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UNIT 1 – How Do Scientists Work?

Topics: Branches of Science • Scientific Method • Present Tenses • Passive Voice • Connectives • Infinitives • Measurement

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1. How Do Scientists Work? (Simple Explanation)

Scientists follow a **systematic way** of working. This process is called the **scientific method**.

Steps of the Scientific Method

1. **Observation** – Scientists observe a problem in nature.
   Example: The soil in a field is very dry.
2. **Question** – They ask a scientific question.
   Why are the plants growing slowly?
3. **Hypothesis** – They make a possible explanation.
   Plants grow slowly because the soil lacks water.
4. **Experiment** – They test the hypothesis.
5. **Results** – They collect, measure, and analyze data.
6. **Conclusion** – They decide if the hypothesis is correct.

This method helps scientists to find **objective**, **measurable** results.

---

2. Branches of Science (Vocabulary)

General Science	Physical Sciences	Life Sciences	Applied Sciences
General science	Physics	Biology	Agronomy
Mathematics	Chemistry	Botany	Meteorology

Definitions (Infinitives to express function)

- *Physics **is used to explain** forces and energy.*
- *Chemistry **helps to study** matter and reactions.*
- *Agronomy **aims to improve** crop production.*
- *Meteorology **is used to predict** weather conditions.*

---

3. Grammar Focus

A. Present Simple

Use it for **facts**, **general truths**, or **regular actions**.

- Scientists **study** natural phenomena.
- Agronomists **measure** soil properties.
- Water **evaporates** at 100°C.

B. Present Continuous

Use it for **actions happening now**.

- The researcher **is analyzing** plant samples.
- The student **is measuring** soil moisture.

C. Passive Voice (Present Tense)

Use it to focus on the **action**, not the doer.

- The experiment **is carried out** in the laboratory.
- Soil samples **are collected** every morning.
- Data **is analyzed** using software.

---

4. Connective: *not only… but also*

Used to add **two related important ideas**.

Examples:

- Agronomy studies **not only** crops **but also** soil and climate.
- A scientist needs **not only** knowledge **but also** practical skills.

---

5. Measurement of Weight (Basic Scientific English)

Unit	Symbol	Example
gram	g	A seed weighs 5 g.
kilogram	kg	A bag of fertilizer weighs 25 kg.
milligram	mg	The sample weighs 20 mg.

Useful verbs:

- **measure** weight
- **weigh** a sample
- **record** the value

Example sentence (present passive):

- The sample **is weighed** on an electronic balance.

---

6. Short Practice Activities (optional)

A. Fill in the blanks (Present simple / Present continuous)

1. The agronomist _____ (collect) soil samples now.
2. Water _____ (freeze) at 0°C.
3. Temperature sensors _____ (be) used in experiments.

B. Write one sentence using "not only… but also"

Example:

C. Match the branch of science with its definition

1. Meteorology
2. Chemistry
3. Biology

a. The study of matter and its reactions
b. The study of living organisms
c. The study of weather

UNIT 2 – Classification of Living Things

1. Theme: Identifying and Classifying Living Things

Biologists classify living things to understand how they are **similar** and **different**.

Why classify?

- To **organize** living organisms
- To **identify** species
- To **study** relationships between organisms

Main groups of living things

1. **Animals**
2. **Plants**
3. **Fungi**
4. **Bacteria**
5. **Protists**

Agronomy focus

Agronomists classify:

- crops (wheat, maize, rice)
- livestock
- soil organisms (bacteria, earthworms, insects)

---

2. Sameness and Difference (Vocabulary)

To express similarity

- *X is similar to Y.*
- *Both X and Y…*
- *X and Y have the same…*

To express difference

- *X is different from Y.*
- *Unlike X, Y…*
- *X has…, but Y does not.*

Example:

- *Maize is similar to wheat because both are cereals.*

- *Unlike maize, beans fix nitrogen in the soil.*

---

3. Grammar Focus

A. Present Perfect

Used to talk about **past actions with present results**.

