3. FORESTRY MACHINERY

3.1 Vocabulary

Which things belong to these materials?

MATERIAL			THINGS
1	Metal	Α	Book
2	Plastic material	В	Table
3	Wood	С	Trousers
4	Glass	D	Shoes
5	Leather	E	Cup
6	Textile	F	Knife
7	China	G	Ruler
8	Rubber	Η	Window
9	Paper	Ι	Tyres

1 2 3 4 5 6 7 8 9	
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3.2 Technical materials

We use these materials for the production and running of the mechanical means:

- **Constructional materials** we use them to build machines and devices:
 - ✓ metals –steel, cast iron, iron

-ironless metals (aluminium, copper, zinc, lead, chrome, tin, silver, gold) -metal-alloys (brass, bronze, dural, melting iron, white bearing metal)

- \vee plastic materials
- ∨ wood
- \vee glass
- \vee leather
- \vee textile
- **v** china
- ∨ rubber
- ∨ paper

Which materials belong to the metals? Underline them: ner legther gold chin

Which mc wood	iterials belon copper	g to the meta leather	als? Unde <mark>gold</mark>	rline them: china	zinc	lead	textile
• Opera	ating materia	als – we use	them for t	he running	of machir	nes and de	vices:
⁻ v	fuel -	solid: wood	, coal, cok	e, peat			
	-	liquid: petro	ol. diesel.	petroleum. l	heating oi	ls	
	-	fluid: gas, a	cetylene,	biogas	8		
v	lubricant -	oils, erase fa	it, graphite	e			
v	other runn	ing material	\mathbf{s} – coolar	nts, brake fl	uid, anti-f	reeze mix	ture
		-					
Fill in the	e right letters	and translat	te the word	ds:			

G - S	S L
C L	L D
W D	S R

3.3 Parts of machines

Mechanical means in the forestry are usually constructed of the components which are normally used in mechanical industry. To these components belong:

- binding components
- mechanisms of common movement
- components for carrying over the twist moment
- hydraulic mechanisms
- pneumatic mechanisms
- electric mechanisms
- combustion engines

Which component do you get when you translate the words? Write them down

1	2	3	4	5	6	7	8	9	10

1. uhlie	6. spievať
2. otvoriť	7. nástroj, náradie
3. hýbať sa	8. železo
4. modrý	9. oleje
5. jednotka, celok	10. klinec

3.3.1 Binding components

We use these components to bind different parts of machines into one unit. Here belong:

- screws
- pegs
- chocks and nibs
- glued joints
- welded joints
- soldered joints

Which binding components can you find in the pictures?



3.3.2 Mechanisms of common movement

We use these mechanisms to change different kinds of movement. Here belog:

- lever mechanisms
- crank mechanisms
- eccentric mechanisms
- star mechanisms
- cam mechanisms

Write the le	tters in the correct order and find the m	echanisms of movement:
KNACR	V E R E L	RAST
A M C	CEECRTNIC	

3.3.3 Components for carrying over the twist moment

We use these components to carry over and change the rotary movement. Here belong:

- shafts
- clutches
- bearings
- transmissions

3.3.4 Hydraulic mechanisms

These mechanisms use pressure or flow of the fluids when they are working. According to the kind of work we divide them into:

- hydrostatic mechanisms
- hydrodynamic mechanisms

Basic hydraulic mechanisms are:

- hydrogenerator it turns mechanic work into pressure of fluid
- **fluid motor** it turns pressure of fluid into mechanic work
- gear it controls the direction of fluid flow
- pipeline
- valves
- cleaners and filters
- fluid tank
- hydraulic accumulator
- hydraulic coupling, hydraulic shifter

Answer the questions:

1. What do we use the hydraulic mechanisms for?

- 2. What does the hydrogenerator do?
- 3. What do the gears control?
- 4. What other mechanisms do you know?
- 5. Which mechanism turns pressure of fluid into mechanic work?

3.3.5 Pneumatic mechanisms

These mechanisms use pressure or airflow during their work. To these mechanisms belong:

- compressors
- pneumatic engines rotary, straightforward
- other parts are similar to hydraulic mechanisms

Can you find 7 hydraulic and pneumatic mechanisms in the crossword?

А	С	С	U	М	U	L	А	Т	0	R	Р
0	U	Ι	R	E	S	А	F	G	J	Κ	В
Ζ	Х	С	V	Ν	В	Ν	Μ	Α	S	D	F
Р	0	Ι	U	Ι	Y	Т	R	E	W	Q	Ι
А	L	S	D	L	Η	J	Q	Х	W	Μ	L
В	V	С	Ι	E	Ι	G	А	D	L	Κ	Т
F	С	0	Μ	Р	R	E	S	S	0	R	E
F	U	Р	А	Ι	Ν	А	С	Х	Μ	Ζ	R
U	Р	0	Ι	Р	E	R	E	S	E	С	Х
U	Ι	0	V	W	R	Т	Y	Ζ	Χ	Q	A
E	V	L	A	V	W	Q	E	R	Т	Y	U

.....

