

**"EXPERIENCE PEDAGOGY, FOREST SCHOOL AND ACTIVE TOURISM"
FOREST SCHOOL MODEL PROGRAM**

(Grade 9)

**1day
Geography module**

SUBJECT AREA / TOPIC ELEMENT: Geographical situation and location, geographical features and characteristics of transport

METHODOLOGY

• GENERAL PROFESSIONAL CONTENT:

- **Location and position of the wider, regional and local geography. Summary and overview repetition and recording of what has been learned about the geographical position and location of the continent, a specific continent (e.g. Europe) , the region, a part of the continent (e.g. East-Central Europe) and the specific country that includes the forest school .**
- **The narrower geographical location and situation within the country - region, county , micro-region/district . They learned about the geographical situation and location of the country (e.g. Hungary), region (e.g. North – Great Plain), county (e.g. Szabolcs – Szatmár – Bereg County) and micro-region/district (e.g. Nyíregyház micro-region/district) that includes the forest school summary and overview repetition and recording.**
- **The location and situation of the geographical landscape, landscape units and sub-landscapes within the country. Summary and overview repetition and recording of what has been learned about the natural geography and location of the country (e.g. Hungary), large landscape (e.g. Great Plain), landscape unit (e.g. Tiszántúl), sub-landscape (e.g. Nyírség) that includes the forest school.**
- **A summary and overview recording of what has been learned about the geographical situation and location of the country, region, county, sub-region/district that includes the forest school (e.g. Hungary / North – Great Plain / Szabolcs – Szatmár – Bereg county / Nyíregyház sub-region) .**
- **"mapping" and getting to know the characteristic traffic geography of the forest school and its surroundings (e.g. Harangodi Forestry School, Napkor) and the forms of transport that enable/ensure its access and accessibility (e.g. road, railway, waterway, bicycle path, footpath) .**



- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work**, **differentiated individual work**, **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

○ **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation , application and use of smartphone, interactive board, film/video, map, mineral and rock collection, model and weather measuring devices .**

○ **Applying/developing various logical-thinking operations :**

- **Applying/developing the ability to think logically/creatively .**

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach .**

● Interactive student/student pair/group - task/tasks :

Group 1 : planning and modeling the journey to the forest school by road using a car using a map, orientator/compass and GPS/route planning program, as well as creating a route map/sketch.

Group 2 : planning and modeling the journey to the forest school by train using a map, orientator/compass and GPS/route planning program, as well as making a railway route map/sketch.

Group 3 : planning and modeling the journey to the forest school by water, using a watercraft, using a map, orientator/compass and GPS/routing program, as well as creating a water route map/sketch.

Group 4 : planning and modeling the journey to the forest school by railway, train and road, with the combined use of a car using a map, orientator/compass and GPS/route planning program, as well as making a railway-road route map/sketch.

Group 5 : planning and modeling the journey to the forest school on a bicycle path using bicycles using a map, orientator/compass and GPS/routing program, as well as creating a bicycle route map/sketch.

+ Active tourism module :

- **Active tourism program (1) :** travel, approach to the forest school, a combination of getting to the forest school by road, using a car and walking.

- **Active tourism program (2) :** travel, approach to the forest school, getting to the forest school by rail, train and a combination of walking tour.

- **Active tourism program (3) :** travel, approach to the forest school, a combination of getting to the forest school by water, small boat/boat and walking tour.

- **Active tourism program (4) :** travel, approach to the forest school, getting to the forest school by rail and road, by car and train, as well as a combination of a walking tour.

- **Active tourism program (5) :** travel, approach to the forest school, getting to the forest school on a bicycle path using bicycles.

Biology module

THEME / THEME ELEMENT: Tree and flower day
METHODOLOGY

1

PURPOSE OF THE OCCUPATION:

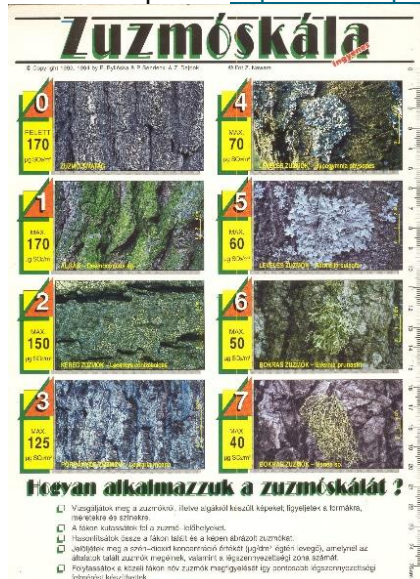
- Gaining new knowledge during the session in the form of research work, using digital tools.
- Searching for lichens in the immediate environment, determining their role in the environment and man point of view. The goal is also to explore whether there is a connection between the biblical manna and lichen.
- Creating a lichen map in the environment of the forest school, observing the basic types (bark lichen, leafy lichen, bushy lichen), distinguishing them, writing down their characteristics, drawing the lichen, comparing them (size, color, shape).

GENERAL PROFESSIONAL CONTENT:

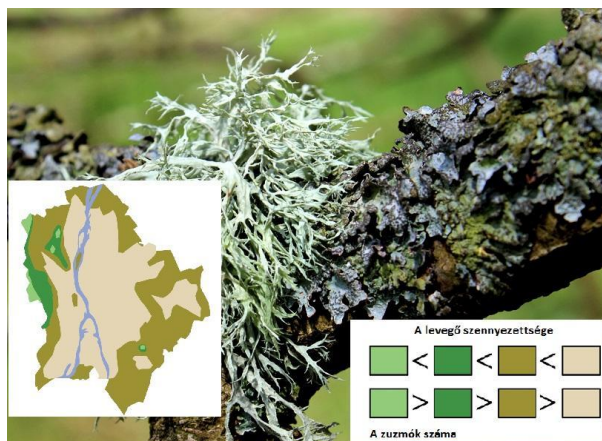
- Definition and recognition of lichens
- exploring the properties of lichens
- learning the steps for creating a lichen map



Image 1 Lichen species <https://hu.wikipedia.org>



Picture 2. Lichen scale <https://kasabiologia8.webnode.hu/masolat-gombak>



3 . image Measuring air cleanliness in Budapest, using a lichen map https://nat2012.nkp.hu/tankonyv/biologia_10/lecke_09_002

- Methodology :

- the students get to know the different types of trees and flowers through different activities, they can gain valuable information
- with the help of a workbook supplemented with a plant identifier, they can explore the flora of the region independently

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student lecture/presentation** (preliminary goal and/or task definition), **pair work** (activity of 2 – 2 students with the same task definition) , **group work** (minimum of 2 -3, maximum of 5 - 6 students' activity with homogeneous and/or differentiated task definition).

- **Application of different methods** :

- **Teacher explanation**, **student experiment/short lecture**, **investigation and observation**, **presentation** , **smartphone**, **interactive whiteboard**, **film/video**, application, use,

Tools: lichen map, smartphone (for lichen identification), worksheets,

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of problem-solving thinking ability and sustainability approach** .

Interactive student/student pair/group - task/tasks

1. Mysterious lichens (lichen hunting)

- Gaining new knowledge during the session in the form of research work, using digital tools. Searching for lichens in the immediate environment and determining their role in terms of the environment and humans. Identifying plants with a treasure hunt game

2. Lichen mapping

- (on the worksheet you will receive the necessary information and work process)

- *The detailed description of the program and the worksheets can be found in the appen*

Physics module

TOPIC / THEME ELEMENT: Kinematics, mechanical measurements, types of movement, speed, acceleration

METHODOLOGY

GENERAL PROFESSIONAL CONTENT:

- Summary and overview, **repetition and recording of what has been learned about movement types** . Summary and overview, **repetition and recording of the basic knowledge of z rectilinear steady, variable and uniformly variable motion, and circular motion** .
- Knowledge and application of the concepts of **track, path and displacement** .
- Creation and analysis of specific movements' **travel-time, speed-time graphs** .
- Differentiate between **average and instantaneous speed** through a specific example.
- Summary and overview, **repetition and recording of the concepts of uniformly changing motion and acceleration** .
- **Timekeeping**: We need to know the principles and methods of timekeeping, including the use of a stopwatch and a phone app.
- **Route planning** : We must know how to use the map and Google Earth application and be able to plan routes and estimate time.

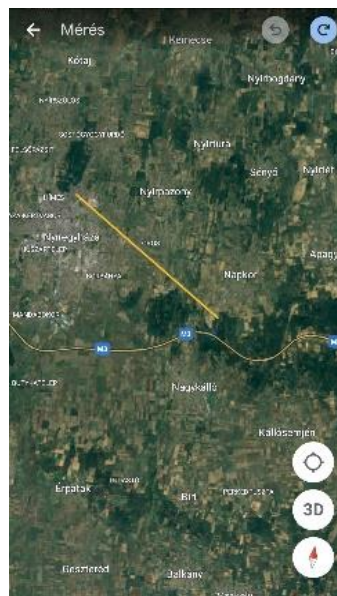


Image: Measuring the displacement with the Google Earth application



Image: Possible trips to the camp: by bike and on foot



*Image: Physics review 2015/10 p. 344
Determining a cyclist's speed and acceleration using measurement*

- Methodology :

- **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods :**

- **Teacher explanation**, **student experiment/short lecture**, **investigation and observation**, **presentation** , **smartphone**, **interactive whiteboard**, **film/video**, **map**, **models**, **use of measuring devices**.

