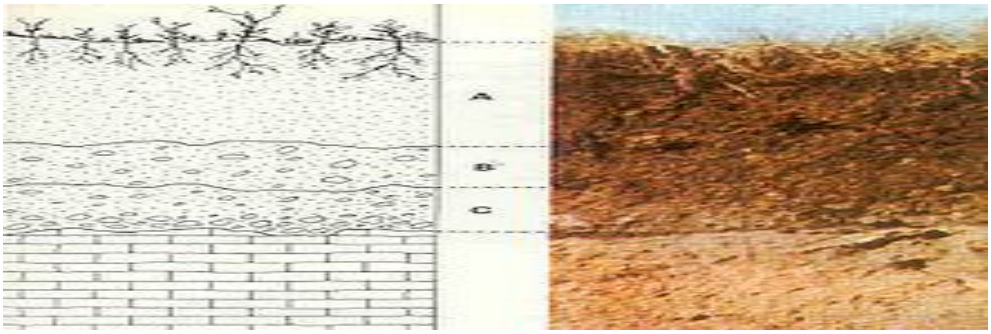
UNIT 2

SOIL

SESSION 5	**SOIL**

STARTER: Look at the illustrations below. With a partner if possible, try to predict what is being discussed exactly.



Step 1. Discuss the pictures. Try to write all essential details and key words from these pictures.

_____

_____

_____

Step 2. Read the text attentively. Look for the main idea.

1 It seems everybody knows what is the soil itself. However the scientific interpretation of the soil differs from its general meaning. Let`s look for its interpretation in agricultural science.

2 **Soil** is a natural body consisting of layers (soil horizons) that are composed of minerals. But those minerals differ from their parent materials in their texture, structure, consistency, color, chemical, biological and other

characteristics. It is known as the unconsolidated or loose covering of fine rock particles that covers the surface of the earth. Soil is commonly referred to as "earth" or "dirt" (technically, the term "dirt" should be restricted to displaced soil).

3 You can see a structure filled with pore spaces in soil forms. Soil can be thought of as a mixture of mineral and organic materials in the form of solids, gases and liquids. Accordingly, soils are often treated as a three-state system. Most soils have a density between 1 and 2 g/cm³.

4 Soil is composed of particles of broken rock (parent materials) which have been altered by physical, chemical and biological processes. Consequently, soil is altered from its original material by the interactions between the lithosphere, hydrosphere, atmosphere, and biosphere. Soil is influenced by some factors, such as the climate (temperature, precipitation), relief (slope), organisms (flora and fauna), parent materials (original minerals), and time.

Step 3. Which of the paragraphs deals with the given ideas?

Ideas	**Paragraphs**
According to the paragraph – soil is treated as many-stated thing and can be considered as a complex of solids, gases and water.	2
This paragraph says about the soil referred to the climate influence, also about typical usage of “soil” as a term.	
This part deals with the layers of earth.	
Paragraph introduces you with the novelty of the topic and leads to learn new information on it.	

Step 4. Try to define the words: *soil, earth, ground, basis, dirt* and match with appropriate definitions.	
Soil	the planet on which we live; the world
Earth	a substance, such as mud or dust, that soils someone or something
Ground	the solid surface of the earth
Basis	the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains
Dirt	underlying support or foundation for an idea, argument, or process

Step 5. Differ synonyms of "soil" from other words and fill in the columns.
Earth, water, dirt, personality, ground, earth, tone, void, basis, individuality, land, cultivating.
Soil – *earth,*

Step 6. Pay your great attention to the definitions below and match with given notions.	
mixture (n)	a minute opening in a surface, especially the skin or integument of an organism, through which gases, liquids, or microscopic particles may pass
pore (n)	change in character or composition, typically in a comparatively small but significant way
organic (adj)	a feeling of reassurance and relaxation following release from anxiety or distress
alter (v)	a combination of different things in which the component elements are individually distinct
relief (n)	relating to or derived from living matter
consistency (n)	a sheet, quantity, or thickness of material, typically one of several, covering a surface or body
mineral (adj)	the way in which a substance holds together; thickness or viscosity
layer (n)	make (something) physically stronger or more solid
consolidate (v)	an organization or company which owns or controls a number of subsidiaries