3.3.6 Electrical mechanisms

They are mechanisms which use the electric current during their work. Here belong:

- electric power supplies:
- **q** storage battery
- q alternator
- q dynamo
- **q** three phase alternating current generator
- electric appliences
- q direct current electromotors
- **q** one phase alternating current electromotors
- q three phase alternating current electromotors

3.3.7 Combustion engines

They transform heat energy of fuels into mechanic work. We divide them into:

- two-strokers
- four-cycle engines
- Wankel engine
- Turbine engines

Fill in the letters and translate the words:

1. B – T T – – –	 3. D – R – – T	
2 U E - T	 4 T - R - A C	r

Answer the questions:

1. Which engines belong to combustion engines?

- 2. Which electric appliences do you know?
- 3. Which mechanisms use electric current during their work?
- 4. Which mechanisms does alternator belong to?

3.4 Machines and devices used in the forest management

Forest workers use a lot of machines which make their work easier. According to the area of their use we divide them into:

- Mechanization equipment in the forest nurseries
- Mechanization equipment for preparing the glades and for the reforestation
- Mechanization equipment for the felling
- Mechanization equipment for collecting wood
- Mechanization equipment for transporting wood
- Mechanization equipment for the storage of wood
- Mechanization equipment for the forest constructions

3.4.1 Mechanization equipment in the forest nurseries

These mechanisms help to grow planting material. We divide them into mechanization of:

- Soil preparation –ploughs, tillers, rollers
- Fertilizing fertilizer loaders, fertilizer scatters
- Seeding seeders
- Lining out knurling, feeding, digging machines
- Undercutting undercutting machines with active and pasive knife
- Weeding and disintegrating weeder hoes
- Harvesting- seedling diggers, seedling pickers
- Chemical protection –irrigators, bedewers
- Irrigating system irrigators, water source, pipeline, water hoses

Try to make the net:

Equipment in the forest nurseries

Soil preparation

plough

Which sentences are true /T/ and which ones are false /F/?

- 1. With using machines the work is not so hard.
- 2.Ploughs do not belong to the equipments for the soil preparation.
- 3.We use the seeders during the harvest.
- 4.We use water hoses to irrigate.
- 5.We do not prepare the soil with the rollers.

3.4.2 Mechanization equipment for preparing the glades and for the reforestation

Here belong the machines which we use to clear away the waste after the felling, to prepare the soil and to afforest the glades:

- Brushwood graders
- Hole diggers
- Soil graders
- Brushwood packeters
- Afforestation machines

Which machines are in the pictures?



3.4.3 Mechanization equipment for the felling

For the felling and wood processing we use:

- **Power saws** for cutting
- q Engine part
- q Cutting part
- Harvesting machines for cutting, limbing, shortening, separating
- q Harvestors
- q Processors
- q Terminology
- Splitters for making chips from the waste

Which equipment or machine belongs to saws, harvesting machines, splitters?







1.....

2.....

3.....

Correct the mistakes and translate the words into Slovak: BRASWOD SOLE REIKS..... PAUER SO..... HARWESTOR..... SPLITER

3.4.4 Mechanization equipment for collecting wood

Here belong the machines which move the wood from the forest to the forest depot which is near the road. These machines are:

- Wheel skidders
- Universal tractors
- Tracked skidders
- Forwarders
- Winches
- Cable equipments

3.4.5 Mechanization equipment for transporting wood

These are machines which we use for transporting wood from the forest depo to the customers

- Forest railway
- Lorries
- Trailers
- Road trains
- Car outfit

3.4.6 Mechanization equipment for the storage of wood

We use them for conversion, separating, barking, splitting, and expedition of wood to the customers.

- Off loading front loaders, cranes, winches
- Transport of wood front loaders, cranes, winches, conveyors
- Conversion conversion line, saws
- Barkers
- Splitting machines

MACHINE			ACTIVITY
1	power saw	А	transporting from the depo to the customers
2	harvestor	В	transporting from the forest to the depo
3	forest railway	С	cutting, limbing, shortening, separating
4	winches	D	preparing the soil
5	hole diggers	E	splitting
6	splitting machines	F	cutting

Which activities do we use these machines for?