- **Applying/developing various logical-thinking operations :**
- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .
- **Application/development of problem-solving thinking ability and sustainability approach .**
- Interactive student/student pair/group - task/tasks :

I. Tasks and measurements to be performed during the trip to the forest school (time, distance traveled, displacement, instantaneous speed, average speed)

1. **Measuring the time elapsed** during the specific trip to the forest school with a stopwatch or **measuring the distance covered using a phone application** .
2. Records of **instantaneous speed values** realized during the trip to the forest school several times with a phone application.
3. Using the measured data, **calculate the average speed** and compare it with the current speed values.
4. Determination of **all routes and displacements during the planned possible trips** to the forest school (travels by road, railway, waterway, bicycle path, hiking trails on foot) using **a map and Google Earth application** , and then **calculating the duration of the planned trips with specified average speeds**.

II. Determining a cyclist's speed and acceleration using measurement

Next to the forest school , students line up at **equal distances (e.g. 1m)** on the bicycle path between Napkor and Nagykálló .

To measure time, they use the stopwatch found on their mobile phone, which is started at the same time as a visual signal.

Using the time data measured by the children, **we plot** the distance traveled by the cyclist **as a function of the elapsed time**.

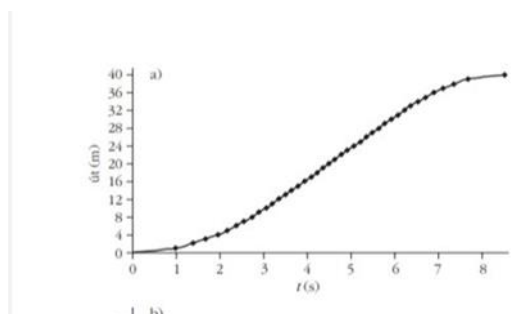


Image: Physical examination 2015/10 p. 345

For the average speed values for the sections, we divide the length of the sections by the time required to complete the sections, and then plot these values **as a function of the elapsed time**.

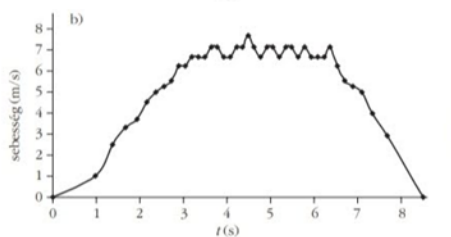


Image: Physical examination 2015/10 p. 345

As a third step, **the acceleration** values for each section **can be calculated**

Chemistry module

SUBJECT AREA / SUBJECT ELEMENT: Introduction METHODOLOGY

- GENERAL PROFESSIONAL CONTENT:

INTRODUCTION

Equipment knowledge and accident prevention regulations

- **The most important learning method in the natural sciences (among them chemistry and physics) is the experiment.**

To carry out the experiments professionally, you need to know the most important tools and the rules for accident-free experimentation.

I. Theoretical knowledge: getting to know (repeating) the rules and tools with the help of the workshop leader's presentation or joint discussion, as well as the tool drawings. (mobile internet can also be used)

II. Theoretical knowledge:

Types of tools to be used during experimentation based on the types of materials (glass tools, wooden tools, metal tools).

Presentation of the name of the devices and their possibilities of use (for heating, storage, chopping, measuring, etc.).

What should we pay attention to when using the tools?

- Methodology :

- **Application of different forms of work :**

Frontal class/group work (class/group size of 24 – 26 people),

individual work , differentiated individual work , student lecture/presentation (preliminary definition of goals and/or tasks),

pair work (activity of 2-2 students with the same assignment), **group work** (minimum of 2-3, maximum of 4-5 students with homogeneous and/or differentiated assignment).

- **Application of different methods :**

Teacher explanation, student presentation/explanation, student experiment/short lecture, smartphone, interactive whiteboard, film/video

I. Task: in group work, collect the most important work and accident prevention rules to be observed

Group 1: general occupational health and safety rules

Group 2: what to do in case of mechanical damage

Group 3: what to do in case of injury caused by electric current

Group 4: what to do in case of injuries caused by heat

Group 5: what to do in case of injury caused by chemic

(Work and accident prevention regulations, see: Annex No. 1)

Group reports!

II. task: Discuss the correct types of tools to use during experimentation and the use of tools

Group 1: glassware,

Group 2: heating devices,

Group 3: volume measuring devices,

Group 4: mass measuring devices,

Group 5: wooden tools

Each group member should choose a drawing of a device. Discuss what the given device can be used for!

(For the drawing of the devices, see: Appendix No. 2)

Group reports!

Demonstrating the use of some tools is the next task.

Each member of the groups demonstrates the use of a tool in practice.

A tool is selected by the group, its use is discussed, and then one member of the group demonstrates the correct use to the others.

2 day

Geography module

SUBJECT AREA / TOPIC ELEMENT: Geo- and surface morphological features, landscape features

METHODOLOGY

• **GENERAL PROFESSIONAL CONTENT:**

Reviewing and summarizing, as well as applying repetition and recording of what was learned about the geo- and surface-morphological characteristics and landscape features of the forest school's narrower and wider-dimensional environment.

○ **Summary and overview repetition and recording of what was learned about surface topography, morphology and the geological and natural geographical relationships of their individual elements, their formation, creation and characteristic features** . (E.g. formation and characteristics of mountainous landforms of different origins and ages, mountain systems, e.g. young chain mountains, plain terrains, e.g. lowlands, basins and basin-like terrains, etc.)

○ **Summary and overview repetition and recording of what was learned about the topography and morphological features and characteristic features of the specific country that includes the forest school** (e.g. Hungary) . (E.g. Carpathians - basin and the mountain ranges of the Carpathians, our central mountains and hilly regions / North and Transdanubia - central mountains, Transdanubia - hills, our plains / Great Plains and Lesser Poland, etc.)

○ **Summary and overview repetition and recording of what was learned about the wider environment of the original school, the landscape and landscape unit that includes the environment of the forest school** . (E.g. Great Plains/Nagyalföld, Great Plains - northeastern part of Tiszántúl, Nyírség and the Szatmár - Beregi plain, etc.)

○ **Summary and overview repetition and recording of what was learned about the narrower environment of the original school, the landscape unit, part of the landscape unit that includes the environment of the forest school** . (e.g. Nyírség, Dél-Nírség, sand ridge, sand hill and plain, loess and quicksand, etc.)

- **Getting to know and recording the typical topography and morphological features of the forest school and its surroundings** (e.g. Harangodi Forestry School, Napkor) . (E.g. South Nyírség, plains, wind furrows, deflation depressions, ridges, residual ridges, parabolic troughs, quicksand , etc.)



- **Methodology** :

- **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation**, application and use of **smartphone, interactive board, film/video, map, mineral and rock collection, model and weather measuring devices**.

o **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively**.

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation).

- **Application/development of problem-solving thinking ability and sustainability approach**.

• Interactive student/student pair/group - task/tasks :

Group 1 : Exercise/experiment carried out **on a sand table** - or in a sample area in nature - **modeling and creation of the topographical and morphological forms typical of the Southern Nyírség** (e.g. plain color, wind furrows, deflation depressions, ridges, residual ridges, parabolic troughs, etc.)

Group 2 : Modeling done **on a sand table** - or in a sample area in nature - **and sample presentation to illustrate the natural and close-to-nature and planted vegetation characteristic of the Southern Plains**. (E.g. natural and planted vegetation samples, economically usable plants, grass cover, field protection forest strip, crops / tobacco, fruit trees, etc.)

+ Active tourism module :

Group 1 : **Active tourism program (1)** : getting to know the topography and morphological characteristics of the immediate environment of the forest **school within the framework of an active tourism program** – walking tour/nature walk . (E.g. Kerekerdő Tourist Center / Harangodi School of Forestry and its surroundings.)

For example, wandering around the forest school environment . (E.g. plain terrain, wind furrows, deflation depressions, garmadas, residual ridges, parabolic troughs, etc.).

Group 2 : **Active tourism program (2)** : getting to know the topography and morphological features of the wider environment of the forest school within the framework of an active tourism program – walking tour/nature walk, bicycle tour. (E.g. Nagykálló sub-region, Nagykálló, Kállósején and their surroundings, etc.)

For example, discovering and getting to know the wider environment of the forest school. (E.g. Nyírség, Dél-Nírség, sand ridge, sand hill and plain, loess and quicksand, etc.).

Biology module

THEME / THEME ELEMENT: **Animal Day/Bird Day**

METHODOLOGY

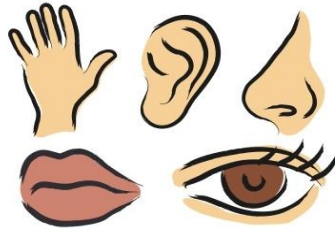
· PURPOSE OF THE OCCUPATION:

The ability to carefully observe the environment, recognize similarities, group, develop spatial orientation.

Expanding knowledge of species, practice accurate observation, description, comparison, development of cooperation competencies.

