extract seeds carefully to continue the garden.



Alternatives:

- Use Bitsboard to make a word game that helps remember the plants name and how to write them. Also consider Osmo word games. Have children share the games and play them on their smartphone or tablet.
- Make an online album showcasing the progress of the plants, generate a QR code to share it with others.
- Exchange seeds with a school from another country.
- Let children build a model of the Icelandic cottage where the old lady lived from Paper Mache.
- Generate mathematics puzzles with the data from measurements of plant growth, temperature, water levels and more.
- You can see photos via the QR code from one school running this project where the photos and the QR code have been made by the children themselves:



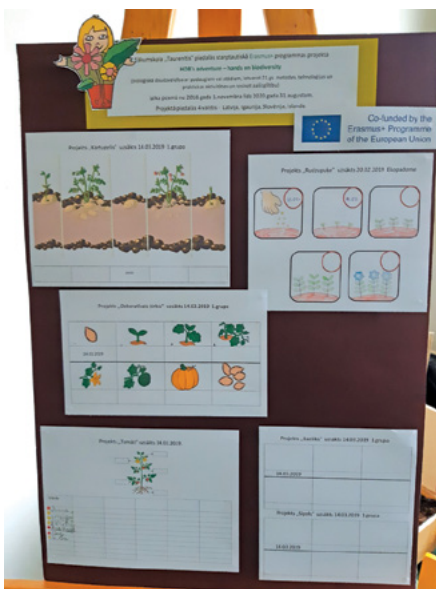
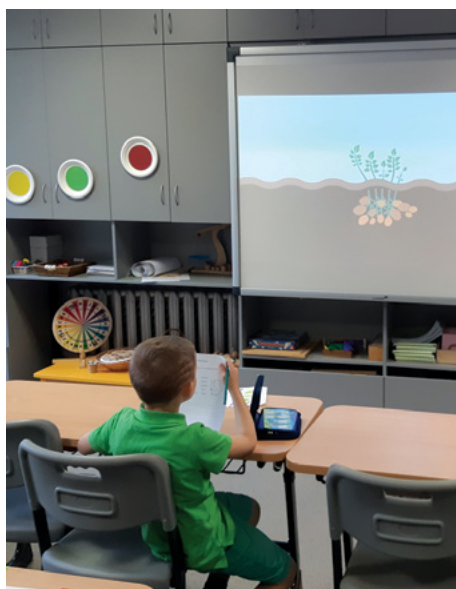
4.2. Potato project

Grow potatoes in the classroom. This is a more demanding version of growing vegetables in 4.1.

Season:	spring
Location:	school premises
Learning aids:	<ul style="list-style-type: none">• boxes• soil• potatoes with a short growth cycle• plastic bags• leftover furniture, if available
Topic:	environmental education, natural sciences, growing food
Objectives:	<p>children</p> <ul style="list-style-type: none">• understand the growth cycle of plants• find out where some common foods come from

Activities:

1. Discuss problems with store-bought vegetables, such as transportation costs and related pollution.
2. Find containers for the potato garden. Old chests, drawers and various boxes can be repurposed as a potato bed. Acquire soil, preferably from compost (see 2.5).
3. Show pictures of potato plant parts, and discuss the difference between sowing seeds and planting tubers.



Watch movies about growing potatoes:

How do potatoes grow

Potato tuber timelapse

- 4.** Plant the tubers in the soil, taking photos along the way. Upload the photos to a shared environment.
- 5.** Generate a schedule by which children water, measure and take care of the potatoes daily. Make a poster of the project with pictures and add measurement data to it.
- 6.** In addition, collect stories, puzzles and various creative tasks about potatoes.



4.3. Seeds as a source of energy

Learn about seeds over three sessions by looking at cereal seeds under magnification, planting them and by baking cookies.

Season:	any
Location:	classroom
Topic:	environmental education, natural sciences, growing food
Objectives:	<div>children</div> <ul style="list-style-type: none">● observe, sketch, distinguish, describe and identify seeds of different plants● look for similarities and differences, and sort/edit according to a selected variable● learn and improve skills at using a dropper and various optical aids (magnifier, microscope)● understand the importance of pictograms for dangerous substances (in the case of iodine)● know that plants are a source of food for other organisms (including humans)● realize that food contains substances that the body consumes for movement, growth, development and proper functioning● understand that some waste (plant residues) can be decomposed - we can compost them● know how to prepare for work and clean up after work is completed● learn about the timing of events and use some basic terms such as: before, then, yesterday, today, tomorrow, week, day of week, day, month● discover that young plants grow from seeds● know that living things, including plants, get food, air, water, etc. from the environment● learn that living things need a place to live● know that when mixing substances, the properties of the ingredients may or may not change● observe material changes during baking/heat treatment● know how to describe and distinguish substances and classify them by their properties (e.g.: state of aggregation, hardness)● know how to follow a workflow plan or scheme,● know how to transform by kneading and cutting● realize that food contains substances that are essential for the body to move, grow and function properly● know that waste is generated in everyday life that needs to be taken care of and that some waste can be reused

- know that eating healthy allows them to grow and develop and help them stay healthy
- are aware of the importance of diversified diets and develop sociality associated with eating, understand the importance of collaboration and know the importance of division of labour

Learning aids:

First session:

- tray
- spelt (dinkel wheat) seeds (paddy), bean seeds and some examples of seeds of other plants (e.g. sunflower seeds, wheat, etc.) (5 different seeds in total)
- leaflets with plant names (depends on the type of seeds)
- picture of plants or examples of plants (fresh or herbarium)
- hand magnifier (magnifying glass)/ digital microscope
- a microscope
- glass
- a knife or scalpel
- microscope accessories (dropper, water glass, microscope slide and cover glass, spatula)
- spelt (dinkel wheat) and wheat flour (1 tbsp in petri dishes)
- iodine solution (iodine test) in a drip bottle (pictograms for hazardous substances!)
- gloves
- paper towels

Second session:

- tray
- spelt (dinkel wheat)/wheat and beans seeds (may also include other types of seeds, e.g. sunflower seeds, pumpkin seeds)
- glass jars for lodging,
- paper towels
- tweezers
- two planting pots (or more)
- soil for planting plants, compost
- water sprayer