HELP DESK

WHAT DO THESE WORDS MEAN?

soil horizon – soil layer

bedrock – solid rock underlying loose deposits such as soil or alluvium

glacial till – tillage relating to or denoting the presence or agency of ice, especially in the form of glaciers

loose rock material – missing mountain matter

weathering – the mechanical and chemical breakdown of rocks by the action of rain, snow, cold, etc

disintegration – the process of losing cohesion or strength

erosion – the process of eroding or being eroded by wind, water, or other natural agents

lithosphere – the rigid outer part of the earth, consisting of the crust and upper mantle

hydrosphere – all the waters on the earth's surface, such as lakes and seas, and sometimes including water over the earth's surface, such as clouds

atmosphere – the envelope of gases surrounding the earth or another planet

biosphere – the regions of the surface and atmosphere of the earth or another planet occupied by living organisms

displaced soil – take over the place, position, or role of soil

pore space – a continuous area or expanse which is free, available, or unoccupied

density – the degree of compactness of a substance

SESSION 6	**SOIL STRUCTURE**

STARTER: Answer the following questions:

- What can affect aeration, water movement or conduction of heat?
- What does water do due to its solution and precipitation of minerals?
- What improves or destroys the soil structure?

Step 1. Write the following text using the words given in the box.

Soil, ped, destroyed, forms, defined, mineralogical, aggregates, erosion, effect, sizes

The clumping of the soil textural components of sand, silt and clay forms **aggregates** and the further association of those … into larger units forms soil structures called **peds**. The adhesion of the soil textural components by organic substances, iron oxides, carbonates, clays, and silica, and the breakage of those aggregates due to expansion-contraction, freezing-thawing, and wetting-drying cycles, shape soil into distinct geometric … . These peds evolve into units which may have various **shapes**, … and degrees of **development**[1]. A soil clod, however, is not a … but rather a mass of soil that results from mechanical disturbance. The soil structure affects aeration, water movement, conduction of heat, plant root growth and resistance to … . Water has the strongest effect on soil structure due to its solution and precipitation of minerals and its … on plant growth.

… structure often gives clues to its texture, organic matter content, biological activity, past soil evolution, human use, and the chemical and … conditions under which the soil formed. While texture is … by the mineral component of a soil and

[1] file:///C:\Users\7\GTA-ViceCityMATRIX\Soil–Wikipedia,thefreeencyklopedia.mht#cite_note-8

is an innate property of the soil that does not change with agricultural activities, soil structure can be improved or … by the choice and timing of farming practices.

Step 2. Find the words to the definitions given below:	
A strong magnetic silvery-grey metal	*iron*
The upper layer of earth, in which plants grow	
Introducing air into something	
A living thing that grows in the ground, having roots	
The liquid which forms the seas, lakes, rivers, and rain and is the basis of the fluids of living things	

Step 3. Do the following statements agree with the information in Reading Passage? In boxes 1-5 on your answer sheet write. Time – 10 min.

YES (Y) *if the statement agrees with the information*

NO (N) *if the statement contradicts the information*

NOT GIVEN (NG) *if there is no information on this passage*

	Water does not affect the soil structure.
	Animals, plants and other life forms for food, fiber, biofuel are considered as products used to sustain human life.
	Soil structure can be improved or destroyed by the choice and timing of farming practices.
	Soil structure can be broadly grouped into *foods, fibers, fuels.*
	Aggregates are made by the clumping of the soil textural components of sand, silt and clay.

Step 4. Match words 1-10 related to the soil and explain your choices.

hydromelioration		rock
horizons		animals
earth layers		plane
watering		lithosphere
particles	soil	gases

Step 5. Take part at the game: *"Past – Present – Future"*.