GENERAL PROFESSIONAL CONTENT:

- Knowledge of the biome of the forest, recognition of the environmental needs of certain species, body structure of animals, relationships between habitat – lifestyle – body structure, visual culture
- Recognition of different bird species based on bird sounds
- Using adverbs to get to know the living world revealed on the trunk of the tree, under the tree
- introducing the body structure of certain animal species
- recognizing the importance of our senses in a natural, forested environment



Picture 4 Our senses https://varazsbetu.hu/beszelgessunk/multisenzoros_tanitas/index.php

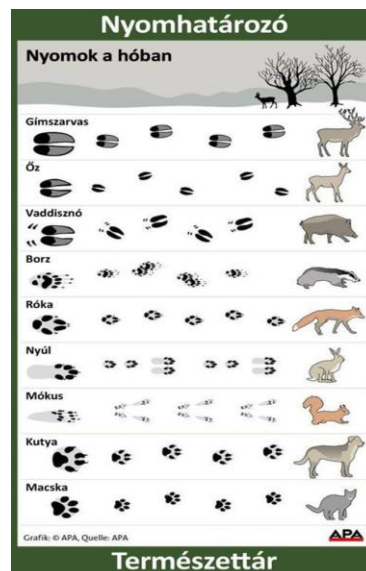


Image 5 Tracer <https://hu.pinterest.com/ballaibrigi/erdei-%C3%A1llatok/>

Methodology:

- during the activities, students gain an insight into the world of tiny arthropods
- with the help of animal identifiers, the wildlife of the habitat provided by the bark of balding and dying trees is explored

o **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student lecture/presentation** (preliminary goal and/or task definition), **pair work** (activity of 2 – 2 students with the same task definition) , **group work** (minimum of 2 -3, maximum of 4 - 5 students with homogeneous and/or differentiated task definition).

o **Application of different methods :**

- **Observation, teacher explanation, student experiment/short lecture, investigation and observation, presentation, smartphone, interactive whiteboard, film/video**, application, use.

Tools: binoculars, animal carrier, worksheet, bird sounds application on smart phone, collection of pens, tape measure

Application/development of various logical-thinking operations :

- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of organizing ability, inferring and generalizing ability** (extrapolation)

Physics module

SUBJECT / TOPIC ELEMENT : **Physics of the soil**

METHODOLOGY

GENERAL PROFESSIONAL CONTENT:

Summary and overview, **repetition and recording of the concept and importance of soil .**

Overview of soil physical characteristics, getting to know the **physical properties of soil :**

- **The color of the soil**, getting to know the **Munsell scale** to determine the color
- Differentiation between **rough frame part and earthed part**
- Getting to know the size of **individual soil particles** - mineral pieces, rock pieces.
- **Soil texture** , knowing, recording and applying the compositional ratio and characteristics of the soil with different grain sizes. **Sandy soil, clay soil, clay soil** . Getting to know and understanding the effect of soil texture on soil water permeability, aeration, nutrient content and biological activity. **Examination of individual grain size, sand size range** (coarse sand, fine sand, dust/silt, clay fraction)

Alkotórész	Méret
Kavics	2mm<
Durva homok	2-0,2mm
Finom homok	0,2-0,02mm
Iszap	0,02-0,002mm
Agyag	0,002mm>

Getting to know the texture triangle and its practical application.

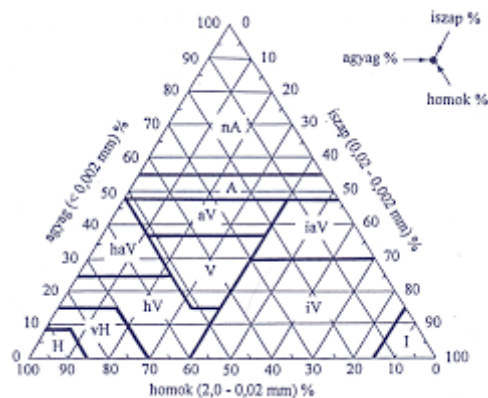


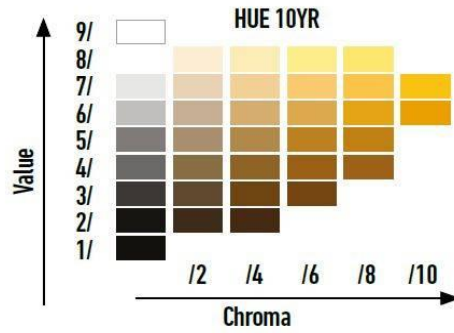
Image: Physical properties of the soil, presentation by Dr. Csaba Varga, Nyíregyháza University Institute of Technology and Agricultural Sciences, Department of Agricultural Sciences and Environmental Management
<http://zeus.nyf.hu/~tkgt/okse/tatata08/tata0807.pdf>

Estimation of the soil texture is simple , with the "kneading test " and the sedimentation method .

- Soil density.
- Soil porosity, soil structure, grain distribution, grain composition
- The **temperature distribution** of the soil , which changes in time according to the seasons and also with depth. Measurement of soil temperature.
- Grouping of the solid phase of the soil **into organic and inorganic phase** .



Image: Introduction to soil science III.
www.geo.u-szeged.hu/~andi/Talajtan%20eloadas%20PDF/Bev_talajtanba_III.pdf



1. ábra: Munsell-skála

Image: [SOIL UNIVERSITY FOR PRACTICE FARMERS or how do we get to know our soils? - Agro Napló - The agricultural news portal \(agronaplo.hu\)](#)



Image : <https://kertikalauz.hu/kertapolas/talaj/talajvizsgalat-milyen-tipusu-a-kertunk-talaja/>



Image: [SOIL UNIVERSITY FOR PRACTICE FARMERS or how do we get to know our soils? - Agro Napló - The agricultural news portal \(agronaplo.hu\)](#)

- **Methodology :**

- **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task

definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

○ **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, investigation and observation, presentation, use of smartphone, interactive whiteboard, film/video, models, measuring devices**

○ **Applying/developing various logical-thinking operations :**

- **Applying/developing the ability to think logically/creatively .**

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach .**

● Interactive student/student pair/group - task/tasks :

1. **Measuring the soil temperature** in several places with a soil thermometer

2. **Excavation of a soil section** , if it is not nearby, or if you cannot observe a notch formed under natural conditions in the area, e.g. along the banks of watercourses.

3. **Examination of the solid phases of a soil profile**

the. **Separation of the coarse part and the earthy part** with a sieve (with 2 mm holes).

b. **Separation of the finer part of the soil by sedimentation**

A test tube is filled to a height of 3 cm with the soil passed through the sieve and then with water glass distilled water to a height of 10 cm. Sealed and shaken vigorously for a few minutes, then left to settle for four hours. After settling, the mechanical composition can be determined, coarse sand is located in the lower layer, fine sand is located above it, and silt and clay are located above. From this, the mechanical composition can also be expressed as a percentage.

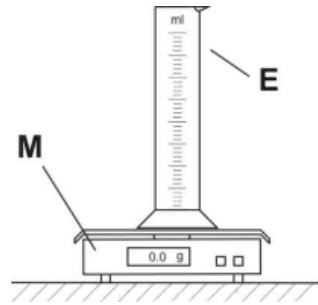
4. **Examination of soil and inorganic phase**

-**color (Munsell scale)**

-**grain size**

- examination of soil structural elements with a hand magnifier (**their shape, size**)

5. **Measurement of soil density**



Determination of **wet bulk density** from an undisturbed soil sample: The ratio of the mass and volume of the components (solid part + water + air).

b. **Dry bulk density** : The ratio of the mass of the undisturbed soil sample dried to constant mass at 105 °C (solid part) and the volume occupied by it.

The **mass and volume are measured** using the methods used so far .

Use a scale to measure mass and a measuring cylinder to measure volume!

To calculate the density, the mass is divided by the volume.

6. Determination of soil texture with a "kneading test"



HOMOK

HOMOKOS
VÁLYOG

VÁLYOG

AGYAGOS
VÁLYOG

AGYAG

Az anyag széttöredezik, szétesik.

A talajmasszából golyó formálható, de henger (sodralék) már nem (készítéskor széttörök).

A golyó hengerré sodorható, de gyűrűvé már nem hajlítható, mert eközben külső szegélyén megrepedezik és széttöredezik.

Gyűrű is formálható belőle, amely a külső szegélyén többé-kevésbé megrepedezik.

Golyó, henger, gyűrű, sőt percc formálható belőle, repedés nélkül.

Kép: <https://www.youtube.com/watch?v=GVK8f2v98Oo>

The soil kneading test is a method for learning **the structure and composition of the soil** . The soil sample is examined and the clay content in the soil is determined. The kneading test helps to determine **the quality of the soil and provides information on the permeability of the soil, soil structure and productivity.**

After soil sampling, the sample is mixed with water to make it wet and kneadable. During kneading, the feel, shape, stickiness and other properties of the soil are evaluated.

Chemistry module

SUBJECT AREA / TOPIC ELEMENT : **Examination of soil samples**

METHODOLOGY

TOPIC / THEME ELEMENT: GENERAL PROFESSIONAL CO

o **After learning about the regional (Great Plains) and local (Nyírség) soil characteristics, the soil samples collected during the active tourism program will be examined.**

Repetition of what was learned about the composition of soils.

For example, the list of soil types in a narrower environment (Harangodi School of Forestry, Napkor) and what we know about them. (Link to geographical knowledge.)

- Methodology :

- **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation** , application and use of **smartphone, interactive board, film/video, map, mineral and rock collection, model and weather measuring devices** .

- **Applying/developing various logical-thinking operations :**

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach** .

Material collection:

We collect samples from the soils in and around the camp and examine them.

Task 1 Determining the water content of soils:

Sampling, measuring the weight of the sample, drying the sample (in the sun or in a jar), determining the weight of the sample after drying, calculating the water content, graphing

Task 2. Facilitating the decomposition of organic compounds by further heating the soil .

Recognition of gases that can be detected with the senses, and determination of their quantity by measuring the mass of the remaining solid material.

Task 3 To test the mineral content of the soil, add a few drops of vinegar/hydrochloric acid to a small amount of different soils, and then deduce the carbonate content of the soil (calcareous, saline) from the experience. Soils that show a positive test are further investigated.