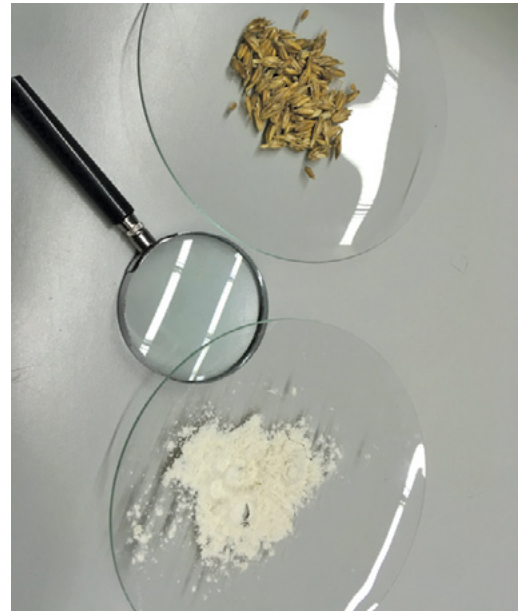
Third session:

- ingredients for biscuits — spelt (dinkel wheat) rock cookies (for about 2 trays of smaller rocks):
- 50 dag spelt (dinkel wheat) flour
- 1 baking powder or wine stone
- 19 dag of sugar
- 17 dag butter
- 3 eggs
- 2-3 tablespoons milk
- grated lemon zest
- sliced walnuts (1-2 fists)
- plastic bowl for kneading dough
- baking paper
- oven (with two baking trays)
- cutting board and knife
- kitchen scale
- containers for weighing ingredients
- spoon
- dining knife
- serving tray/plate or cookie jar

Activities:

1. Arrange for some older children to join the sessions (two or more).
2. First session (2 x 45 minutes)
 - Give students a bag of different seeds and ask them to sort them into groups (for simplicity limit them to one variable at a time). Encourage them to halve some seeds (if necessary, help them by soaking the seeds first, removing the shell or wrapping, etc). Discuss the criteria for sorting after they have had a chance to try it themselves. Sort again using different criteria.
 - Ask children to identify the plants by the seeds. Provide leaflets, books and access to the Internet.
 - After children have spent some time observing the seeds, hand out magnifiers and have them take a closer look.
 - Discuss how to decide which seeds are edible and whether they need to be milled into flour first, or not.
 - Have children sketch a comparison of different cereal seeds.
 - Take a closer look at the halved seeds and flour by using magnifiers or a digital microscope.
 - Explain what iodine is and why it is dangerous. Hand out gloves. Have children drop a bit of iodine on the halved seeds and flour and observe changes in colour.

- Have children prepare a microscopic preparation of coloured flour showing starch grain globs in both the flour and the seeds themselves. Sketch the image from the microscope. Explain that starch is how most green plants store energy, which humans can then consume.
- Clean up carefully, separating the iodine-infused seeds and flour and disposing of it safely. The rest of the seeds and flour can be put into compost. Have children wash their hands.



3. Second session (45 minutes)

- Place the plants on a tray. Give children time to observe the plants.
- Let children fill pots with soil and plant half the seeds by making a small hole with their finger, placing the seed in the hole and covering it with soil. If children are planting a seed that requires light to germinate, such as parsley, don't let them cover it with soil. Label the pots with the name of the plant, the planter and the date. Place them in a location with plenty of sunlight.
- At the same time as planting into soil, have children fill glasses with paper soaked in water. Place seeds in between the glass and the paper (use tweezers if necessary).
- Clean up the area and wash hands.
- Set up a watering schedule for the children and have them use a water sprayer to water the plants regularly. Have children sketch the progress of the plants with dates in a journal.
- After several weeks of observation, discuss what the children have noticed about the needs of the plant. Guide them to realize that seeds carry nutrients required for the plant to grow in the beginning. Discuss what to do with the plants: transfer them into soil, plant them in the school yard or compost them.



3. Third session (45 minutes)

- Read the recipe together and explain it step-by-step. Give safety instructions before working with knives and heat. Have all children wash hands and pay attention to hygiene while working with food.
- Have children prepare the dough and form rock cookies. Bake them in the oven.
- Discuss how the ingredients changed in appearance when you mixed them together and baked them. Explain the role of starch in the baking process and remind them that we learned in session one that starch has a great deal of energy for us.
- Discuss the difference between white flour and whole grain flour. Explain the benefits of using spelt (dinkel wheat) flour — it's more disease-resistant wheat. Conclude with a discussion of nutrients and the need for dietary fiber.
- Have children choose when and where to do the tasting of the cookies and have them store them properly.
- Clean the surfaces, wash the dishes, and wash hands.
- Enjoy!

Cookie recipe: SPELT (DINKEL WHEAT) ROCK COOKIES

Ingredients:

- 500 g spelt (dinkel wheat) flour
- 1 satchel of baking powder or winestone
- 190g of sugar
- 170g of butter (cut into small pieces)
- 3 eggs
- 2-3 tablespoons of milk
- lemon zest from one lemon
- sliced nuts (1-2 fistfuls) (cut into small pieces)



Process:

Combine the ingredients and knead the dough. Tear small pieces of dough and shape them into cookies by hand. Place them on a greased baking tray or on baking paper. Bake at 180-200 ° C. The cookies should be done in about ten minutes (or when they start turning slightly brown).

4.4. Microgreens in the classroom

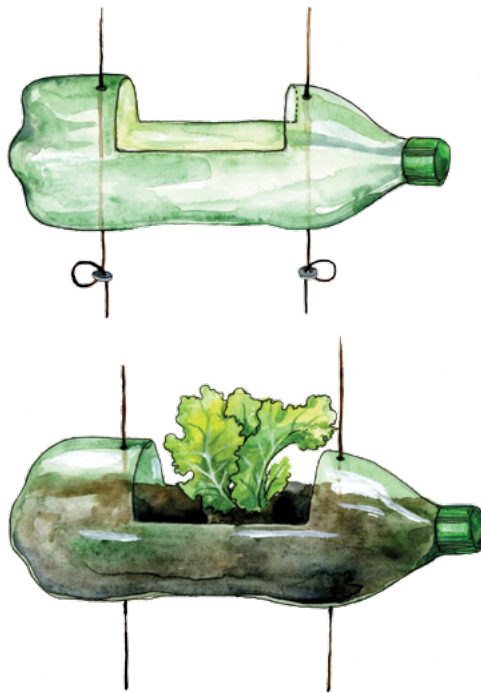
Learn about plants and their role as a source of food and enjoyment by planting microgreens in the classroom.