	1	2	3		4		5		6	
--	---	---	---	--	---	--	---	--	---	--

3.4.7 Mechanization equipment for the forest constructions

We use them for building and keeping up the roads, slope roads, bridges and forest buildings. Here belong:

- Bulldozer
- Grader
- Excavator
- Bush hammer
- Blast mixer
- Cranes
- Rollers
- Finisher
- Lorries
- Drilling machines

How many machines can you find in th line?

CRANEEXCAVATORGRADERLORRIESBUSHHAMMERBULLDOZER

Vocabulary Metal Plastic Leather Rubber Device Iron Copper Chrome Gold Bronze White bearing metal Solid Petrol Coke Heating oils **Biogas** Coolants Components Movement Hvdraulic Screw Nib Soldered Crank Cam Clutch Pressure Fluid motor Pipeline Filter Coupling Straighforvard engine Electric power Dvnamo Direct current Fuels Combustion engine Felling Soil Tiller Scatter Lining out Weed Harvest Bedewer Waste Wood processing Splitter Wheel skidder

Wood Textile Paper Steel Ironless Zinc Tin Metal alloys Dural Fuel Fluid Diesel Peat Gas Erase fat Brake fluid Binding Carry over Pneumatic Peg Glued joints Kind Eccentric Rotary Bearing Flow Gear Valve Fluid tank Shifter Similar Storage battery Three phase Alternating current Two-stroker Glade Storage Fertilize Roller Seeder Dig Disintegrate Seedling picker Pipeline Brushwood grader Saw Chips Tracked skidder

Glass China Mechanical means Cast iron Aluminium Lead Silver Brass Melting iron Lubricant Liquid Coal Petroleum Acetylen Graphite Anti-freeze mixture Common Twist Combustion engines Chock Welded Lever Star Shaft Transmission Divide Direction Cleaner Accumulator Compressor Current Alternator Appliences Heat energy Four-cycle engine Reforestation Grow Plough Loader Knurling Undercutting Hoe Irrigator Water hose Hole digger Limbing Forest depot

FORESTRY ENVIRONMENT

4.1.1 The Earth

Structure of the Earth :

Link the titles1,2,3 to their components A, B, C:

1	Anatomy of the Earth	A	Lithosphere, upper matle,	crust, uppermost lower matle, ou	t part of mantle, ter core, inner co	asthenosphere, ore
2	Earth's elements	В	nitrogen, oxy	gen, other gasse	28	
3	Earth's atmosphere	C	iron, oxygen, silicon, magnesium, sulphur, nickel, calcium, aluminium			
	1		2		3	

Earth is the third planet from the Sun and the largest of the terrestrial planets in the Solar system in diameter- 6371 km and mass density. The Earth consists of: iron (32,1%), oxygen (30,1%), silicon (15,1%), magnesium (13,9%), sulphur (2,9%), nickel (1,8%), calcium (1,5%) and aluminium (1,4%).

The Earth has rounded shape. The Earth consists of several layers. The three main layers are the **core**, the **mantle** and the **crust**.



Are these sentences true or false **T/F**? If they are false, correct them.

- 1. Earth is the first planet from the Sun.
- _____
- 2. Earth is the largest of the terrestrial planets in the Solar system.

3. Earth does not consist of sulphur.
4. The content of oxygen is higher than the content of iron.
5. The content of nickel is lower than the content of magnesium.
•••••••••••••••••••••••••••••••••••••••

4.1.2 Earth's structure

The outer layer, up to 75km thick, is known as **the crust**. This is the relatively thin layer on which we live. The crust is made up of solid material but these material is not everywhere the same. There is an **Oceanic crust** and a **Continental crust**. The Oceanic crust is about 6-11 km thick and consists of heavy rocks, like basalt. The Continental crust is thicker than the Oceanic crust, about 30 km thick. It is mainly made up of light material, like granite. The upper part mainly consists of granite rocks, while the lower part consists of basalt and diorite.

The crust 'floats' on top of the mantle. It is the middle layer of the Earth, up to 2,800 km thick (it is the thickest layer of the Earth). The function of the mantle is to separate the inner mantle and the outer mantle. The inner mantle consists of sulphides and oxides of silicon and magnesium. The outer mantle is a lot thinner than the inner mantle. The outer mantle consists of silicates of iron and magnesium.

The upper part forms part of the **lithosphere** and is rigid. It is the stiffer part of the outer mantle and the crust. The lithosphere 'floats' on the **asthenosphere**, like ice on water. The lower semi-molten part forms the Asthenosphere. It is the tough liquid part of the outer mantle. The mantle has very high temperatures resulting in rock being in a 'molten' state. This 'molten' rock is known as **magma** and is able to move.