Task 4 Dissolve the minerals from the soil using clean water , then add a few drops of vinegar/hydrochloric acid to the solution. From the experience, let's deduce the carbonate content of the soil. (e.g.: salty)

3 day

Geography module

SUBJECT AREA / TOPIC ELEMENT: Climate, climatic features and characteristic features

METHODOLOGY

• **GENERAL PROFESSIONAL CONTENT:**

Reviewing, summarizing, and applying repetition and recording of what was learned about the climate of the forest school's narrower and wider environment, and the characteristic features of its climatic features.

○ **Summary and overview repetition and recording of what was learned about the climate** (e.g. the system of the Earth's solar climate belts, zones, the climates of the zones, the characteristics of the climatic elements of each zone, etc.) .

○ **Summary and overview repetition and recording of what was learned about the climatic features and characteristic features of the specific country that includes the forest school** (e.g. Hungary) .

○ **Summary and overview repetition and recording of what was learned about the wider environment of the original school, the large landscape and landscape unit** (e.g. Great Plains, Tiszántúl) that includes the environment of the forest school .

○ **Summary and overview repetition and recording of what was learned about the narrower environment of the original school, the landscape unit** (e.g. Nyírség, Dél-Nyírség) that includes the environment of the forest school .

○ **The typical climatic features of the forest school and its environment** (e.g. Harangodi Forestry School, Napkor) , its individual climate elements (e.g. temperature, humidity, air movement/wind, precipitation/rain, pressure/hPa, UV-INDEX) **and their effects recognition and recor.**





- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods** :

- **Teacher's explanation**, **student experiment/short lecture**, **examination and observation**, **presentation** , application and use of **smartphone**, **interactive board**, **film/video**, **map**, **mineral and rock collection**, **model and weather measuring devices** .

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach** .

- Interactive student/student pair/group - task/tasks :

Group 1 : Measuring , determining, recording and comparing the maximum, minimum and average air temperature (°C) in a specified time interval (1 day) in the environment of the forest school with a temperature measuring instrument (traditional liquid, electric, digital, infrared, air sensor and/or plug-in thermometer, smartphone weather program, OMSZ - internet).

Group 2 : Determining the cloudiness of the atmosphere and visibility , the measurement and determination of air humidity (%) and humidity and precipitation (mm) at a specified interval (1 day) in the environment of the forest school with a humidity and precipitation measuring instrument (precipitation meter ombrometer, ombrograph, hygrometer, psychrometer, condensation moisture meter, smartphone weather program, OMSZ - internet).

Group 3 : Measuring , establishing, recording and comparing the maximum, minimum and mean values of air pressure (hPa) in a specified time interval (1 day) in the environment of the forest school with an air pressure measuring instrument (liquid and/or aneroid barometer/barometer, smartphone weather program, OMSZ - internet).

Group 4 : Measurement , determination, recording and comparison of air movement and wind conditions (km/h and sky direction) in a specified time interval (1 day) in the environment of the forest school with an instrument measuring the strength and direction of air movement (Wild pressure plate wind flag, hand scoop anemometer, universal wind recorder, smartphone weather program, OMSZ - internet).

Group 5 : Measurement of the UV index (0.1 - 10), determination, as well as recording and comparison in a specified time interval (1 day) in the environment of the forest school with a UV index measuring instrument (electric UV meter, digital UV meter, infrared UV meter , UV – tester, smartphone weather program, OMSZ – internet).

- + Active tourism module :

Group 1 : Walk / (hiking) in a natural environment/1 (measurement of air temperature in different designated sunny and shady parts and locations of the original school).

Group 2 : Walk / (hiking tour) in a natural environment/2 (determination of cloudiness/visibility + measurement of humidity and air humidity, precipitation in a frequented place/"meteorology house/station" and/or higher terrain/"observatory").

Group 3 : Walk / (hiking) in a natural environment/3 (measurement of air pressure at different specific locations of the forest school).

Group 4 : Walk / (hiking tour) in a natural environment/4 (air movement, measurement of wind conditions in specific parts / locations of the forest school / "high ground" / "observatory").

Group 5 : Walk / (hiking) in a natural environment/5 (measurement of UV index at different locations of the forest school - sunny and shaded).

Biology module

TOPIC / THEME ELEMENT: **Medicinal Plant Day**
METHODOLOGY

PURPOSE OF THE OCCUPATION:

- During the sessions, our goal is to introduce medicinal plants to the students
- to explore and raise awareness of the effects of medicinal plants and their importance for the human body in everyday life
- To deepen among students the method, form and process of using medicinal plants

GENERAL PROFESSIONAL CONTENT:

- Learning the correct use of plant identifiers
- Recognition and proper collection of medicinal plants
- Learning the effects of medicinal plants
- Learning the steps of soap making



Picture 6. Soap making

Methodology :

- during the activities, students can discover different herbs, their beauty, characteristics and effects on health.
- during the activity, their creativity, attention, accuracy, and communication skills develop.

Application of different forms of work :

- **Frontal class/group work** (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student lecture/presentation** (preliminary goal and/or task definition), **pair work** (activity of 2 – 2 students with the same task definition) , **group work** (minimum of 2 -3, maximum of 5 - 6 students' activity with homogeneous and/or differentiated task definition).

Application of different methods :

- **Observation, teacher explanation, student experiment/short lecture, investigation and observation, presentation , smartphone, interactive whiteboard, film/video**, application, use.

Tools : Stainless steel pot, bowl, strainer, stove, rubber gloves, mask, mixing stick, stick blender, linen, thread, string, mold for soap making, caustic soda, grease

Application/development of various logical-thinking operations :

- **Applying/developing the ability to think logically/creatively** .
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of organizing ability, inferring and generalizing ability** (extrapolation)

- a detailed description of the program and worksheets can be found in the appendices

Physics module

SUBJECT AREA / TOPIC ELEMENT : **The air**

METHODOLOGY

GENERAL PROFESSIONAL CONTENT:

- Reviewing and summarizing, as well as applying, repetition and recording of what was learned **about the composition, properties, and role of air** :
- Reviewing and summarizing what was learned **about the absolute and relative humidity of the air** , as well as applying repetition, recording, and understanding that **it affects the properties of the air** . The moisture content of the air can affect the change in air pressure and affect the temperature sensation.
- Reviewing and summarizing, as well as applying, repetition and recording of what was learned from **Harmatpointró** . Understanding that dew point is important because it affects the **formation of clouds and precipitation** , the development of **the weather** and the well-being of living beings.
- Overview and summary of the concept of **air pressure** , as well as practical repetition and recording. The **dependence of air pressure on air temperature , humidity , movement and height above sea level** . Summary and overview of air pressure measurement units, repetition and recording . They are important phenomena related to air pressure, also from a practical point of view.
 - Getting to know devices suitable for measuring air pressure** .
 - Operating principle of **the barometer** .
 - Measuring air pressure experimentally** .
 - Recording of a repetition of Torricelli's experiment.**



<http://www.erdesztierdeiiskolak.hu/erdei-iskolak/eszak-alfold/harangodi-erdeszeti-erdei-iskola/>



*Picture: Physical examination 58th year. Issue 1 (January 2009)
Torricelli's experiment with water*

- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods** :

- **Teacher explanation** , **student experiment/short lecture** , **examination and observation** , **presentation** , **smartphone** , **interactive whiteboard** , **film/video** , **map** , **application and use of measuring instruments** , **models and weather instruments**.

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach** .

- Interactive student/student pair/group - task/tasks :

1. Air pressure measurement

Torricelli's famous experiment with water

To prove the **existence of atmospheric pressure**, **Torricelli** performed his famous experiment with mercury in 1643. According to his experience, the **air balances with the pressure from the weight of a column of mercury 76 centimeters high**.

Due to the danger of mercury, the experiment **is repeated with water** in the camp.

Since the **density of water is approx. It is 13 times smaller than the density of mercury**, so we have to think with much **higher water column** heights when performing the experiment.

The air pressure is approx. Maintains a **10 meter water column** .

The height of the viewing platform in the area of the Napkori Forest School is more than what we need, so it is perfectly suitable for carrying out the experiment.

As a first step, we connect a 10-meter-long pipe (e.g. sprinkler pipe) with a 1-meter-long transparent glass pipe, then fill it with water and seal the end of the glass pipe.

Attach a weight to the free end of the pipe and turn it into a bucket full of water.

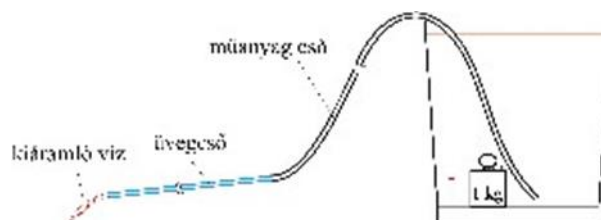


Image: <https://tudasbazis.sulinet.hu/hu/termesztudomanyok/physics/activities-physics-tasks-collection/toricelli-exercise-with-water/toricelli-exercise-with-water>

With the help of a rope suspended from the appropriate level of the viewing platform, we pull the tube up by holding the end of the glass tube.

At a height of about **10 meters**, the **Torricelli space begins to form**, and then we can also observe that the **water begins to boil due to the reduced pressure**.

While raising the pipe, after a while, no matter how much we raise it higher and higher, the height of the water level returns to the same level.

The hydrostatic pressure from the height of the water column formed in the tube balances the air pressure acting on the surface of the water in the bucket.