Season:	winter to spring
Location:	classroom
Learning aids:	<ul style="list-style-type: none">• seeds of different types of greenery, grain and herbs• empty bottles• sticks and cardboard• computer• camera or smartphone• web application Posadi.si (for Slovenia), or MyGarden, Moon & Garden, Plantix
Topic:	environmental education, natural science, digital education
Objectives:	<ul style="list-style-type: none">• children• can explain the external structure of plants• know the importance of plants• know that green plants are living beings that produce important gas (oxygen) used by themselves and animals, including humans

Activities:

1. Bring fruits and vegetables to the classroom (apples, strawberries, tomatoes, peppers, beans, apricots, oranges, avocados, etc). Look at the fruit, cut them open to see what's inside. Ask children why they think plants grow something that humans and other animals find tasty. Guide the discussion such that children realize that fruit contain seeds, and the tasty flesh of fruit both provides nutrients for the seed to grow and incentivizes animals to distribute the seeds over a large area. Ask about the seeds of different plants such as salad, cauliflower, grass, etc.
2. Show a number of seeds. Ask children to try and identify them based on what they saw before. Discuss the needs of plants — what does a plant need to grow from a seed? Why do seeds have different sizes and shapes?
3. Introduce the concept of microgreens in a computer room or with tablets/smartphones. Allow children to search for microgreen facts on the Internet. Have them work in pairs or groups to make mind maps (either on paper or by using an application) about microgreens which include the needs of plants and list suitable vegetables and spices. Check the information and let each pair or group choose a plant or several for sowing.

4. Have children cut into the side of plastic bottles and fill them with soil (see the picture below). Let them use a finger to make a dent in the soil, insert the seed and cover it with soil. Have children water the soil (touch the soil, if bits cling to fingers, it's sufficiently moist). Place the bottles somewhere that has sunlight.
5. Make sure children label the bottles with their name, the name of the plant and the date. Optionally, have children craft or paint signs that can be attached to the bottles, or print a photo of a corresponding mature plant.
6. Set up a watering schedule to ensure the seedlings have enough water.





- 7.** Let children measure the growth of their plants regularly and write down the results in a notebook (or a shared Google sheet). Sketch or take photos of the changes to its stem, leaves, roots and other parts. Continue making observations at least once a week for one and a half months.
- 8.** When the plants reach 3-5 cm (peas might be taller), cut them with scissors to complement school food such as sandwiches. Let children taste all of the plants and discuss the different flavours.
- 9.** Encourage sowing microgreens at home. Discuss different uses of microgreens, such as different recipes. Allow the children to research the topic on the Internet. Optionally, prepare one of the recipes in the classroom.
- 10.** Once the plants reach 6 weeks, transfer them to the school garden and continue observing their growth there. Before the transferral, identify other plants in the garden using PlantSnap and other identification tools. Have children plan a sowing schedule using an application such as Posadi.si, MyGarden, Moon & Garden, Plantix or another. Remind the children of the importance of pre-planning a garden as some plants get along and others do not.

Alternatives:

- 1.** In order to observe the development of roots, place the soil and seed in transparent bags that you can fix to a window using sticky tape.
- 2.** Arrange to exchange seed surprises with another school — don't let children say which seeds they'll send, only information on planting and timing (as this can vary greatly in different types of vegetables and ornamental plants). Preferably use seeds which do not need a long time before they start growing. Schedule a group video call (Skype, Google chat, etc.) between the children to discuss the experience and compare successes. This can be done with a group from a different country to practice foreign language skills, learn about their culture and their flora.



Examples of customizing projects to the local environment

5.1. Re-planting Icelandic trees

Reducing soil erosion and neutralizing carbon from the atmosphere by planting trees. **“A large tree often sprouts from a small seed”**

Project by Krakkaborg kindergarden, Iceland

Participants: 4-5 year olds

Timeframe: February 15th-July 3rd, 2019

Teachers first received instructions from a forester on how to handle pine seeds.

The goal was for the children to learn about the history of Icelandic woods and types of trees in the country at the time of settlement. The children listened to talks on how forests reduce soil erosion and how they impact the way carbon is neutralized from the atmosphere. The students picked pinecones and saw first-hand how a seed becomes a tree and how they grow in different environments. In addition, the students used technology such as projectors and a USB microscope.

The project started with the students picking pinecones

Before going to the woods to pick pinecones, the teacher talked about how best to pick them—it's best to wear mittens to avoid pricking one's finger. Also, it is better to twist the cones off in order not to harm the tree. Then the group went into the forest for the picking. Back in school the pinecones were placed in a warm spot for them to open.

When the pinecones had opened, they were put in paper bags and shaken. The students let the seeds fall to the floor but when doing so the shape of the seedpod acts as a helicopter wing, so the seeds fall slowly. The seeds were placed in water (the ones that float are not usable) and two days later placed on tissue paper for drying before being placed in a box and in a refrigerator. Some of the seeds were placed in a box and stored in a refrigerator for a week. Others received cold stimulation; sat in water for 48 hours before pouring out the water and placing the seeds in a well-sealed plastic bag and then kept in a refrigerator at 2-5 degrees Celsius for 2-3 weeks.

The students studied the seeds under a USB microscope, and enlarged and projected on a wall. They drew the seeds and watched an Icelandic documentary on how to sow pine seeds. The documentary is called From Seeds Grow Forests Fair. On an outing with a teacher the students looked for pine trees growing from wind borne seeds.



Students drawing seeds

14 days into the project the seeds were sown in a different environment. Some seeds were put in gardening soil, others in seedling soil and seed blocks. Some seeds were placed under lights, others placed by a window. The children were in charge of watering and did a very good job. The seeds put in seed blocks and the ones placed under a light, along with the ones who had received cold stimulation generated the most pine trees.

Eight small pine trees have been placed outside in a vegetable crate. We have put moss around the trees in order to give them shelter.

During the project, we talked about trees in Iceland at the time of settlement. Below you'll find some discussed topics.

At the time of settlement in Iceland, three types of trees grew in the country; Birch (*Betula pubescens*), Rowan (*Sorbus aucuparia*) and Aspen (*Populus tremula*). Iceland was overgrown with forests and from the time the country was settled it took 250 years to destroy the forests. The wood was used for building houses, as firewood, and was also destroyed by lava from volcanic eruptions.