At the centre of the earth is the core. This part of the Earth is about 2,900 km below the Earth's surface. This is divided into the outer and the inner core. The inner core is -the centre of the Earth is solid and about 1,250 km thick. It mainly consists of iron and nickel. The outer core is about 2,200 km thick. The outer core is liquid and mainly consists of iron. It is partly molten due to the extreme temperature, but the inner core pressures are so great that it cannot melt completely. Because the Earth rotates, the outer core spins around the inner core and that causes the Earth's magnetism.

Read the text and answer the questions:

Which is the thickest layer of the Earth?
Which layer is the one where people live?
How is the crust divided?
Which part of the crust is thinner? What does the upper part of the crust consist of?
What is the function of the mantle?
Which layer consists of silicates of iron and magnesium?
How would you describe the Lithosphere?
Is the Asthenosphere tough or liquid? Describe the formation of magma?
What does the inner core mainly consist of?

Is the outer core all molten? Why the outer core cannot melt completely?
What causes the Earth's magnetism?

Describe the picture. Which Earth's layers are in the picture?



1		 •	•	•	•	•	•	•			 	•	•	•	•	•	•		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
2		 •	•		•	•	•	•			 	•	•	•	•	•	•		•	•			•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	
3		 •	•		•	•	•	•			 	•	•	•	•	•	•		•	•			•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	
4			•			•					 	•	•	•		•											•		•	•				•					•		
5	,	 •	•	•		•	•	•			 	•	•	•		•									•	•	•	•	•	•		•			•	•		•	•		

How many elements can you find in this crossword? Translate the words into Slovak:

	1	1	1	1	1	1	1	1
Т	0	R	U	S	F	А	М	Е
Р	Е	М	U	Ι	С	L	A	С
Ι	N	Y	Н	L	R	U	G	R
L	Е	K	С	Ι	N	М	N	U
S	G	0	В	С	G	Ι	Е	Н
Т	Y	Ι	R	0	N	N	S	Р
Р	X	Е	Т	N	L	Ι	Ι	L
А	0	D	А	F	J	U	U	U
S	G	Е	Ζ	Т	В	М	М	S

1	5
2	6
3	7
4	8

4.1.3 Vocabulary (Earth)

earth		aluminium	melt
anatomy		solar system	rotate
element		layer	spin around
atmosphere		solid	cause
lithosphere		thick	magnetism
crust		granite	mantle
basalt		asthenosphere,	diorite
outer		separate	inner
consist of	core		sulphide
nitrogen		oxide	oxygen
silicate		gass	rigid
iron		stiff	silicon
tough		magnesium	liquid
sulphur		temperature	nickel
divide		alaium	proceura

4.2.1 The Earth's Atmosphere

The earth is surrounded by all kind of gasses. This layer is called the earth's Atmosphere. Without this atmosphere life on earth isn't possible. It gives us air, water, heat, and protects us against harmful rays of the sun and against meteorites.

This layer around the earth is a colorless, odorless, tasteless mixture of gasses, water and dust. The atmosphere consists of 78% **nitrogen**, 21% **oxygen**, 0,93 % **argon**, 0,03% **carbon dioxide** and 0,04% of other gasses.

Write down the composition of the atmosphere in the picture



The atmosphere is divided into five layers depending on how temperature changes with height.



Troposphere is the lowest layer of the atmosphere. In the troposphere, the temperature decreases as altitude increases. It contains roughly 80% of the total mass of the atmosphere. We breathe the air in the troposphere. The weather and clouds occur in this layer.

Stratosphere is characterized by a temperature increase with altitude. Only the highest clouds are in this layer. The ozone layer is located in the stratosphere. Many airplanes fly in the stratosphere because it is very stable.

In the **Mesosphere** the temperature decreases with altitude. Atmospheric temperatures reach the lowest average value of around -90° C in the mesosphere. This is also where a lot of meteors burn up when entering the atmosphere.

In the **Thermosphere**, temperature increases with altitude. The thermosphere is the first layer exposed to the Sun's radiation. The International Space station orbits in this layer. It is also where the space shuttle orbits.

The **Ionosphere** is an extension or a part of the thermosphere. It is not another atmospheric layer, but a region of the atmosphere. It contains many ions and free electrons. Ionization process release energy which heat up the upper atmosphere. Auroras occur in the ionosphere.

The upper limit of our atmosphere is the **Exosphere**. This layer extends from the thermosphere out to space. In the exosphere atoms and molecules escape into space.