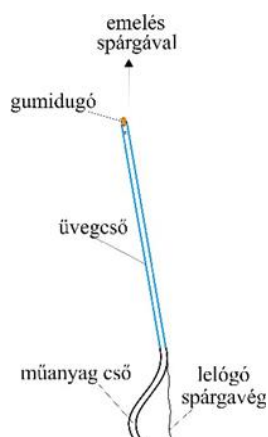


Image :

<https://tudasbazis.sulinet.hu/hu/termesztudomanyok/physics/activities-physics-tasks-collection/toricelli-exercise-with-water/toricelli-exercise-with-water>

Chemistry module

TOPIC / THEME ELEMENT: The chemistry of air
METHODOLOGY

- GENERAL PROFESSIONAL CONTENT:

- **Getting to know the most important components of air, the types of natural substances and pollutants.**

The percentage composition of air by volume. The physical properties of the gases that make up the air and their chemical reactions. Their detection based on their reaction or lack thereof.

For example, the causes and consequences of air pollution, their role in climate change.

E.g. Discussing the local characteristics, then placing sensors during the active tourism program, recording and analyzing the experiences.

E.g. Testing the air:

- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods** :

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation , smartphone**

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach** .

Testing the air:

Measuring the amount of suspended dust. Stretching a film containing a sticky substance on one side (e.g.: thick cellux), placing it outdoors, and after a few hours, counting and examining the stuck particles (grains of sand, solids, etc.).

Determination of humidity with chemicals or instruments.

Experiment:

After measuring the mass of freshly prepared anhydrous copper sulfate (or diphosphorus pentoxide or quicklime), placing it outdoors, and then re-measuring the mass of the sample after a given time. From the difference in mass, a conclusion about the humidity.

(By carrying out the experiment at several times of the day, e.g.: morning, noon, evening, night, the change in air humidity can be monitored and compared with measurements from geography .)

4 day

Geography module

SUBJECT AREA / TOPIC ELEMENT: Hydrographic, natural vegetation and soil properties and characteristic features

METHODOLOGY

- **GENERAL PROFESSIONAL CONTENT:**

Reviewing, summarizing, and applying repetition and recording of what has been learned about the characteristic features of the hydrographic, natural vegetation and soil features of the forest school's narrower and wider environment.

- **About the hydrography** (e.g. surface and underground water system/network, types and occurrences of rivers and stagnant waters, natural and artificial rivers and lakes, water flow, etc.), **natural vegetation** (e.g. typical natural and near-natural vegetation, established vegetation, characteristic tree species, undergrowth, typical cultivated plants, etc.) **and the summary and overview repetition and recording of what was learned from soil geography** (e.g. typical soil types and their occurrence, tillage and soil erosion, natural and artificial soil protection, soil strength replenishment) .

- **A summary and overview repetition and recording of what has been learned about the hydrographic properties and characteristic features, natural vegetation and soil geography of the specific country that includes the forestry school** (e.g. Hungary) . (e.g. river water network and system, natural and artificial rivers and stagnant waters, lakes, bogs and swamps, underground water system / e.g. characteristic natural and near-natural vegetation, planted vegetation, characteristic tree species, undergrowth, characteristic cultivated plants, etc. / e.g. characteristic soil types and their occurrence, tillage and soil erosion, natural and artificial soil protection, soil energy supply).

- Summary and overview repetition and recording of what was learned about the wider environment of the forest school, **the typical hydrographic properties of the large landscape and landscape unit** (e.g. Great Plains, Tiszántúl) , its natural vegetation and soil geography **that includes the environment of the forest school.** (e.g. river water network and system, natural and artificial rivers and stagnant waters, lakes, bogs and marshes, groundwater system / e.g. characteristic natural and near-natural vegetation, planted vegetation, characteristic tree species, undergrowth, characteristic cultivated plants, etc. / e.g. characteristic soil types and their occurrence, tillage and soil erosion, natural and artificial soil protection, soil energy supply).

- **Reviewing and summarizing what you have learned about the hydrographic features, natural vegetation and soil geography of the narrower environment of the forest school, the landscape unit that includes the environment of the forest school** (e.g. Nyírség, South Nyírség) (e.g. surface waters, watercourses / rivers and stagnant waters, lakes, artificial watercourses / groundwater, springs / typical vegetation, typical types of trees, typical cultivated plants etc. / typical soil types and their occurrence, cultivation and soil erosion, natural and artificial soil protection, soil energy replenishment) .

- **Getting to know and recording the characteristic hydrographic features, natural vegetation and soil geography of the forest school and its immediate surroundings** (e.g. Harangodi Forestry School, Napkor) . (e.g. surface waters, watercourses / rivers and stagnant waters, artificial watercourses, underground waters / ground water, aquifers, springs, etc. / e.g. characteristic natural and near-natural vegetation, established vegetation, characteristic tree species, undergrowth, typical cultivated plants, etc. / e.g. typical soil types and their occurrence, tillage and soil erosion, natural and artificial soil protection, soil replenishment).

- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods** :

- **Teacher's explanation** , **student experiment/short lecture** , **examination and observation** , **presentation** , application and use of **smartphone** , **interactive board** , **film/video** , **map** , **mineral and rock collection** , **model and weather measuring devices** .

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .
- **Application/development of problem-solving thinking ability and sustainability approach** .

- Interactive student/student pair/group - task/tasks :

Group 1 : **Creation and editing of a thematic hydrographic map/sketch** (paper-based and/or digital) **about the hydrographic features, character and network of the wider environment of the forest school** (e.g. county / Harangodi forestry school / Szabolcs - Szatmár -Bereg county) (e.g. course and system of natural rivers / main river, tributaries, artificial rivers, lakes, marshes, bogs, etc.)

Group 2 : **Creation and editing of a thematic vegetation/plant community map/sketch** (paper-based and/or digital) **of the natural vegetation of the wider environment of the forest school** (e.g. county / Harangodi forestry forest school / Szabolcs-Szatmár-Bereg county) (e.g. original natural plant cover, close-to-nature planted vegetation, economically planted vegetation, marsh, bog, area with protected natural vegetation, etc.).

Group 3 : **Preparation and editing of a thematic soil map/sketch** (paper-based and/or digital) **of the soil types, soil types and occurrences** (e.g. , brown forest soil, potting soil, meadow soil, bog soil, etc.)

Group 4 : **Map design , route map/sketching**, application of orienteering/compass and GPS/route planning program during exploration and exploration of the **hydrographic features, natural vegetation and typical soil types of the immediate surroundings of the Zere school within the framework of an active tourism program** – walking tour/nature walk **to get to know**. (E.g. Kerekerdő Tourist Center / Harangodi School of Forestry.)

Group 5 : **Map design , route map/sketching**, application of orienteering/compass and GPS/route planning program during exploration and exploration of the **hydrographic properties, natural vegetation and typical soil types of the wider environment of the elementary school within the framework of an active tourism program** – walking tour/nature walk **to get to know**. (E.g. Harangodi - reservoir, Kállósemjéni Mohos - lake nature reserve, Lónyai - main channel Kállói VII. main stream,)

+ Active tourism module :

Group 1 : **Active tourism program (1)** : getting to know the hydrographic features, natural vegetation and soil geography characteristic of the forest **school** 's **immediate** environment **within the framework of an active tourism program** - walking tour/nature walk . (E.g. Kerekerdő Tourist Center / Harangodi School of Forestry.)

For example, wandering around the natural environment of a forest school . (E.g. forest school lake, surface and seasonal watercourses, natural and near-natural vegetation of the forest school environment, typical soils, etc.). **Visiting and getting to know the educational trails created in the forest school** (e.g. Harangodi Forestry School / "Pagony" and the "Őzike" educational trail!)

Group 2 : **Active tourism program (2)** : getting to know the natural geographical features **of the wider environment of the forest school** (small area / e.g. Nagykállói microregion, Nagykálló and the Harangodi reservoir, Kállósemjéni Mossy lake) within the framework of **an active tourism** - walking tour/nature walk, bicycle tour - **program**. (E.g. Harangodi - reservoir, Kállósemjéni Mohos - lake nature reserve, Lónyai - main channel Kállói VII. main stream,)

For example, discovering and getting to know the wider environment of the forest school (small area / Nagykállói small area) close to nature. (E.g. Harangodi - reservoir, Kállósemjéni Mohos - lake Lónyai - main channel Kállói VII. main stream).





Biology module

TOPIC / THEME ELEMENT: **Soil and water day (the world under a microscope)**
METHODOLOGY

· PURPOSE OF THE OCCUPATION:

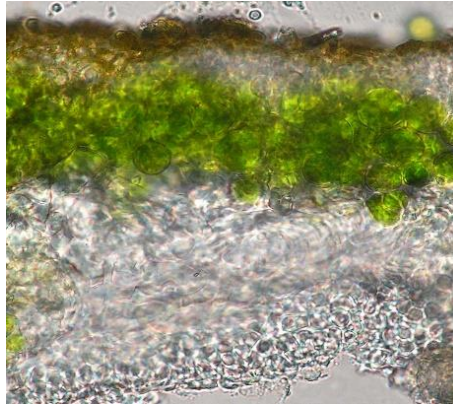
- Students should understand the essence and significance of the operation of the microscope as an optical magnifying device in the examination of biological samples.
- Students practice the basics of independent microscope use while working with interesting, living material.
- Learn to prepare simple microscopic preparations independently, learn about the importance of dyes in microscopy.
- They practice documenting what they see in the microscope according to specific aspects
- Description of the body structure of lichens, their ecological importance, and their role in the biosphere.

· GENERAL PROFESSIONAL CONTENT:

- Habitat and structure of lichens
- Deepening the correct use of a microscope
- Recognition of aquatic microscopic organisms
- Getting to know the structure of living things



Picture 7 in Zuzmó's petri dish



8. image Lichen section

Methodology :

- students can acquire and deepen their knowledge in the field of microscopy
- during the activities, their creativity develops and they become independent.
- they can gain new information during discovery

Application of different forms of work :

- **Frontal class/group work** (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student lecture/presentation** (preliminary goal and/or task definition), **pair work** (activity of 2 – 2 students with the same task definition) , **group work** (minimum of 2 -3, maximum of 5 - 6 students' activity with homogeneous and/or differentiated task definition).