Form:
have/has + past participle

Examples:

- Scientists **have classified** thousands of plant species.
- Agronomists **have identified** new pests this year.
- Biologists **have discovered** new bacteria in the soil.

B. Passive Voice (Present Passive)

Used when the action is more important than the actor.

Form:
am / is / are + past participle

Examples:

- Living things **are classified** into groups.
- Samples **are collected** from the field.
- The weight **is measured** using a digital balance.

---

4. Definitions (Language Work)

To define, use: **is**, **are**, **refers to**, **is used to**, **is a type of**.

Examples:

- *A species **is** a group of organisms that can reproduce together.*
- *A microorganism **is a living thing** that is too small to see without a microscope.*
- *Classification **is the process of** grouping living things.*

---

5. Measurement of Weight (Review)

Common units

Unit	Symbol	Example
gram	g	A seed weighs 5 g.
kilogram	kg	A fertilizer bag weighs 20 kg.
milligram	mg	The sample weighs 15 mg.

Useful verbs

- **weigh** (to determine weight)
- **measure** (to find size or quantity)
- **record** (to write the value)

Example (passive):

- The seed **is weighed** on a balance.

---

6. Short Student Activities

A. Use present perfect

Complete:

1. Scientists _____ (discover) new plant species.
2. Agronomists _____ (study) soil organisms.
3. Students _____ (collect) samples from the field.

B. Classification practice

Write one similarity and one difference between:

- Beans and maize
- Wheat and barley
- Earthworms and insects

C. Define the terms

Define the following:

1. Species
2. Organism
3. Bacteria

UNIT 3 – The Power of Water

1. Branch of Science: Earth Sciences

Earth sciences study **natural forces**, such as water, wind, and earthquakes.
In agronomy, water is a **key natural force** because it shapes land, soil, and plant growth.

A. Theme: Cause and Effect (Water as a Natural Force)

Water can **cause** many changes on Earth, and these changes are the **effects**.

Cause and Effect Examples

- **Cause:** Heavy rain
  Effect: Soil erosion
- **Cause:** Fast-moving water
  Effect: Rocks are carried away.
- **Cause:** Lack of water
  Effect: Crops dry and die.

Useful language

- *Water causes…*
- *As a result…*
- *Because of…*
- *This leads to…*

B. Sameness and Difference (Water Forms)

To express similarity

- *Rivers are similar to streams because both contain flowing water.*

To express difference

- *Unlike lakes, rivers move across the land.*
- *Surface water is different from groundwater.*

C. Grammar Focus

1. Simple Past

Used for **completed actions in the past**.

Examples:

- The river **flooded** last year.
- Heavy rain **destroyed** many crops.
- Water **formed** deep valleys over time.

2. Passive Voice (Present & Past)

Present Passive (am / is / are + past participle)

- Soil **is carried** away by running water.
- Water **is used** for irrigation.

Past Passive (was / were + past participle)

- Many fields **were damaged** by floods.
- Houses **were destroyed** by the storm.

D. Connective: *so…that*

Used to explain **strong cause and effect**.

Structure

so + adjective/adverb + that + result

Examples:

- The river was **so strong that** it moved large rocks.
- The rain was **so heavy that** the field flooded.
- The wind was **so cold that** the crops died.

E. Measurement of Distance

Distances help agronomists study land, irrigation, and field size.

Common units

Unit	Symbol	Example
meter	m	The canal is 50 m long.
kilometer	km	The river is 12 km from the farm.
centimeter	cm	The plant grew 15 cm last week.

Useful verbs

- **measure** distance
- **calculate** distance
- **estimate** distance

Example (passive):

- The distance between plots **is measured** with a tape measure.

F. Short Practice Activities

1. Simple Past

Complete:

1. Heavy rain _____ (cause) flooding.
2. The river _____ (wash away) the soil.
3. The storm _____ (damage) the crops.

2. Passive Voice

Rewrite in passive:

1. Water erodes the soil.
   → The soil _____.
2. The flood destroyed the bridge.
   → The bridge _____.

3. Use *so…that*

Write one sentence:

- The water was so _____ that _____.