Evaluation of the project by two other schools

The project was tested by one elementary school in Iceland. The teachers who tried the project found it easy to do and interesting and the students were very interested. The teachers felt it was easy to combine working on the project and discussing biodiversity and global issues. The school adapted the project to its own circumstances and the students designed their own seed trays by measuring, sawing and screwing the trays themselves. They then mixed together soil and homemade compost for sowing seeds. The project allowed for spending time outdoors, and children got to move during sessions. Children also had an opportunity to look at plants growing in the school yard. The students documented the process visually by drawing. The biggest challenge of the project is to find space for everything the project entailed.

The foreign school that tested the project found the outdoors time to be a big benefit of the project. The teachers felt that by doing this project the children learned about the cycle of life and nature. They also thought that by doing this project, the children might learn to care for and respect nature in the future and not only during the project itself. It was the teacher's opinion that the plants that grew from the seeds should be planted in a nearby forest in order for the children to be able to continue to discover and explore. It would be nice to choose trees that are common in the vicinity.



5.2. The process of growing fruit and vegetable plants

Season:	any, but done April to June 2019
Location:	classroom, school yard, outdoors
Duration:	half a day many times
Learning aids:	<ul style="list-style-type: none">• soil• compost• containers (to grow the plants in)• ActivPanel• a 65" interactive table (not necessary, you can also use other smaller tablets)• camera• water• clear plastic zipper bags (or you could reuse other plastic bags and close them tightly)• diary (sheets of paper)• measuring instruments• pencils• seeds from selected fruits and vegetables• (e.g. strawberries, golden berries (cape gooseberries), lemons, mango, avocado and watermelons)• carrot tops• paper tissue• spray bottles and toothpicks
Topic:	Learning about the process of growing fruit and vegetable plants, and fruits and vegetables.
Objectives:	<ul style="list-style-type: none">● Children are physically active during lessons.● That children use technology (with assistance) to record the process by using cameras and our brand new ActivPanel, which is an interactive tablet. The process will also be recorded by pencil and paper.● That the children learn that you can grow your own fruits and vegetables by using leftover carrot ends, seeds from fruits we have already eaten and by harvesting seeds from our own plants.

Activities:

1. Watch instructional videos by using the ActivPanel. (Links are to be found under "steps in the project" section in detail below.)
2. Buy or acquire potting soil and compost.
3. Find containers to grow seeds in.
4. Collect seeds from fruits and plants.
5. Plant seeds and care for them.
6. Take pictures of the process, use the ActivPanel to view them and create a picture show that demonstrates the process.

These kinds of growing projects can take a long time and require patience. Sometimes they fail and because of that we decided to try all kinds of seeds in the hope that at least one would work out.

Questions and topics to discuss with children:

- Why do we need fruits and vegetables?
- What do plants need to survive?
- What do humans need to survive?
- What are the benefits of growing your own fruits and vegetables (money, pollution, chemicals and so on)?
- What kind of fruits and vegetables are we able to grow?
- Sometimes we use seeds when we grow new plants,
- how do we get those seeds?
- Do all plants require the same care? (light, water, acidity, and so on)
- How are fruits and blossoms related?
- Which vegetables have edible parts in the ground?

Steps in the project in detail

Strawberries

We are very excited to try to grow strawberry plants. In Flúðir, which is a nearby community, there is a farm called Silfurtún that produces strawberries. These strawberries are called Silfurber and they are delicious. We contacted the farmers to find out which variety they use, and we found out that it is called Sonata. The farmers also gave us four healthy strawberry plants and we are going to take good care of them until summer, and then they can be planted in our garden. When we have managed to grow our own strawberry plants, we intend to plant them alongside the ones the farmers gave us.



First you need to pick some beautiful strawberries and choose a variety that is not a hybrid. Use a knife and cut off the skin where the seeds are. Put a mix of potting soil and compost into a container.

Spread the skin with the seeds on the top of the soil, cover them up with some more soil and water them. In about 2-3 weeks the plant starts to emerge from the soil. Be sure to water the plants regularly. It can take a while for the plant to produce berries, so you need to be patient and enjoy taking care of the plant.

Link: How to grow strawberries from seed

Golden berries (cape gooseberries)



A member of our staff gave us 4 golden berries which came of a plant that had been grown indoors.

Fill a container with potting soil, this plant thrives best in low fertilized soil and sand. Cut the golden berries in half, scoop the insides of the berries out and smear it on top of the soil. Cover the seeds with a thin layer of soil and water it with a spray bottle. Then you just have to wait and see. And remember to keep the plant hydrated.

Link: We did not use any videos here. A friend gave us good advice.

Lemons

The staff in Leikholt love their healthy morning lemon/ginger drink. Therefore it was easy for us to get seeds for our project.

In this project it is best to use many seeds because we don't know how many will germinate. The seeds are very slippery, so you need to dry them off with a paper towel. Around the seed is a thick layer which you need to peel off with your fingernails, this will shorten the germination period. Put the seeds on top of a folded paper towel, put the towel in a plastic zipper bag and dampen it. Close the bag thoroughly and keep it in a dark, warm place for about 8-10 days, or longer it depends on the seeds. Before you plant the seedlings, they need to be at least 1 cm long. When the seedlings are ready, plant them in a container filled with a mix of potting soil and compost and water them frequently. It might take a long time for the plant to produce lemons. How long depends on how well cared for the plant is.

Link: [How to grow a lemon tree from seed](#)

Carrots

Every day at noon the children are offered a variety of vegetables as a side dish with lunch. Carrots are on the menu daily, so it was pretty easy for us to get carrot tops for this project. The carrot tops usually end up in our organic bucket, which then ends up as food for our neighbours' chickens.

We are going to use these carrot tops to grow a carrot plant. This plant does not produce carrots, but it grows beautiful white flowers. When the flowers are brown and dry it is time to harvest the seeds and plant them.

Cut the carrot top of a few carrots (1 carrot top = 1 plant) and put them in a container filled with water (the water should not overflow the carrot top). The keep the containers in a dark place for about 2-3 days or until the carrot tops will have sprouted. Fill a somewhat large container with potting soil and plant the carrot tops. Water it with a spray bottle



and keep it hydrated. In about 30 days the plant might start to bloom. When the flowers are brown and dry you need to harvest the seeds. Now the seeds are ready to be planted, however if it is still cold outside (for those who choose to plant them outside) you can store them for a long period.

Link: [How to collect carrot seeds](#)

Mango

When you decide to grow mango from a seed it is good to choose a very ripe mango. To us mangos are rather exotic fruits, so we were excited for this project. No one around us has a mango plant so we needed to buy one from the supermarket.