Application of different methods :

- **Observation, teacher explanation, student experiment/short lecture, investigation and observation, presentation , smartphone, interactive whiteboard, film/video, application, use.**

Tools: microscope, glass for sampling, slide, coverslip, chemical spoon, knife, magnifying glass

Application/development of various logical-thinking operations :

- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of organizing ability, inferring and generalizing ability** (extrapolation)

- *The detailed description of the program and the worksheets can be found in the appendices*

Physics module

TOPIC / THEME ELEMENT: Physics of natural waters

METHODOLOGY

GENERAL PROFESSIONAL CONTENT:

Mechanics- **movement of fluids**

Dynamics - the causes of the flow of natural **waters**

Hydrostatics

Statics of liquids

Summary and overview repetition and recording **of the mechanical properties** of liquids (natural waters)

The behavior of the particles **of the liquid state** , the shape and volume of the set.

Pascal's law

The pressure resulting from the weight of liquids, the **hydrostatic pressure**.

Flow of fluids . Change in flow in case of obstacles, formation of vortices.

Continuity equation - **review** and recording of material retention

Overview and recording **of Bernoulli's theorem** .

Water flow **of rivers and streams**.

Rivers as **energy sources** .

Examination of the physical properties of natural waters (color, smell, temperature, turbidity...)

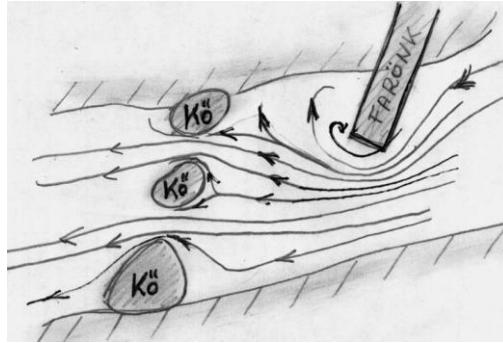


Photo: András Juhász, Péter Tasnádi, Péter Jenei, Judit Illy, Csilla Wiener, István Főzy: Teaching physics in secondary school I.



Photo: András Juhász, Péter Tasnádi, Péter Jenei, Judit Illy, Csilla Wiener, István Főzy: Teaching physics in secondary school I.

The measurement of the speed of running water



Picture: Harangod reservoir



Picture: Harangodi School of Forestry, fire reservoir



Image: <https://www.vizzintmero.hu/felzini-viz/turbiditas-merok-zavarossag-merok/secchi-korong>

- Methodology :

- **Application of different forms of work** :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods** :

- **Teacher's explanation**, **student experiment/short lecture**, **examination and observation**, **presentation** , application and use of **smartphone**, **interactive whiteboard**, **film/video**, **map**, **measuring devices** and **weather measuring devices** .

- **Applying/developing various logical-thinking operations** :

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach** .

- Interactive student/student pair/group - task/tasks :

1. **Examination of the flow of water**

2. **The fall of the watercourse** , the root cause of the **movement of the watercourse**

Examining and understanding **the water movement** and **speed of a natural watercourse**, stream . Carrying out various experiments and measurements in the stream, with the help of which it is possible to observe how the **difference in level**, **the shape of the bed**, **constrictions**, **obstacles** and **eddies** **affect the movement of the water** .

3. **The speed of the water flow**

Measuring the fall, flow changes, and **speed of the stream** using different methods and determining the water yield.

4. The water flow as **a source of energy**

As part of the session, topics related to the use of river water as an energy source can also be researched.

If there is no moving natural water nearby (stream, small river), I recommend the following measurement and testing option, which can also be carried out in the case of stagnant water:

Examination of the **physical properties** of water :

1. Natural water **color**
2. **The smell of** natural water
3. Examination of **the transparency** of natural water using a Secchi disc



Image: <https://www.vizzintmero.hu/felszini-viz/turbiditas-merok-zavarosság-merok>

4. Examination of water **turbidity**
5. Measurement of water **temperature** compared to soil temperature

Chemistry module

TOPIC / THEME ELEMENT: **The chemistry of water**
METHODOLOGY

• **GENERAL PROFESSIONAL CONTENT:**

○ **After learning about the waters discussed in a broader (country) and narrower (large landscape/landscape unit) context, the task is to learn about water molecules, explore the relationships between molecules, and then analyze the physical and chemical properties of water.**

○ **Repetition of what you have learned about water under the guidance of the class leader (with explanation if necessary).**

The structure of the water molecule, the polarity of the bond, the polarity of the molecule, the interaction between molecules in the different states of matter.

Physical properties of water (color, smell, change in density with temperature).

Water as a solvent.

By reviewing the solubility table of solid substances and gases, determining the conditions of dissolution and recording them.

(can also be done in group work, for example:

Tasks per group:

Group 1. The structure of the water molecule, the polarity of the bond, the polarity of the molecule, the interaction between molecules in the different states of matter.

Group 2. Physical properties of water (color, smell, change in density with temperature).

Group 3. Water as a solvent.

By reviewing the solubility table of solid substances and gases, determining the conditions of dissolution and recording them.)

What substances does water dissolve?

Experiments on solubility:

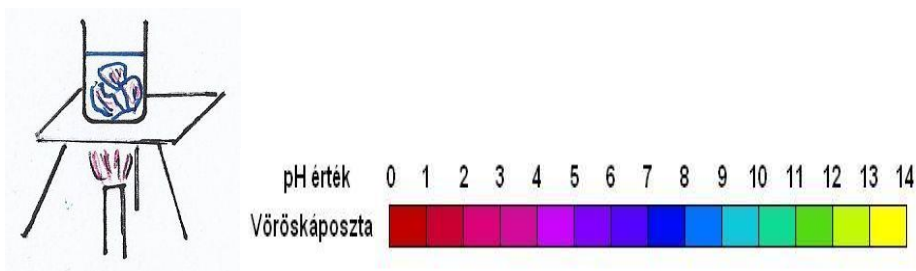
Examination of the liquid solubility of various salts and minerals with clean water (if possible with distilled water)

examples of materials to be tested:

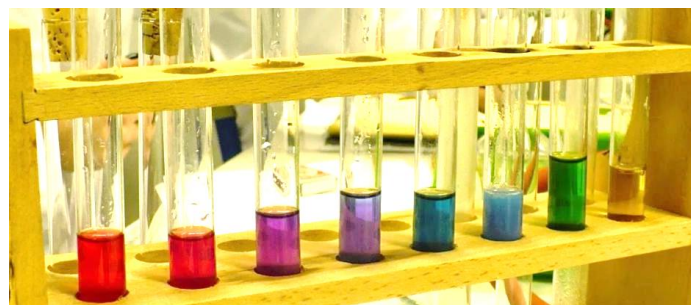
solids: table salt, baking soda, sugar, limestone, sand, etc.

liquids: alcohol, oil, vinegar, milk, gasoline, etc.

Examination of the spying effect of the waters with an indicator we made ourselves :



Cool the solution and then use it to determine the pH. pH bowl



Author's own recording

Determination of pH of solutions with red cabbage indicator.



Red cabbage indicator color in solutions with different chemistry
(Author's own recording)

Target:

Determining the dissolved substance content of water.

● Methodology :

○ **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24 – 26 people),
- **individual work , differentiated individual work , student lecture/presentation** (preliminary goal and/or task definition),
- **pair work** (2 - 2 students' activities with the same task definition),
- **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated assignment).

○ **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation , smartphone, application, use.**

○ **Applying/developing various logical-thinking operations :**

- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach .**

Experiments in the field:

Collection of materials for experiments:

Collect water from different places in clean bottles or glasses.

For example, from streams, lakes, dug wells, artesian wells, groundwater, rainwater, etc. in the surroundings of (e.g. Harangodi Forestry School, Napkor).

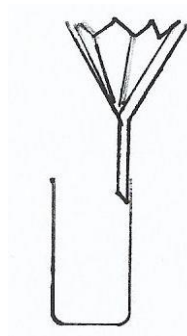
Task:

Let's examine the properties of water that can be determined with our senses, e.g.: color, transparency, turbidity, smell, light transmittance, e.g.: with laser light (laser pointer wand), etc.

Experiment:

Filter to separate the floating, insoluble particles, then observe the solid particles with a microscope or hand magnifier.

A drawing of the basic tools of filtering can be seen here:



Task:

With a microscope or a hand magnifier, we observe the small solid particles on the filter paper, as well as the small organisms that we can identify (connection with biology)

Task

Prepare an indicator solution (e.g. from red cabbage leaves or colored flower petals)

Experiment: Cut the red cabbage leaves into small pieces, then place them in a large beaker (e.g. 200 cm³) and pour enough distilled water to cover them. Boil the solution for 5-10 minutes until the dye dissolves from the cabbage leaf.

Task: Determination of the pH of the waters we collect

Measure the pH of the water with universal indicator paper and/or the red cabbage indicator we made. If we have a pH meter, let's clarify the data.

Experiment:

Measure the weight of the watch glasses to be used for evaporation, then add the same volume (e.g. 2 cm³) of water from water samples from different places to each one.

Evaporate the water in the sun (or by heating), then measure the mass of the remaining materials together with the watch glass, or take photos of the watch glasses.

Arrange the waters in a table based on dissolved substance content (measured data or photos will help).

Let's show the finished table to the others.