4. Distance Practice Write a sentence using **meter** or **kilometer**.

UNIT 4 – The Specific Role of Water

1. Branch of Science: Physics and Engineering

Physics and Engineering study **energy**, **forces**, and **how machines work**.
Water plays a **specific and important role** because it can:

- move objects,
- generate energy,
- transfer heat,
- transport nutrients in plants and soil.

In agronomy and engineering, we study how the **movement** and **properties** of water affect natural and man-made systems.

✓ A. Theme: Cause and Effect — Description of a Process

Water is involved in **many physical processes**.

Example 1: Water Erosion Process

1. Rain falls on the soil.
2. Water flows over the surface.
3. The flowing water **carries soil particles**.
4. Soil **is removed** from the field.

Cause and Effect

- **Cause:** Heavy rain
  Effect: Water removes topsoil.
- **Cause:** Fast water flow
  Effect: Larger particles **are transported**.

Useful Expressions

- *As a result…*
- *This causes…*
- *This leads to…*

✅ B. Sameness and Difference

Similarity

- *Irrigation canals are similar to natural streams because both carry water.*

Difference

- *Unlike rivers, irrigation canals are man-made.*
- *Surface water is different from groundwater.*

📄 C. Grammar Focus

1. Simple Past

Used for **completed events in the past**.

Examples:

- Water **carried** nutrients down the slope.
- The engineer **built** a new drainage system.
- The river **flooded** last year.

---

2. Present Perfect

Used for **past actions with present results**, or an action that continues.

Examples:

- Water **has created** deep valleys over time.
- Engineers **have improved** irrigation systems.
- Scientists **have studied** the movement of water for many years.

---

3. Relative Pronouns (who, which, that)

Used to add information about nouns.

Examples:

- *Water **which** moves rapidly can cause erosion.*

- *A pipe **that** is 20 meters long carries water to the field.*
- *The engineer **who** designed the system works at the research center.*

📏 D. Other Language Work: Dimensions

Dimensions describe the **size** of an object or structure.

Common Dimension Words

- **length**
- **width**
- **height**
- **depth**
- **diameter**

Examples in Agronomy and Engineering

- The canal is **3 meters wide**.
- The water tank is **2 meters high**.
- The pipe has a **diameter of 10 centimeters**.
- The well is **15 meters deep**.

✏️ E. Short Practice Activities

1. Simple Past

Complete the sentences:

1. Water _____ (enter) the canal.
2. The river _____ (destroy) the bridge.
3. The farmer _____ (dig) a drain.

---

2. Present Perfect

1. Water _____ (shape) the landscape for millions of years.
2. Engineers _____ (create) better pumps.
3. Rainfall _____ (increase) this season.

---

3. Relative Pronouns

Combine the sentences:

1. This is the pump. It moves the water.
   → This is the pump **that moves the water**.
2. The canal is very long. It carries water to the fields.
   → The canal _____.
3. The scientist works at the laboratory. He studies water flow.
   → The scientist _____.

---

4. Dimensions

Write a sentence using one dimension word:
length, width, height, depth, diameter

Example:

- *The well is 12 meters deep.*

UNIT 5 – Two Vital Elements

1. Branch of Science: Chemistry

Chemistry studies:

- **elements**,
- **substances**,
- **their composition**,
- **their properties**,
- and **chemical processes** (natural and industrial).

In agronomy, two vital elements often studied are **oxygen** and **hydrogen**, or **nitrogen** and **carbon**, because they are essential for soil, plants, water, and life.

🔬 A. Themes: Discovery, Chemical Analysis, Properties, Processes

1. Discovery & Chemical Analysis

Chemists discover elements and analyze:

- what substances are made of,
- how much of each element they contain,
- how they react.

Example:
Scientists analyzed water and discovered that it contains hydrogen and oxygen.