Cut the mango in half (see video). Around the seed is a shell that needs to be removed. The seed might have started to germinate inside the shell so be careful. Fill a container with a mix of potting soil and compost and make a hole in the middle. Put the seed in the hole, cover it with soil and water it. Be sure to water the plant frequently. In about 7-10 days you might see the plant emerging from the soil. It might take a long time for the plant to produce mangos. How long depends on how well cared for the plant is.

Link: [How to grow a mango from seed](#)

Avocado

We rarely eat avocados in Leikholt but it is rather common in many homes. A member of our staff had two over ripe avocados and gave them to us. When you decide to grow avocado from a seed it is good to choose a very ripe avocado.

Cut the avocado in half and be careful not to cut the seed in the middle (see video). The seed is very slippery and needs to be cleaned. Around the seed is a brown skin that needs to come off. It will help the seed to sprout. Take 3 toothpicks and stick them in the seed on an angle and avoid the lines/cracks (see video). Fill a clear plastic or a glass container with water and put the seed on top. Only the top of the seed should be dry and remember to add water regularly because it slowly evaporates. Growing an avocado plant is a marathon not a sprint so you need to be very patient. The seed will sprout eventually and when it has developed roots, stem and a leaf/leaves then it is ready to be planted in soil. Be sure to water the plant frequently when potted.

Link: [How to grow avocado from seed](#)



Watermelon

The children in Leikholt sometimes eat melons and like them a lot. In this project we wanted to try watermelon seeds and see if we can grow our own watermelon plant. And if we are lucky maybe grow some watermelons.

Watermelons carry a lot of seeds. Cut the melon into boat pieces and pick the seeds out. Fold a paper towel and put the seeds on top. Open a clear plastic bag (with a zipper) and put the paper towel inside it and dampen it. The seeds should be kept in a dark place for approx. 1 week or until they germinate. When the seeds have germinated it is time to plant them in soil. Fill a container with a mix of potting soil and compost and plant the germinated seeds (seedlings). Remember to water the plant regularly.

Link: Germinating and transplanting melon seeds

(The seeds in this video were store bought but we used fresh seeds)

Afterthoughts:

The first time we harvested all the ripe fruits from our tomato and strawberry plants. Our harvest was pretty good, and it tasted even better. We all agreed that we are pretty good at taking care of our potted plants. However, we were a bit devastated when we discovered that 4 of our strawberry plants were covered with spider mite. A few weeks ago, we noticed that two plants had spider mite and immediately started treatment. We washed the plants, mixed brown soap, lemon drops and water into a spray bottle and sprayed the infected plants regularly, we also sprayed the healthy plants to prevent further infections. Our plan is now to move the infected plants outside and see if the plants (these specific plants are green house plants) will survive in our Icelandic weather (the spider mites do not like Icelandic weather at all). Our fight against the spider mites continued and in the end we experimented with other kinds of treatments. We mixed a few drops of tea tree oil and Fairy (detergent) with water and used it for a few weeks and it worked well.

Our mango plant did not survive along with our carrot plants. We believe that it was because they were not watered over the weekends. However, we are going to try again and by then we have hopefully developed a watering system for the plants. All our other potted plants are doing great. We have Golden berry plants in 5 pots, 5 Lemon plants that thrive, 5 Watermelon plants. But the avocado stone did not sprout but we are going to try again. And now we are also growing Forget me not flowers from seeds in small pots, and they have already started to grow. We have learned a lot in this project and have a so much more to learn.

Between lessons plans we are going to go on walking tours around the neighbourhood (in all kinds of weather and in all seasons) to look at plants and learn about them using our plant guide books. On these walking tours we can also stop to play activity games and exercise our minds and bodies.



5.3. Exploring biodiversity in the forest

Children get acquainted with a nearby woodland area and do various activities there over a number of visits.

Season:	autumn
Location:	forest
Duration:	half a day several times
Learning aids:	<ul style="list-style-type: none">• carts• hammer• measuring tape• cloths• 3 nuts for each child• object of nature• laminated photo collages featuring part of the forest• an alcohol felt pen• different size mirrors• laminated teaching card containing living and non-living objects from the forest• magnifying glasses• setting keys
Topic:	speech and language, environmental education, mathematics, physical education, research
Objectives:	<ul style="list-style-type: none">children<ul style="list-style-type: none">● discover, learn and compare the living and inanimate nature in the forest through play and exploration● use relaxed exercise of natural forms of movement● develop language skills● practice compliance with game rules● learn to classify

Activities:

Use one activity per visit to a forest.

1. Measuring and marking space in the forest

With the help of a forester (if possible), select a suitable part of the forest located near the kindergarten. Choose a section that offers many opportunities for exploration. The size should be 20 x 20 meters. Draw a perimeter with a ribbon tied around carts. Talk to the children about movement within the chosen space.

Together, take a look at the selected space. Children try to list as many things that they see or hear. Try to name the trees that are seen.

In the future visit the same chosen part (leave the carts and ribbon there).

The children, together with the teacher, make sure that their forest is always clean.

2. Forest memory

Collect about 10 common objects from nature (stone, bark, cone, needle, chestnut, seed, leaf, branch, etc.) so that children do not see them. Put them on a cloth and cover them with another one. Gather the children around. For 25 seconds show them what is under the cloth, then cover things again.

Children have 5 minutes (or more) to bring as many of the things that they saw as they can remember (they can search for items individually, in pairs or in small groups). Make sure that each child (or a pair/group) has its own place to collect items. Then count and review to see how successful they were.

In the end, pull objects one by one from under the cloths and say something about them (preferably dramatically). Children are given the opportunity to complete their collection. At the end of the activity the children make one common mandala on the forest floor, using previously collected natural material.

3. Squirrel is preparing for winter

Talk about squirrels before the activity (in the kindergarten or in the forest) - how they live and how they survive in the forest by collecting food in the summer, and hiding it for the winter. Still many squirrels have a hard time during winter.

Each child gets three nuts or hazelnuts, which he must hide in the woods (not all three in the same spot) — just like a squirrel hides his (in the trunks, under the leaves, in the ground,...). After doing this, you can play some other game or sing a song. When some time has passed, we send out "squirrels" to look for their nuts. Do they remember where they hid them?

(Children learn about the life habits of a squirrel, they move and they practise their memory skills).

In a similar way we can choose another animal and some of its lifestyle.