5 day

Geography module

SUBJECT AREA / THEME ELEMENT: Complex natural geographical environmental conditions and characteristic features of settlement geography

METHODOLOGY

- GENERAL PROFESSIONAL CONTENT:

The summary and overview repetition and recording of what was learned about the narrower and wider dimensions of the environmental and/or settlement geography, characteristic natural and social geographical features of the forest school, and its complex discovery and learning during the implementation of alternative active tourism programs.

- **The immediate environment of the forest school** (forest school / e.g. Forestry School in Harangodi) is a summary and overview of what has been learned about **the complex natural and social-geographical**, national knowledge and historical **aspects of local history, recording, as well as complex exploration active tourism program** - walking tour/nature walk, bicycle tour in the framework of

- **The narrower environment of the forest school and its settlement/settlements** (forest school and the settlement connected to it / e.g. Harangodi Forestry School / Napkor settlement / Nyíregyházi microregion), as well as **the local history of its settlement/settlements, settlement and architecture-art historical memories**, summary and overview repetition, recording, and complex discovery of what they learned about its attractions in the framework of an active tourism program - walking tour/nature walk, bicycle tour .

- **The wider environment of the forest school (micro-region and its settlement/settlements / e.g. Nagyálló sub - region, Nagyálló and the Harangodi reservoir, Kállósemjén and the Mohos lake)**, as well as **the local history of its settlement/settlements, settlement and architectural-art historical memories**, the summary and overview repetition, recording, and complex discovery of what was learned about its attractions within the framework of an active tourism program - walking tour/nature walk, bicycle tour .







- Methodology :

- **Application of different forms of work :**

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- **Application of different methods :**

- **Teacher's explanation, student experiment/short lecture, examination and observation, presentation** , application and use of **smartphone, interactive board, film/video, map, mineral and rock collection, model and weather measuring devices** .

- **Applying/developing various logical-thinking operations :**

- **Applying/developing the ability to think logically/creatively** .

- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

- **Application/development of problem-solving thinking ability and sustainability approach .**

• Interactive student/student pair/group - task/tasks :

Group 1 : Map design , **route map/outline creation**, application of orienteering/compass and GPS/route planning program **to learn about the forest school's immediate surroundings within the framework of an active tourism program .**

2nd group : Map design , **route map/outline creation** , application of orienteering/compass and GPS/route planning program **to learn about the narrower surroundings of the original school and settlement/settlements within the framework of an active tourism program .**

Group 3 : **To get to know the wider environment and settlement/settlements of the original school within the framework of an active tourism program, planning a map, making a route map/sketch** , using a orienteering/compass and GPS/route planning program during exploration and exploration.

+ Active tourism module :

Group 1 : Active tourism program (1) : complex learning of the natural and socio-geographical, historical and historical features of the **forest school's immediate environment within the framework of an active tourism program** - walking tour/nature walk, bicycle tour .
(E.g. Kerekerdő Tourist Center / Harangodi School of Forestry.)

For example, wandering around a forest school and its facilities, its natural environment .
(E.g. Harangodi Forestry School / complex building complex, lookout, outdoor oven, pet farm). **Visiting and getting to know the educational trails created in the forest school** (e.g. Harangodi Forestry School / "Pagony" and the "Ózike" educational trail!)

E.g. Getting to know and viewing the national knowledge and history - local history aspects of the forest school . (E.g. Harangodi School of Forestry / viewing the GULAG - GUPVI commemorative exhibition).

Group 2 : Active tourism program (2) : getting to know the **forest school's narrower** natural geographical features, as well as **the local historical, settlement and architectural-art historical monuments** and attractions of the settlement/settlements within the framework of **an active tourism program** – walking tour/nature walk, bicycle tour . (E.g. Harangodi School of Forestry / Napkor settlement and its surroundings / Nyíregyházi sub-region.)

E.g. Discovering and getting to know the architectural and art historical aspects of the settlement (e.g. Napkor) . (E.g. Napkor / Roman Catholic and Greek Catholic church, Kállay – mansion/castle).

E.g. Visiting the working meteorological station in the immediate vicinity of the original school's natural geography and settlement (e.g. Napkor) . (E.g. Napkor area / OMSZ / National Meteorological Service) observatory/radar station.)

Group 3 : Active tourism program (3) : the wider environment of the forest school (microregion and its settlement/settlements / e.g. Nagykálló microregion, Nagykálló and the Harangodi reservoir, Kállósemjén and the Mohos lake) and local history **of its settlement/settlements, getting to know the complex 's historical, architectural and artistic monuments** and attractions within the framework of **an active tourism program** - walking tour/nature walk, bicycle tour . (E.g. Nagykálló, Harangodi - reservoir, Kállósemjén, Kállósemjéni Moss - lake nature conservation area, Lónyai - main channel Kállói VII. main stream,)

For example, discovering and getting to know the wider environment of the forest school (small area / Nagykállói small area) close to nature. (E.g. Harangodi - reservoir, Kállósemjéni Mohos - lake Lónyai - main channel Kállói VII. main stream).

For example, the wider environment of the forest school (small area / Nagykállói small area) **is the discovery and learning of the architectural and art historical aspects of the settlement.** (E.g. Nagykálló / the Főtér, the former County Hall, the Roman Catholic, Greek Catholic and Reformed churches, Kálló Castle, "Ínségdomb", the birthplace of Frigyes Korányi, Kállósemjén / Kállay Castle, Chapel, College).

Biography module

TOPIC / TOPIC ELEMENT: **Treasures of the forest/field**
METHODOLOGY

· PURPOSE OF THE OCCUPATION:

- Promote the development of students' environmentally conscious behavior and way of life.
- To understand the relationship between consumption and environmental resources, the principle of sustainable consumption.
- Respect for nature, the forest, responsibility, and the effort to prevent environmental damage should become decisive in our way of life
- Developing and enhancing an ecological way of thinking

· GENERAL PROFESSIONAL CONTENT:

- sustainability
- getting to know the fruits of trees and shrubs provided by the forest
- practicing plant and crop identification using a plant identifier
- ways of using the hidden "treasures" of the forest



9. image Poster making on the topic of sustainability

Methodology :

- during the activity, students' awareness of sustainability and the environment is strengthened.
- their values increase
- their imagination, creativity and communication skills develop.

Application of different forms of work :

- **Frontal class/group work** (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student lecture/presentation** (preliminary goal and/or task definition), **pair**

work (activity of 2 – 2 students with the same task definition) , **group work** (minimum of 2 -3, maximum of 5 - 6 students' activity with homogeneous and/or differentiated task definition).

Application of different methods :

- **Observation, teacher explanation, student experiment/short lecture, investigation and observation, presentation , smartphone, interactive whiteboard, film/video, application, use.**

-

Tools: glue, cardboard, colored pencils/markers

Application/development of various logical-thinking operations :

- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of organizing ability, inferring and generalizing ability** (extrapolation)

.

- *The detailed description of the program and the worksheets can be found in the appendices*

Physics module

TOPIC / TOPIC ELEMENT: Team competition

METHODOLOGY

● **GENERAL PROFESSIONAL CONTENT:**

Teams must use a map to get to checkpoints (similar to orienteering).

At the checkpoints, they will find measurement tasks in a box, which they must complete independently or even with the help of the Internet using the tools in the box or a pre-downloaded phone application.

The teams go through the checkpoints in a different order. When evaluating the competition, the most accurate measurement result, the correct order, and the time count.



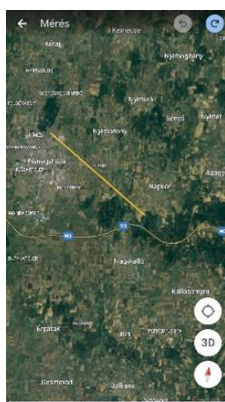
Image: Measuring with a caliper



Measuring the height of a tree from its shadow



Image: Determining the height of a tree by measuring the elevation angle



Távolság 11,9 km

Image: Measuring displacement with the Google Eart application

- Methodology

- **Application of different forms of work :**

Frontal class/group work (class/group size of 24 – 26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (activity of 2 – 2 students with the same task definition), **group work** (activity of a minimum of 2-3, a maximum of 4-5 students with homogeneous and/or differentiated assignment).

- **Application of different methods :**

Teacher explanation, **student experiment/short lecture**, **investigation and observation**, **presentation** , application and use of **smartphone**, **interactive whiteboard**, **film/video**, **models**, **measuring instruments** .

- **Applying/developing various logical-thinking operations :**

1. **Applying/developing the ability to think logically/creatively .**

2. **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).

3. **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).

4. **Application/development of the ability to systematize, infer and generalize** (extrapolation) .

5. **Application/development of problem-solving thinking ability and sustainability approach .**

- Interactive student/student pair/group - task/tasks :

Tasks at checkpoints:

- 1 Measuring **the density of gravel** using a spring force meter and water in a container:

The weight of the pebble is measured both in air and immersed in water.

The mass of the gravel can be determined from the weight of the gravel measured in air.

$$G_k = m_k \cdot g$$

When the pebble is suspended in water, the force meter shows a value corresponding to the buoyancy force. Buoyancy is equal to the weight of water displaced by the body. From the weight of the displaced water, we know the mass of the displaced water, and from this, and from the density of the water, the volume of the displaced water can be calculated, which is equal to the volume of the gravel immersed in the water.

$$F_{as} = G_{kiviz}$$

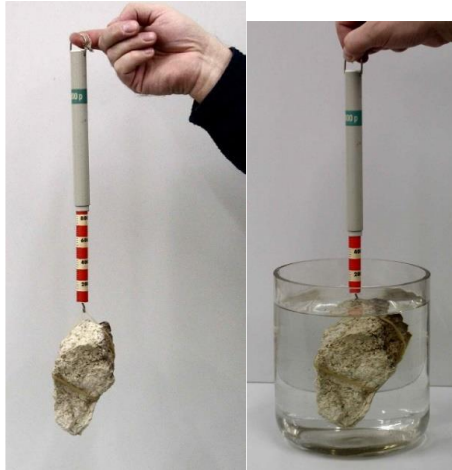
$$G_{kiviz} = m_{kiviz} \cdot g$$

$$\rho_{viz} = 1000 \text{kg/m}^3$$

$$V_{out\ water} =$$

$$V_{sewage} = V_{gravel}$$

The volume can be calculated from the weight and density of the gravel



Picture: András Juhász, Péter Tasnádi, Péter Jene, Judit Illy, Csilla Wiener, István Főzy: Teaching physics in secondary school I.