Re-grouped into three teams, you should fill up the table with columns *"Past – Present – Future"*. Remember what information did you know on soil structure before this session and write in column *Past*; summarize what you have learned during this class and write in column *Present*; conclude what information would you like to learn more in the future and write all predictions in column *Future*. Wins the team, which will write more information and details in the columns.

	I team	II team	III team
Past			
Present			
Future			

HELP DESK

WHAT DO THESE WORDS MEAN?

aggregate – a whole formed by combining several separate elements; construction, installation

ped – the association of aggregates of sand, silt and clay into larger units

soil clod – a lump of earth or clay

aeration-solution – a process of searching ways of aeration or matters dealt with aeration

precipitation – the action or process of precipitating a substance from a solution

clue – a piece of evidence or information used in the detection of a crime

soil evolution – the process of developing soil

innate property – natural possessions collectively

timing – the choice, judgement, or control of when something should be done

clay – a stiff, sticky fine-grained earth that can be moulded when wet, and is dried and baked to make bricks, pottery, and ceramics

silica – a hard, unreactive, colorless compound which occurs as the mineral quartz and as a principal constituent of sandstone and other rocks organic constituent

humus – a substance found in soil, formed from dead or dying leaves and other plant material

SESSION 7	**PHYSICAL PROPERTIES OF SOILS**

STARTER: Playing a game: “Seat-changing”.

Teacher sticks the pieces of papers on students` backs. It is one of wise-sayings of Thomas Fuller. Students must reorder the words for making the whole sentence by changing their seats (without knowing the stick-words stuck on their backs).

loves	a tree	plants	others
that	himself	beside	he

Step 2. Discuss the meaning and actuality of the saying in the class and write your own opinion in two paragraphs.

1.Meaning:_____

_____

_____

_____ .

2.Actualty:_____

_____

_____

_____ .

Step 3. Fill in the gaps using *to be* in appropriate forms of verbs and write down

full text in your notebook.

Let`s talk on physical state of soil. The physical properties of soils (be) *are* **texture**, **structure**, **density**, **porosity**, **consistency**, **temperature**, **colour** and **resistivity**. Most of these … (determine) the aeration of the soil and the ability of water to infiltrate and to be held in the soil.

Soil texture … (be, determine) by the relative proportion of three kinds of soil particles. They are called soil "separates": sand, silt, and clay.

Do you know what are **"peds"**? Peds are larger soil structures and they … (be, create) from the separates when iron oxides, carbonates, clay, and silica with the organic constituent humus, coat particles, and cause them to adhere into larger, relatively stable secondary structures.

The main measure of soil **density**, particularly bulk density … (be) a soil compaction. So the soil **porosity** … (consist) of the part of the soil volume occupied by air and water. **Consistency** … (be) the ability of soil to stick together. **Soil temperature and colour** … (be) self-defining. So according to these factors soils can be recognized and regrouped into classes. **Resistivity** may … (refer) to the resistance to conduction of electric currents and … (affect) the rate of corrosion of metal and concrete structures. The properties … (may) vary through the depth of a soil profile.

Step 4. Choose the title for the text. Explain the reason of your choice.

- Soil – as an essential component of objective reality.
- Information on physical properties of soils
- Variation of soils properties
- Altering of physical properties of soils according to different living factors

Step 5. Do the following statements agree with the information in Reading Passage? In boxes 1-4 on your answer sheet write. Time – 10 min.

TRUE (T) *if the statement agrees with the information*

FALSE (F) *if the statement contradicts the information*

NOT GIVEN (NG) *if there is no information on this passage*

	Soil texture is determined by the relative proportion of the three kinds of soil particles, called soil "separates": sand, silk, and clay.
	Consistency is the ability of soil to stick together, e.g. agglutinate or paste.
	Resistivity refers to the resistance to conduction of electric currents and affects the rate of corrosion of metal and concrete structures.
	Soil is defined according to its colour, temperature, consistency, structure and odor.

Step 6. Look for the specific information of the text.