4. Forest photo-orienteeing

Before visiting the forest, the teacher has to take photos of the different parts in the chosen space. Each pair (or group) gets four photos — three are taken from this forest, one photo is an intruder. The children try to find which part of the forest is in the photo and which photo does not belong to it.

5. My photo of nature

We usually look down and do not see what is happening in the tree canopy. During this activity we encourage children to observe and listen.

With the help of different mirrors, they try to capture beautiful scenes and try to describe them with words (they tell one another what they see and why they chose a particular scene). This activity can be done by taking photos with a smartphone or tablet.



6. Treasure hunt

Prepare learning cards with different objects (a 9-16 item chart, e.g. cone, green leaf, yellow leaf, blue flower, red flower, small stone, moss etc). Children can search for these objects individually, in pairs or in small groups.

7. Free research of biodiversity in a forest space

Children are given magnifying glasses and pictorial identification keys for trees, shrubs, mushrooms, etc. Encourage them to observe as many different plants as possible in pairs and try to find them in the identification keys. The children also take pictures with a digital camera while exploring. Use the pictures to present the forest activities to parents. Later use pictures of plants and small animals to create a memory game. Name the trees, shrubs and other plants.

8. Memory game

Children match in pairs. Each child has to find different natural materials in the forest and then put them on the cloth. The other child observes the materials and tries to memorize them. After a few moments, cover the materials with another cloth, so the other one in the pair has to list as much as material as he can remember.

9. Find a certain colour in the forest

In the playroom, prepare a cardboard box of eggs — children colour each part with a different colour. In the forest, they have to search for materials and things that are the same colour as the ones in the eggs carton. Later, determine how many objects of a particular colour children found. Draw a number of dots for each colour.



10. What is in the bag?

Prepare different materials from the forest (not too many, maybe five) and put in the bag that you later give to children. Each of them has to name the items that are in the bag.

Give empty bags to the children (working in pairs). One child puts three things in the bag and the other one has to find out what is in the bag. Then they change roles.

11. What do I feel?

The activity is played in pairs. One child has covered eyes and the other one is carefully leading him/her to a tree, some roots, flower, etc. The one with covered eyes has to guess what he is touching and he has to describe what it feels like (warm, cold, smooth, rough, hard, soft,...).



5.4. Changes in different ecosystems over one school year

Purpose of the project: to research the biodiversity in a small limited area near the school and observe changes over the year.

Time required: 120 minutes in the first school week in August, then 40-80 minutes every other week over the year. At the end of the school year at least 8 teaching hours are needed for evaluation of data and presentation.

Research period: one school year, from August to June.

Necessities:

- camera or smartphone
- access to computers or ipads
- books and websites about all kinds of organisms and their analysis
- a magnifying glass
- a digital microscope
- thermometer
- small containers for samples
- paper and colours or computers with Power Point

Preparations: pick suitable grounds on the school ground or near the school. If possible try to find different types of vegetation or ecosystems so students can discover the diversity.

Implementation:

At the beginning the assignment is introduced to the students, a thesis is made and simultaneously their presumptions discussed: what kind of organisms do they expect to see/find?

Students are divided in groups of three to four children. Each group picks a research area, around half to one square meter. Either the area is marked or a picture taken so that the group can find exactly the same area again. The group explores the area. What kind of organisms do they find? Small samples are taken inside for further research if necessary. Every species or group of organisms is written down. A picture is taken of the whole area and of things that students think interesting. Students measure the temperature outside and the soil temperature. Small sample of the soil can be taken inside for students to investigate further in a digital microscope. The lesson continues in the classroom after outdoor activities, e.g. to complete species analysis and record results. All data, e.g. species list and pictures, are collected. Here you also need to give

time for discussion. What organisms were found? Did something surprise the students? Regarding the type analysis of organisms, the requirements may be large or small, depending on the age and ability of the students. Examples of lower demands "small plant with purple and yellow flowers", an example of higher requirements would be the species name "Heartsease (*Viola tricolor*)".

Every other week, the groups visit their research area, take at least one picture and look for changes or new organisms. Students also measure outside temperature and soil temperature each time. Every change and measurement are written down. The groups discuss and compare the results.

Before the end of the school year (in May or June) the groups look at all their data and prepare a presentation of their findings in each area - for example a poster or slideshow. In the presentation students describe their area, list of organisms and the changes which occurred over the time (e.g. weather and soil temperature, maybe growth or decrease in growth). Pictures are set in chronological order.

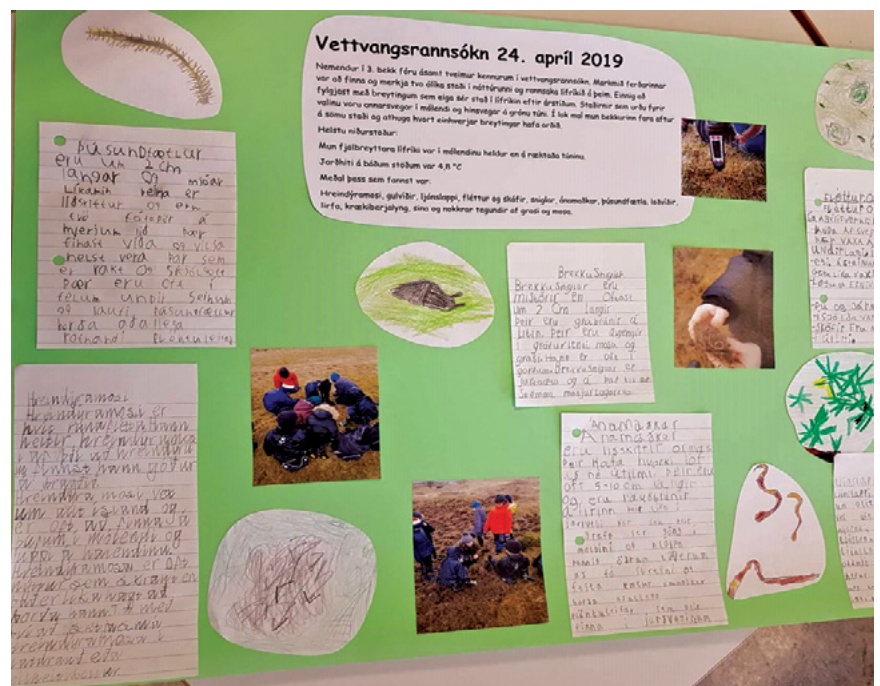
After the introduction the groups participate in a final discussion about the difference between the areas. Would the results be different in another country elsewhere in the world e.g. in warmer climates or colder climates?