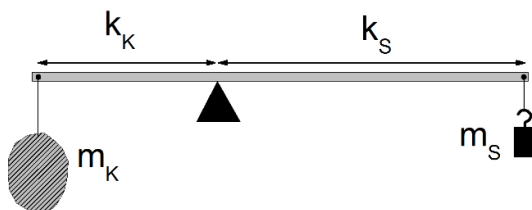
2. Measuring **the weight of a pebble** using a loop rod, a weight of known weight and a ruler.

We hang the weights of known mass (50g) on one end of the noose rod, and the gravel of unknown mass on the other end. Then, by trial and error, find where the bar needs to be supported in order for the balance to be balanced. The distance of the pebble and the weight from the axis of rotation can be measured with a ruler, and the unknown mass can be calculated based on the equality of torques.

$$M_k = M_s$$

$$m_k \cdot k_k = m_s \cdot k_s$$

$$m_k =$$



Picture: András Juhász, Péter Tasnádi, Péter Jene, Judit Illy, Csilla Wiener, István Főzy: Teaching physics in secondary school I.

3. Measurement with a caliper (e.g. the inner diameter of a screw nut, the cross-section of a tree branch, the diameter of feathers, antlers, etc.)

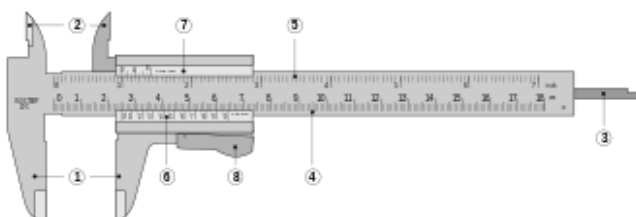


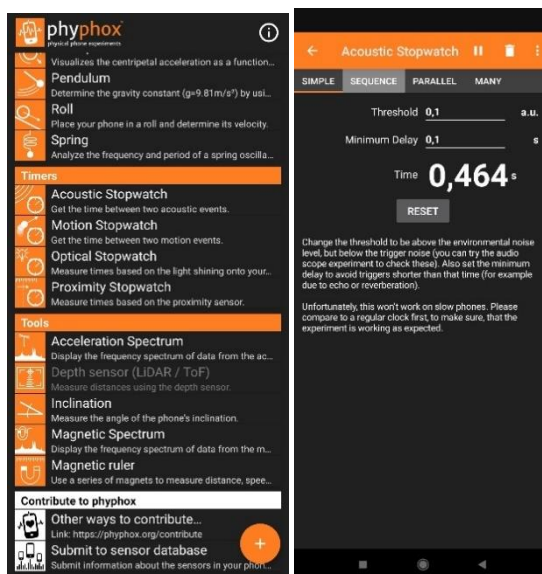
Image: Wikipedia

1. **External measuring jaw** : used for measuring external dimensions
2. **Internal jaw** : used for measuring internal dimensions
3. **Depth gauge** : used for measuring depth
4. **Main scale (mm)**
5. **Main scale (inch)**
6. **Vernier (mm)**
7. **Vernier (inch)**
8. **Fixer** : used to fix the moving part in order to facilitate accurate reading

Simulation: <https://nagysandor.eu/AsimovTeka/Stefanelli/subler.html>

4. Measuring the speed of sound with the free Phyphox phone application

At a known distance (several meters), two students face each other. Phyphox or another similar application should be downloaded on both students' mobile phones. Time measurement is started and stopped with the same loud clap on both phones. The speed of the sound can be calculated from the time it takes for the sound of applause to travel from one phone to the other and the distance traveled.



5. Measuring the height of a tree

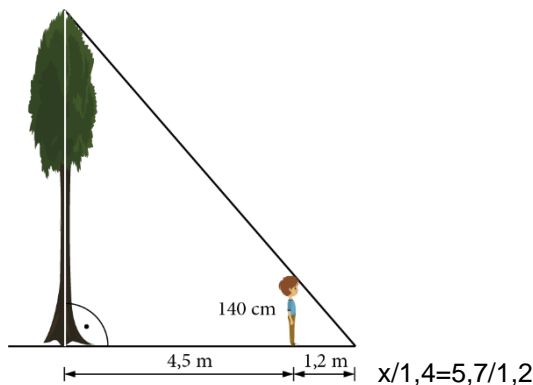
the. Measuring the height of a tree from its shadow

A student of known height stands in the line of the shadow of a tree so that his shadow just fits into the shadow of the tree.

The height of the tree can be determined from the height of the student, the length of the shadow of the tree and the student.

With the data in the picture, if the height of the tree is: x

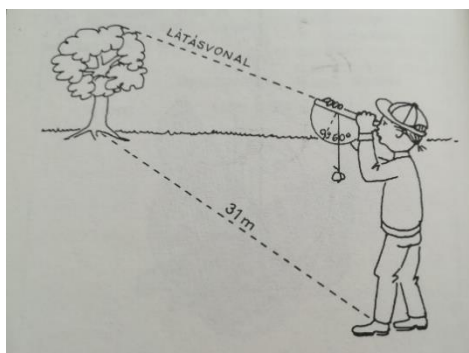
We see two similar right-angled triangles, thus: x



$$x = 6,65\text{m}$$

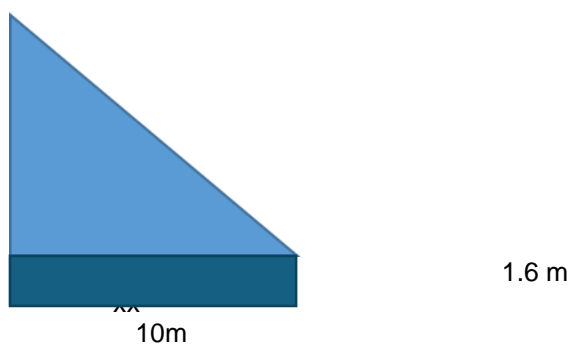
Image: https://www.nkp.hu/tankonyv/matematika_10_2_nat2020/lecke_09_071 Source: OH (and legal predecessors) / Dezső Szalók

b. Measuring the height of a tree **by measuring the elevation angle**



Picture: <http://sasszemtklnyi.blogspot.com/2018/12/magassag-meres-teodolittal.html>

The elevation angle is measured with a phone application.



Using the attached drawing, the calculation process:

The student sees the top of the tree at a distance of 10 meters from the tree at an elevation angle of 48° from an eye height of 1.6 meters. From this data:

$$\operatorname{tg}48^\circ = \frac{x}{10}$$

$$x = 11,106 \text{ m}$$

$$\text{The height of the tree: } x + 1.6 \text{ m} = 12.706 \text{ m}$$

6. Measuring **your displacement** (between the starting point and the given control point) using the Google Earth phone application

Chemistry module

TOPIC / THEME ELEMENT: **Examining the "stones"**
METHODOLOGY

- GENERAL PROFESSIONAL CONTENT:

Walking around the area, we found "stones" of different shapes and presumably different compositions.

The task is to search the Internet for test methods that can be used to determine the composition of the "stones".



- Methodology :

- Application of different forms of work :

- **Frontal class/group work** (class/group size of 24-26 people), **individual work** , **differentiated individual work** , **student short lecture/presentation** (preliminary goal and/or task definition), **pair work** (2-2 students with the same task definition), **group work** (minimum of 2-3, maximum of 4-5 students with homogenous and/or differentiated tasks).

- Application of different methods :

- **Student experiment/short lecture, investigation and observation, presentation , smartphone, map, mineral and rock collection,**
- o **Applying/developing various logical-thinking operations :**
- **Applying/developing the ability to think logically/creatively .**
- **Application/development of analytical and deductive skills** (recognition, understanding and interpretation of whole-part relationships and correlations).
- **The ability to synthesize, the application/development of inductive thinking** (hypothesis creation based on cause and effect relationships, prognostication, system creation).
- **Application/development of the ability to systematize, infer and generalize** (extrapolation) .
- **Application/development of problem-solving thinking ability and sustainability approach .**

Examination of the "stones":

Prepare the tools and chemicals for each detection method, then carry out the experiments.

Experiment:

Snap off a smaller piece from the larger "stone" and place it in a beaker or test tube.

Add the reagent.

Let's check if it dissolves in this water.

Test the solution with an indicator.

Let's find out its spy effect.

It reacts with hydrochloric acid.

etc.

Let's collect shells , snails, etc. shells if there are in the area.

Pour vinegar (hydrochloric acid) into the mussel or snail shell, or put a few pieces of mussel shell in a test tube, then examine it with vinegar or hydrochloric acid!

Let's describe the changes!

If gas evolves, show with a burning lighter that the gas is combustible, fueling combustion, or not fueling combustion.

Heat the shell of the shell/snail for a short time, then drop the red cabbage indicator on the heated part.

Record our experiences!

Let's continue!

Give us an explanation or search on the net!