Specific information	Paragraph
Paragraph deals with the general information on soils properties; also the ability of water to infiltrate and to be held in the soil is remembered.	*1*

HELP DESK

WHAT DO THESE WORDS MEAN?

physical properties of soils – natural features of soil

porosity – the state or condition of being porous

consistency – the state of being consistent; the thickness of a liquid or semi-liquid substance

colour – the property possessed by an object of producing different sensations on the eye as a result of the way it reflects or emits light

resistivity – a measure of the resisting power of a specified material to the flow of an electric current- of the immediate present; in progress

infiltrate – pass slowly into or through something

relative proportion – proportion existing only in comparison to smth else

kinds of soil particles – types of soil pieces

soil "separates" – soil allotments

sand – a loose granular substance, typically pale yellowish brown, resulting from the erosion of siliceous and other rocks and forming a major constituent of beaches, river beds, the seabed, and deserts

silt – fine sand, clay, or other material carried by running water and deposited as a sediment, especially in a channel or harbour

clay – a stiff, sticky fine-grained earth that can be moulded when wet (and is dried and baked to make bricks, pottery, and ceramics)

carbonates – a salt of the anion CO_3^{2-}, typically formed by reaction of carbon dioxide with bases

silica – a hard, unreactive, colorless compound which occurs as the mineral quartz and as a principal constituent of sandstone and other rocks

coat particles – skin pieces

bulk density – a great part of density

SESSION 8	**THE MINERAL COMPONENTS OF SOIL**

STARTER: Answer the following pre-reading questions:

a) Can you tell about the structure of soil?

b) What components do you consider the soil is made of?

c) Do you differentiate organic soil from the mineral soil?

Step 1. Skim over the following text (quickly) and look for the words referring to the definitions given in the table:

Definition	Paragraph	Word
Ground, earth, land, country	1	*soil*
To receive something good	2	?
Related to the supposed ability of the human mind to sense things that can not be observed	3	?
One part of a system or whole	2,3	?
Ability of a living thing to act or function independently	3	?

1 When we talk about soil`s texture we always mention it`s mineral components of soil, sand, silt and clay. The mineral constituents of a loam soil might be 40% sand, 40% silt and the balance 20% clay by weight. Soil texture affects soil behavior, in particular its retention capacity for nutrients and water.

2 Sand and silt are the products of physical and chemical weathering; clay, on the other hand, is a product of chemical weathering, but often forms as a secondary mineral precipitated from dissolved minerals. It is considered as the

specific surface area of soil particles. The unbalanced ionic charges exchange capacity of soil, and hence its fertility.

3 Sand is least active, followed by silt; clay is the most active. Sand's greatest benefit to soil is that it resists compaction and increases porosity. Silt is mineralogically like sand but with its higher specific surface area it is more chemically active than sand. But it is the clay content, with its very high specific surface area and generally large number of negative charges, that gives a soil its high retention capacity for water and nutrients. Clay soils also resist wind and water erosion better than silty and sandy soils, as the particles are bonded to each other.

Step 2. Choose the title for the passage and explain the reason of your choice.

Title: _____

Reason of choice: _____.

Step 3. Put the headings to the paragraphs independently. Explain your choice.