Fill in the right letters in the atmospheric layers. Which layer is missing? Write it down

$T_{}M_{-}P_{}E$	_TT_S_H	OHE
_ R O _ P _ E	_ES_HE	

Which description is for which layer. Write the name of the right layer in the gap:

1	contains many ions and electrons.
2	is the first layer heated by the Sun.
3	extends from the top of the stratosphere
4	is the upper limit of the Earth's atmosphere.
5	is the layer where the weather happens.
6	contains the ozone layer, the part of the Earth's atmosphere.
7	is the first layer above the surface.
8	is the layer where many airplanes fly.
9	is responsible for auroras.
10	is the layer in which a lot of meteors burn up.

4.2.2 Greenhouse effect

The greenhouse effect is important. Without the greenhouse effect, the Earth would not be warm enough for humans to live, it could be as low as -18 °C. But if the greenhouse effect becomes stronger, it could make the Earth warmer than usual. Even a little warming may cause problems for humans, animals and plants. As humans emit more carbon dioxide and other greenhouse gases into the atmosphere the greenhouse effect becomes stronger. This causes the earth's climate to change unnaturally. One big problem is the global warming process that is causing melting of polar ice and raising of sea levels around the globe.

The atmosphere allows most of the light from the Sun to pass through and reach the Earth's surface. The incoming **solar energy** has a very short wavelength and passes through the atmospheric gasses unaffected to reach the Earth's surface. As the Earth's surface is heated by sunlight, it absorbs the solar energy and **radiates** part of this energy. The Earth releases it back to the atmosphere as longer wavelengths of the **infrared** (**IR**) **radiation**. This energy is electromagnetic radiation with small amounts of IR and UV radiation. Some of the IR radiation goes back into space. Some of the IR radiation emitted by the Earth is absorbed by gasses in the atmosphere.

Three main gases in our atmosphere that contribute to the greenhouse effect are **carbon dioxide** (CO₂), **methane** (CH₄) and **water vapor** (H₂O). These greenhouse gases absorb the IR radiation emitted by the Earth and sent the energy as heat back towards the Earth. This is the cause of warming known as the greenhouse effect.

Correct the wrong information in these sentences:

The gases most responsible for the greenhouse effect are magnesium and oxygen. The decrease in surface temperature is called global warming. Infrared radiation is not electromagnetic radiation. Greenhouse gases are named thus because they help trap heat inside the Sun. Without the greenhouse effect, the Earth's average temperature would be about 10 °C. The incoming solar energy from the Sun has a very long wavelength. The solar energy enters the Earth's atmosphere, passing through the greenhouse effect. Some of the IR radiation passes back into the air. Some of the carbon dioxide is absorbed in the atmosphere by the greenhouse gases. The greenhouse gases re-emit the IR radiation as water back toward the Earth's surface.



Read the text and translate it with the help of the dictionary. Write five questions for the schoolmates.

1	 	 	 	
2	 	 	 	
3	 	 	 	
4	 	 	 	
5	 	 	 	

4.2.3 Vocabulary

Earth's Atmosphere

Greenhouse effect

surround	ionosphere		warm
heat	extension		emit
harmful	ion		climate
ray	electron		unnaturally
meteorite	ionization		global warming process
colorless	release		polar ice
odourless	heat up		raise
tasteless	aurora		sea level
dust	exosphere		globe
argon	extend	allow	
carbon dioxide	escape		pass through
height	gradient		surface
troposphere			incoming
decrease			solar energy
altitude			wavelength
increase			atmospheric
contain			unaffected
clouds			absorb
occur			radiate
stratosphere			release back
ozone layer			infrared
airplane			radiation
stable			electromagnetic
mesosphere			amount
reach			contribute
low			methane
high			water vapor
average			burning
value			fossil
meteor			fuel
burn up			pollute
exposed			increase
radiation			responsible
orbit			trap
space			average
shuttle			re-emit

4.3 Geomorphological division of Slovakia



The Carpathian Mountains cover about two-thirds of the Slovak territory. Slovakia is the part of Western Carpathians and Eastern Carpathians. They are divided into the Inner Carpathians and the Outer Carpathians. The lowlands are the part of the Pannonian Basin and cover about one-third of the Slovak territory. The Vienna Basin is situated in the west part of Slovakia. The Danubian Lowland is situated in the south- west Slovakia, which is the part of the Little Hungarian Plain. The Eastern Slovak Lowland is situated in the south-east Slovakia, which is the part of the Great Hungarian Plain.

Cover the text, write it as a dictation and correct it.