A shorter version of the project would go through only one research trip and prepare a presentation afterwards.

Evaluation:

Students evaluate their own participation in the research and the project in whole by answering questions.

Teachers evaluate each student's performance and give comments, using formative assessment.



5.5. Trees around the school

Children learn about specific trees around the school from an interactive slideshow and play various games to reinforce the knowledge.

Age of children: 8 years

Learning methods: conversation, interprets, working with text, presentation, project work, research learning

Learning aids:

- Powerpoint slides about trees
- book
- computers or tablets
- memory game
- crossword in Excel
- board
- tokens (figures to move around)
- dice
- Kahoot!
- Wait

Objectives:

- children
- identify trees around the school
- know morphology (tallness, colour of bark, shape of leaves, fruits), uses and interesting facts about the trees

Description of the lesson plan (4 hours):

Introduction

Show children a **Powerpoint presentation about trees**. Start by slowly revealing a picture of a tree part by part (drag and drop green squares while the presentation isn't in slide mode. Have children guess what's on the picture. Stop the slideshow after the reveal, you'll return to it later.

Similarities and differences among trees

Give each child a tablet with a **picture of a tree** on the screen. Have children decide on criteria by which to split into two groups depending on the type of tree they have. For example, they can split depending on whether their trees have leaves or needles (deciduous or coniferous). Repeat the process using different criteria. Have children describe and name their trees. Discuss what their trees have in common and what are the differences.

About trees

Continue the Powerpoint presentation from earlier. Talk about several trees: *Tilia* (lime tree), apple tree, *Taxus* (yew), spruce, willow, birch and cypress. Talk about their morphology (height, colour of bark, shape of leaves, fruits), uses and interesting facts about each tree.

Discuss trees on the endangered species list (*taxus*) and what can be done to save them.

Book

Have children make a book about trees using **this** template. Fill the blank spaces by writing, drawing and colouring. You can also glue items onto the pages. For example, if a child is working on apple trees, have them first write the name "apple tree" in the top-left blank space.

Memory

Create a game on **matchthememory.com** using **these** pictures of trees. First, have them match names to pictures of leaves, then names to pictures of fruit, etc.

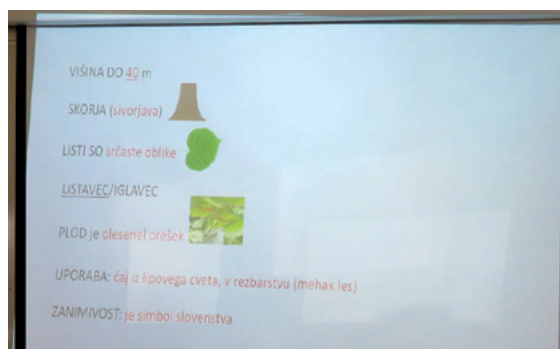
Crossword puzzle

Make a crossword puzzle on Excel or on a specific app such as **Puzzlemaker**. You can print these out too. Some questions for the crossword puzzle:

- Is a yew deciduous or coniferous?
- Which tree has white bark?
- Which tree is the symbol of your country?
- From which tree you can make barrels?
- What is the fruit of a spruce called?
- From which tree can you make baskets?
- Which tree is on the picture?
- Which tree is toxic?

Guessing game

Play a **guessing game**. Show 12 hints (statements) about trees from this slideshow, and have children write down the name of the tree on a piece of paper. Show the answer on the next slide.



Draw or speak

Show a **Powerpoint presentation** where each slide has a picture of a pencil or a mouth. Have children read what is on the slide. If there is also a pencil, have the child draw that which is written on the slide. If there is a mouth on the slide, have the child explain to the others what is written without using any of the words on the slide. Have other children guess what is written on the slide. The child that guesses the correct answer gets one point and is also next to draw or speak to the others.

Take a challenge or wait

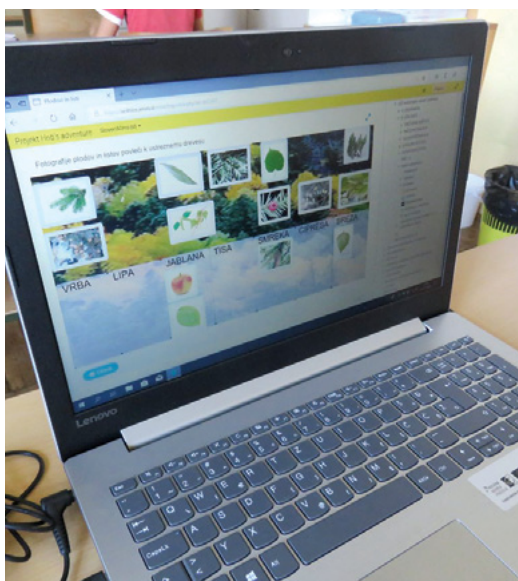
Children play in pairs or in small groups. Give each group a **game board**, dice, tokens and a computer or a tablet with **Powerpoint**. First, children throw the dice and move the token on the board so many spaces as there is a number on the dice. If a child lands on a question mark, he or she has to decide whether to wait for another round or take a challenge. If a challenge is chosen, another player presses the blue triangle on the side of the Powerpoint presentation and reads out the question on the random slide shown. If the answer is correct, the player gets a new turn. If the answer is incorrect, the player must move back to the square from which he started the turn. The first to pass "finish" wins.

Kahoot!

Make a game on **Kahoot!** (game-based learning platform) with **23 questions**. Questions are projected on the board and children choose the answers on their tablets.

Planting

Go to the forest to look for seedlings. Have children dig them out carefully (make sure this is an area where it's allowed!). Plant seedlings in the school yard and observe their development. Make sure to label the trees clearly and to make a map of the yard with the name of the tree and child who planted it. Take photos of changes. If you do this for few years in a row and plant trees in line we can observe changes in years. Bonus: each generation has its own tree in a school yard.