Headings	Paragraphs
	1
	2
	3

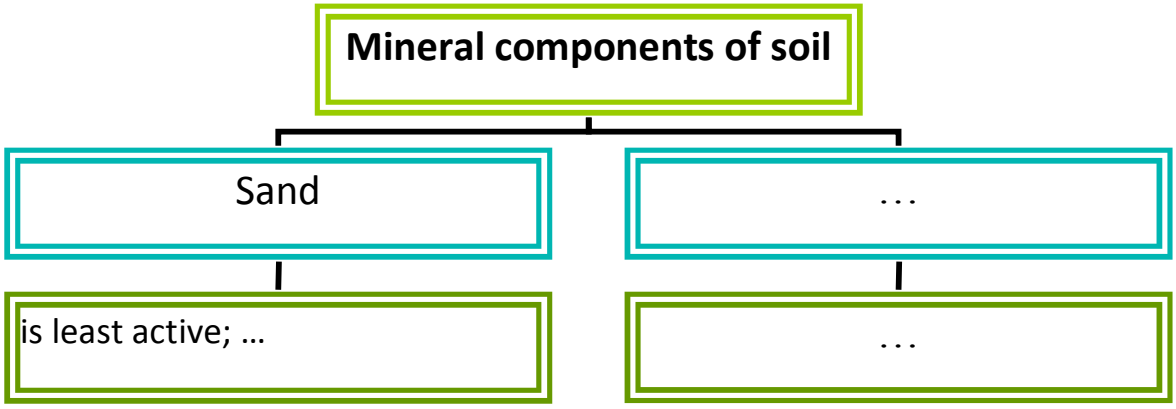
Step 4. Using NO MORE THAN FOUR WORDS from the passage, answer the following questions. Write your answers on the lines below.

1. What does affect the soil texture?
2. What do clay soils also resist better than silty and sandy soils, as the particles are bonded to each other?

3. Where is the clay often washed downward through the soil profile and accumulates?
4. What kind of soil components are classed as rock and gravel?
5. According to the text, how is called the soil rather than mineral soil?

1. _____.
2. _____.
3. _____.
4. _____.
5. _____.

Step 5. Complete the mind-map according to the text and fill in the columns.



Step 6. Compare the features and give explanation of each choice.

_____

_____

_____

_____

_____ .

HELP DESK

WHAT DO THESE WORDS MEAN?

mineral constituents – mineral items

soil behaviour – soil condition

dissolved minerals – minerals, incorporated into a liquid so as to form a solution

chemically active – chemically moving about often or energetically

rock – the solid mineral material forming part of the surface of the earth and other similar planets, exposed on the surface or underlying the soil

primarily quartz particles – starter quartz pieces

optical microscope – a microscope using visible light, typically viewed directly by the eye

rock – the solid mineral material forming part of the surface of the earth and other similar planets, exposed on the surface or underlying the soil

gravel – a loose aggregation of small water-worn or pounded stones ■ a mixture of gravel with coarse sand, used for paths and roads and as an aggregate

gravelly sandy loam – a fertile soil of clay and sand containing humus

mineral fraction – mineral part/portion

organic matter – organic substance

SELF-CONTROL on UNIT 2 (total 15 points)

Step 1. VOCABULARY CHECK (5 points). These are the important words that you have studied in Unit 2. You should make sure that you know these words before you go on to Unit 3.

atmosphere	organic matter
bedrock	physical properties of soils
biosphere	pore spaces
carbonate	porosity
clay	primarily quartz particles
coat particle	resistivity
colour	sand
consistency	soil
content	soil behaviour
density	soil degradation
disintegration	soil "separates"
displaced soil	silt
dissolved mineral	temperature
gravel	
gravelly sandy loam	
hydrogen	
mineral constituent	
infiltrate	
kinds of soil particles	

Step 2. TRUE-FALSE ACTIVITY (4 points). Which of the following bits of information is given (G) or not given (NG) in Unit 1?

1. Soil consists of several kind of minerals which is the same consistency. _____
2. Soil is impact by abiotic and biotic part of nature . _____
3. Soil structure effects on planting and growing flora. _____
4. Temperature and color of soil related on structure of soil. _____

5. Clay soils stay against wind and water erosion more effectively than silt soils._____

Step 3. COMPREHENSION TASK (3 points). Read and explain the meaning of the following proverbs and wise-sayings on gardening and planting. Underline metaphorical and specific usage of some expressions.

God gives every bird a worm, but he does not throw it in the nest
Swedish proverb

Keep a tree green in your heart and perhaps a singing bird will come
Chinese proverb

Though a tree grows so high, the falling leaves return to the root
Maylay proverb

He that plants thorns must never expect to gather roses
English proverb

The sluggard does not plow after the season, so he begs during the harvest and has nothing.
The Bible; Proverbs 20:4