Sub-system	Province	Sub-province	Area
			Slovak Ore Mountains
			Fatra-Tatra Area
		Western	Slovak Medium
		Carpathians	
		Carpatinans	Lučenec
			Depression
	Western		Matra-Slanec
Carpathian Mountains			Slovak-Moravian Carpathians
r		Orter	Western Beskids
		Carpathians	Central
		Carpaunans	Eastern Beskids
			Podhale Area
		Inner Eastern Carpathians	Vihorlat-Gutín Area
	Eastern Carpathians	Eastern	Wooded
		Carpathians	Low Beskids
		Vienne Desin	South Moravian Basin
	West Pannonian	vienna Basin	Záhorie Lowland
Pannonian Basin		Little Plain	Danubian
	Pannonian	Great Hungarian	
	Basin		Eastern Slovak Lowland

Finish the name of the sub-system, province, sub-province and area according to the Slovak translation in the picture above:

Choose at least ten categories of these geographic areas and find an example to each category. Use your map or the internet.

oblasť = area

provincia = province

(sub)provincia = (sub)province

nížina = lowland (0 - 200/300 m ASL)

vysočina = highland (above 200/300 m ASL)

rovina = flat (altitude difference app. 0 - 30 m)

pahorkatina = hills, downs (altitude difference app. 30 - 100/150 m)

vrchovina = upland, highland (altitude difference app. 100/150 - 300/310 m)

hornatina = highland(s) (altitude difference app. 300/310 - 600/640 m)

vel'hornatina = mountains (altitude difference app. above 600/640 m)

planina = app: plain, plateau, tableland

zníženina, depresia = depression

panva = basin

kotlina = basin

vrchy = hills

pohorie = mountain range, mountain chain

.....

4.4 Pedology

Pedology (from Greek: pedon, "soil"; and logos "study") is the study of soils in their natural environment.

Soil scientists are called **pedologists**.

Read the text and answer the questions

Soil composition

Soil covers most of the land surface of the Earth. Soil can be very different from one location to another. Soil is a mixture of organic and inorganic material formed over thousands of years. The organic materials are dead decaying plants and animals. Humus is degraded organic material in soil. The inorganic materials are rocks of different sizes and minerals.

Soil formation

The formation of soil takes 1000 years or more. Soil formation takes place when many things interact, such as air, water, plant life, animal life, rocks and chemicals. Soil is formed from the weathering of rocks and minerals. The rocks break down into smaller pieces through the process of weathering. They are then mixed with moss and organic matter. Decaying plants and animals make the soil thick and rich. Over time this creates a thin layer of soil.

Is the soil the same everywhere? Describe the composition of the organic material?
Describe the composition of the inorganic material?
What things are necessary while soil formation?
What happens during the process of weathering?
Describe the process of soil formation.

Soil types

The type of soil varies from place to place. There are three basic different types of soils: Clayey soils, loamy soils and sandy soils. Loamy soils are the most ideal. The texture of the soil depends on the amount of each one in the particular soil. The soil can be classified into these types:

Sandy soil
Silty soil
Clayey soil
Loamy soil
Peaty soil
Chalky soil

These are only the basic types; the soil in any location may be a combination of one or more of them. There are clayey loams and sandy loams.

Rearrange the letters and write the words correctly. Translate them into Slovak:

1. TEAPY	4. DYSAN
2. MOALY	5. YLAC
3. KALCHY	6. LITYS

Soil horizons and soil profile

There are various layers in the soil called soil horizons. They differ in a number of properties which are used to define types of soil horizons. The arrangement of these soil horizons in soil is known as a soil profile. Soil horizons differ in soil properties. Easily seen soil properties are colour, texture, structure and thickness. Special laboratory tests require properties such as chemical and mineral content, consistence and reaction.

Underline the soil properties:

taste	structure	consistence	smell	texture	plan	t content
mineral	content	humidity	thickness	location	colour	humus

Which of them belong to the visible properties?

.....

The types of **soil horizons** are:

O Horizon is an organic layer of soil on the top. It is made up of leaf litter and humus.

A Horizon (surface soil) is the topsoil beneath the O horizon. It is mostly made up of humus and minerals. Seeds germinate and plant roots grow in this layer.

E Horizon (eluviation layer) is above the B horizon. It is mostly made up of sand and silt. Eluviation refers to the movement of materials from the A and E horizons to the B horizon. This layer has a significant loss of minerals and clay as water drips through the soil.

B Horizon (subsoil) is the layer beneath E horizon. It contains clay and minerals from layers above it when mineralized water drips from the soil. This accumulation of eluviated material is called illuviation.

C Horizon (substratum) is beneath horizon B. It consists mostly of weatherized rocks.

R Horizon (rock layer) is beneath all the other layers. This layer is hard bedrock, which is not soil.

Write O, A, E, B, C or R Horizon to each description of the horizon:

C horizon is also called substratum

R horizon is made up of hard rock.

E horizon is typical for the removal of soil materials into lower horizons.

O Horizon mostly consists of decomposed organic matter.