5.6. Secrets of lake Cerkinca

Age of children: 8 years

Learning aids:

- a map
- tablets with QR reader
- a wooden chest with a lock
- keychains
- puzzles in a box
- laminated and coloured decoder
- a shoe box with different materials
- a book with underline letters
- a pen with hidden paper
- a box with sand and marbles
- text with missing letters

Worksheet can be found here

Objectives: children

- identify trees around the school
- learn about tree morphology (height, colour of their bark, shape of leaves, fruit) uses and interesting facts
- learn about local landmarks

Description of the lesson plan:

(1 hour)

Storytime:

According to legend, witches live on the mountain Slivnica and they create weather phenomena. One day the witch Ursula was making weather and instead of just three drops of mouse saliva, she accidentally dropped the whole bottle into the cauldron. She got scared because, she knew that the next day would now be extremely windy. As she was a big fan of rare trees, she was afraid the wind would uproot many of them, or at least break many branches. Unfortunately, it was impossible undo her mistake, she made a chest with the seeds of rare trees so that future generations could replant the trees lost to the winds. To guard it from evildoers, she locked with challenges that only a true tree lover can solve. If you correctly solve all the 7 tasks, you can open this chest. The code of this chest is the sum of all the answers of the seven tasks.

Tasks (can be found here)

Children get a map and there are 7 marks on the map. They have to find 7 different trees, name them and if they do that correctly, they get a list with a QR code. They have to scan the QR code with a tablet and read questions and tasks (hints) about Lake Cerknica. The answers are always numbers and if they add up all seven numbers, they get a code to unlock the chest. In this case, each task was given under a different tree that grew nearby, also teaching identifying trees.

Task 1 Tree: Tilia (lime tree)

Question:

Lake Cerknica is one of the largest intermittent lakes in Europe. How many km² measures the lake when it is at its fullest?

Hint:

Find a small box. The number is on the back of the puzzle.

We printed a photograph of Lake Cerknica and on the other side of a paper is number 30. We cut the photograph in pieces. Children have to assemble the photograph. The puzzles are in a small box near the tree. There is also a tape (glue).



Answer: 30

Task 2 Tree: taxus (yew)

Question:

How many tree species cannot grow elsewhere in Slovenia besides Lake Cerknica?

Hint:

Look under the slide. Touch and feel how many tree leaves are in the box.

In a paper box (shoe box) we put different things. Among them there are two tree leaves. We made a hole in a box so a child's arm can go in the box. Then we glue the box. Without looking they have to touch and feel how many tree leaves are in the box. You can also put bark, twigs, cones, flowers, etc. in the box.



Answer: 2

Task 3 Tree: spruce

Question:

The lake is home to one half of all European mammal species. How many mammal species call Lake Cerknica home?

Hint:

Look in the book, pages 148, 149 in 150.

There is a book near the tree. On the pages 148, 149 and 150 we underline the letters in correct order. When children see the underlined letters, they'll discover the number forty-five (you can use any book that you don't mind underlining letters in).

Answer: 45

Task 4 Tree: willow

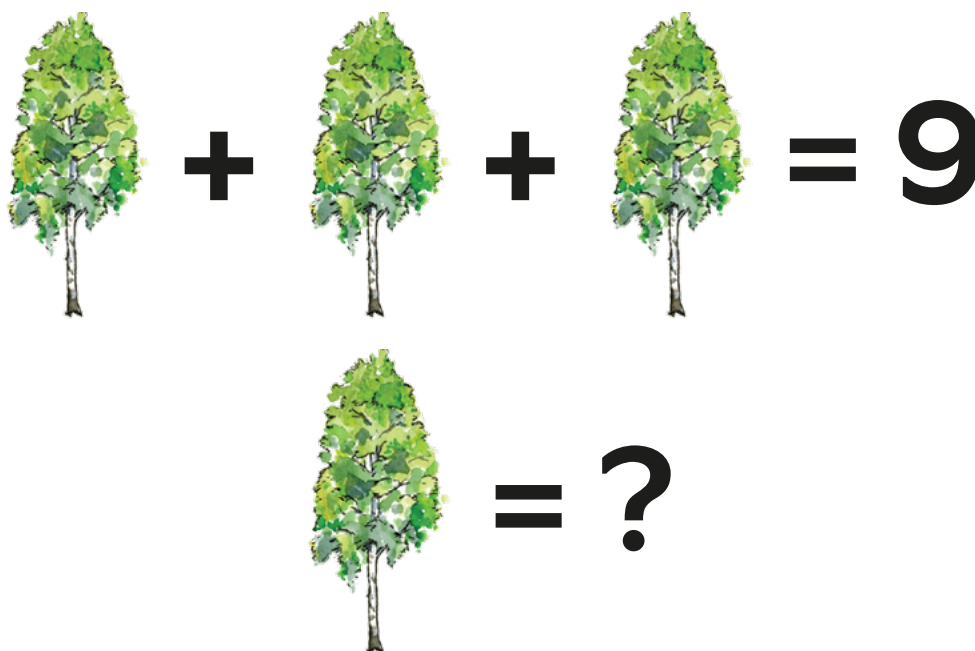
Question:

How many carnivorous plants grow on Lake Cerknica?

Hint:

Thoroughly check the pink pen.

There is a pen near the tree. They have to disassemble the pen and there is a small paper with a task.



Task 5 Tree: birch

Question:

A little less than a third of all European butterfly species can be spotted here.
How many butterfly species can be spotted here?

Hint:

Find all the marbles. Red marble represents number 100, blue marble number 10, and white marble number 1.

We put some sand and also 1 red, 2 blue and 5 white small marbles in a box.

Answer: 125



Task 6 Tree: cypress

Question:

How long was the largest northern pike caught in Lake Cerknica?

Hint:

Which letters are missing in the text about a northern pike?

If they put in the correct letters, they get one hundred and six.

Answer: 106



THE NORTHERN PIKE

The n_rther_ pike (*Esox lucius*), known simply as a pik_ is a species of carnivorous fish. They are typical of brackish and fres_ waters of the Northern Hemisphere.

Pike can grow to a relatively large size: the average length is abo_t 40–55 cm. Norther_ pike are most often olive green, sha_ing f_om y_llow to white along the belly.

Pike are foun_ in sluggish stre_ms a_d shallow, weedy places in lakes and reservoirs, as well as in col_, clear, rocky waters.

The northern pike is a relatively aggressive species, e_pecially with regard to feed_ng. For e_ample, when food sources are scarce, cannibalism develops.

The sum of answers is 311. ($30 + 2 + 45 + 3 + 125 + 106 = 311$)

The children unlock the locked chest. Inside they should find labelled seeds. Tell the children that if those trees ever go extinct, we can replant them from the seeds.

Alterantives:

- You can make keychains with a seed to give to the children.
- You can plant the seeds with the children.