B horizon is characterized by an accumulation of clay.

A horizon is rich in minerals and is formed at or near the surface.

Identify and write down the types of horizons:



4.4.1 Vocabulary (Pedology)

pedology	consistence	soil
reaction	scientist	taste
pedologist	smell	composition
humidity	cover	visible
land	litter	location
top	organic	beneath
inorganic	germinate	dead
eluviation	decaying	above
humus	refer	degraded
movement	rock	significant
size	loss	formation
drip	interact	sand
weathering	silt	break down
clay	piece	subsoil
matter	mineralized	rich
accumulation	thin	eluviated
type	illuviation	vary
substratum	clayey	weatherized
loamy	bedrock	sandy
removal	texture	mostly
depend on	decomposed	amount
near	particular	classify
silty	peaty	chalky
horizon	profile	various
differ	define	arrangement
thickness	require	content

4.5 Mineralogy

Mineralogy is the study of the chemistry, crystal structure, and properties of *minerals*.

Halite

colourchemical categorychemical namecolourless or whitehalidesodium chloride= NaClHalite is very soft, tastes salty and dissolves easily in water. It usually occurs as cube-shapedcrystals. Halite is also known as rock salt. We get our table salt from it. In cold climates salt isused to control ice on roads and footpaths. It is also used as the mineral supplement forhunting and domestic animals.

Gold

colour
golden yellowchemical category
metallic elementchemical name
aurum= AuGold is one of the most popular, rarest and most valuable minerals. Gold is one of the heaviest
minerals. It is soft, malleable, durable and shiny. Gold is the conductor of heat and electricity.It is resistant to corrosion. It is used in jewelry and arts, but also in dentistry and medicine.
The most important industrial use of gold is in the manufacture of electronics.

Magnetite

colour	chemical category	chemical name
black	oxide	ferrous-ferric oxide= Fe ₃ O ₄
Magnetite is a natural black	x oxide of iron, containing	from about 65 to 72% iron. It is the
most magnetic naturally occ	urring mineral on Earth and	d was once used in compasses. Most of
the magnetite mined is used	as an ore of iron. It is also	used in the creation of steel.

Bauxite

colour	chemical category	chemical name
white or grey to	oxide/hydroxide	hydrated aluminium oxide= $Al_2O_32H_2O$
dark red-brown		

Bauxite is a sedimentary rock and it is formed in weathered volcanic rocks. Bauxit is the most important aluminum ore. Approximately 95% of the world's bauxite production is processed into aluminium.

Quartz

colourchemical categorychemical namevariety of colourssilicates/ oxidesilicon dioxide= SiO2Quartz is the most common mineral. It occurs in basically all mineral environments and is an
important constituent of many rocks. Quartz is also the most varied of all minerals. It occurs
in all different forms, varieties and colours. Quartz is important in the production of soaps and
ceramics and in the computer industry. It is the primary ingredient for the manufacture of
glass. Transparent rock crystal has many electronic uses and is also used in the study of
optics. Many varieties of quartz are well known in the gem trade and jewelry. Amethyst
(purple), citrine (golden orange), rose quartz (pink), smoky quartz (smoky brown), rock
crystal (colourless), aventurine (green), tiger's eye (reddish brown) and carnelian (reddish
orange).

Diamond

colourchemical categorychemical namecolourless or variety of coloursnonmetallic elementcarbon=CIt forms at high temperatures and pressures that occur in Earth's mantle. Diamond is
chemically resistant and it is the hardest known natural substance. It has the highest melting
point (4090° C) and it is also the greatest conductor of heat. Diamond is very rare and it is
the world's most popular gemstone. Diamonds are used in the jewelry, however only 20% are
suitable for gem use. The other 80 percent mined are used as abrasives, as thermal insulators,
in optics, and in electronics.

Read the text about minerals. Then describe some features of a mineral to your partner who will guess its name.

Which minerals are in the pictures? Write them down:





Halite is usually blue and has sweet taste.

Gold is a *soft, shiny,* yellow element that is the most *malleable* of all the metals Magnetite contains from about 65 to 72% iron. The chemical name of bauxite is ferrous-ferric oxide= Fe_3O_4 . Quartz is the least common and also the least varied of all minerals. Diamond forms at low temperatures and has the lowest melting point.

How many minerals can you find in this line?

VGOLDUBAUXITENCITRINEWIHALITEDOQUARTZKAMETHYSTOPDIAMOND

Fill in the name of the mineral or the usage.

Mineral	Usage
Magnetite	
	as abrasives, as thermal insulators, in optics in electronics and in jewelry
Halite	
	the most important aluminum ore.
Gold	
	in the production of soaps and ceramics, in the computer industry, in the manufacture of glass, in electronic uses, in the study of optics, in jewelry

4.4.1 Vocabulary (Mineralogy)

mineralogy	electricity	soap
chemistry	resistant	ceramic
crystal	corrosion	industry
structure	jewelry	primary
property	art	ingredient
halite	dentistry	glass
colourless	industrial	transparent

sodium chloride	manufacture	optics
soft	magnetite	gem
taste	ferrous-ferric oxide	trade
salty	iron	amethyst
dissolve	magnetic	citrine
occur	mined	rose quartz
cube	ore	smoky quartz
shaped	creation	rock crystal
rock salt	steel	aventurine
road	bauxite	tiger's eye
footpath	hydroxide	carnelian
supplement	hydrated aluminium oxide	diamond
hunting	sedimentary	nonmetallic
domestic	weathered	carbon
gold	volcanic	resistant
metallic	approximately	hard
aurum	production	natural
rare	process	substance
valuable	variety	suitable
heavy	silicate	abrasive
soft	silicon dioxide	thermal
malleable	common	insulator
durable	environment	sweet
shiny	constituent	least
conductor	varied	usage

4.5 Petrology

The study of the origin, occurrence, structure and history of rocks, much broader study than petrography.

Petrography

Petrography is that branch of petrology which focuses on detailed description of rocks. Petrography deals with the physical and chemical properties of rocks, the description and systematic classification of rocks.

Rock classification

Rocks are classified by mineral and chemical composition, by the texture of the constituent particles and by the processes that formed them.

There are three major classes of rocks: igneous, sedimentary and metamorphic.

Igneous rocks form when molten rock cools and become solid. Molten rock is called magma when it is below the Earth' surface and lava when it is above. Igneous rocks are divided into two groups, based on where the rocks form. Igneous rocks that form when magma cools slowly below the Earth's surface are called **intrusive** or **plutonic igneous rocks** (granite, gabbro, iorite). Igneous rocks that form when lava cools quickly above the Earth's surface are called **extrusive** or **volcanic igneous rocks** (basalt, rhyolite, andesite).

Sedimentary rocks form at the Earth's surface, mostly under water. There are three basic types of sedimentary rocks: Clastic sedimentary rocks are made up of little pieces of other rocks called sediment (sandstone, shale and silstone). Chemical sedimentary rocks are made up of mineral crystals by chemical processes (rock salt, chalk, chert). Organic sedimentary rocks are made up of the remains of plants and animals (coal, lignite, peat).

Metamorphic rocks were once igneous or sedimentary rocks. They form deep in the earth. Factors such as high temperature, great pressure and chemical reactions cause one type of rock to change into another type of rock. There are two basic types of metamorphic rocks.**Foliated metamorphic rocks** are formed under heat and directed pressures that are unequal. They are identified on the basis of their texture: slate, phyllite, gneiss. **Non-foliated metamorphic rocks** are formed under heat and relatively low pressures that are equal in all directions. They are identified on the basis of their composition: marble, quartzite, metabasalt.

Read the text and answer the questions:

1. Define the term petrography.
2. Which factors are important in rock classification?
3. How does magma differ from lava?
4. How do the intrusive rocks form?
5. To which type of rocks does basalt belong ?
6. Which rocks are made up of pieces of other rocks?
7. What is the difference between chemical sedimentary and organic sedimentary rocks?
8. Do sandstone and shale belong to the same type of rocks? If yes, to which one?
9. Where do the metamorphic rocks form?
10. Which factors help in the formation of metamorphic rocks?
11. Give some examples of foliated and non-foliated metamorphic rocks.
Correct the names of rocks:

quartzotemetabazaltmarplesyltstone

ryolite	cert	 rok salt	
granate	slave	 gabro	

liknite

phylite

4.5.1The rock cycle

The transformation of one rock type to another is described by the geological model called the rock cycle. The rock cycle is a group of changes. Igneous rock can change into sedimentary rock or into metamorphic rock. Sedimentary rock can change into metamorphic rock or into igneous rock. Metamorphic rock can change into igneous or sedimentary rock.



4.4.1 Vocabulary (Petrography)

petrography deep occurence directed focus slate classification non-foliated major direction magma quartzite slowly cycle plutonic geological iorite erosion rhyolite clastic shale rock salt organic lignite

metamorphic origin foliated branch basis deal gneiss particle equal molten marble based on belong intrusive described gabbro cementation volcanic andesite sediment silstone chalk remain peat

petrology great broad unequal description phyllite constituent relatively igneous identify lava metabasalt below transformation granite compaction extrusive basalt sedimentary sandstone chemical chert coal