2. Properties

Each element has special properties:

- **Oxygen**: colorless, odorless gas, supports life and combustion
- **Hydrogen**: lightest element, flammable
- **Nitrogen**: makes up 78% of the air, essential for plant growth
- **Carbon**: forms organic molecules; solid (graphite), diamond, gas (CO_2)

3. Natural and Industrial Processes

- Natural: photosynthesis, respiration, nitrogen cycle
- Industrial: fertilizer production, water purification, combustion

---

⚗ B. Composition of Substances

Chemists describe composition **in percentages**.

Examples:

- Air contains **78% nitrogen**, **21% oxygen**, and **1% other gases**.
- Water is **100% pure H_2O** when distilled.
- Soil may contain **45% minerals**, **25% water**, **25% air**, **5% organic matter**.

Useful sentences:

- *The mixture is composed of…*
- *The substance contains…% of…*
- *It consists of…*

📘 C. Grammar Focus

1. Past Perfect

Used to describe an action that happened **before another past action**.

Form:
had + past participle

Examples:

- The chemist **had discovered** the element before he analyzed its properties.
- The laboratory **had completed** the tests when the results arrived.
- The water **had evaporated** before the sample was measured.

Past Perfect Passive

had been + past participle

Examples:

- The samples **had been collected** before the experiment started.
- The substance **had been heated** to 90°C before mixing.

---

2. Contracted Relative Clauses

Relative clauses can be shortened.

Examples:

- *Water that contains minerals* → **Water containing minerals**
- *The gas which is produced by the reaction* → **The gas produced by the reaction**
- *The elements that are needed by plants* → **The elements needed by plants**

🌡 D. Other Language Work

1. Expressing Composition in Percentages

Examples:

- The fertilizer contains **30% nitrogen**.
- The solution is **50% water** and **50% alcohol**.
- The sample is composed of **10% clay**, **60% sand**, **30% silt**.

2. Properties (Useful Adjectives)

- solid / liquid / gas
- soluble / insoluble
- reactive / stable
- acidic / alkaline / neutral
- flammable / non-flammable

Example sentence:

- *Oxygen is a reactive gas.*
- *Nitrogen is a stable, non-reactive gas.*

3. Expressing Temperature

- The water was heated **to 80°C**.
- The reaction occurs **at 25°C**.
- The mixture was cooled **down to 5°C**.
- The temperature **rose to 40°C** during the process.

🔛 E. Short Practice Activities

1. Past Perfect

Complete:

1. The chemist _____ (analyze) the sample before he wrote the report.
2. The water _____ (evaporate) before the experiment began.
3. The sample _____ (heat – passive) before it was tested.

---

2. Contracted Relative Clauses

Rewrite:

1. Water that contains salt → _____
2. The gas which is formed by combustion → _____
3. Elements that are used in fertilizers → _____

---

3. Composition in Percentages

Write one sentence describing composition (any substance you choose).

---

4. Expressing Temperature

Write one sentence using **to**, **at**, or **down to**.

UNIT 6 – Water Pollution

1. Branch of Science: Ecology

Ecology studies:

- the environment,
- living organisms,
- and the relationship between humans and nature.

Water pollution is a major ecological problem because it affects:

- plants
- animals
- soil
- human health

🌍 A. Theme: Cause and Effect Processes

Water pollution happens through **processes** where one action (cause) creates a result (effect).

Causes

- Factories **release chemicals**
- Farmers **use fertilizers and pesticides**
- Cities **produce wastewater**
- Oil **leaks** from tankers

Effects

- Water **becomes contaminated**
- Fish **are killed**
- Soil **is poisoned**
- Drinking water **is unsafe**

Useful expressions:

- *This causes…*
- *As a result…*
- *This leads to…*

Example:
Factories release waste, and as a result, rivers become polluted.

📓 B. Grammar Focus: Present Continuous Passive

Used to describe actions happening **now**, but the focus is on the action, not the doer.

Form

am / is / are + being + past participle

Examples in Ecology

- Water **is being polluted** by chemicals.
- Trees **are being destroyed** by acid rain.
- Rivers **are being cleaned** by environmental groups.
- Wastewater **is being treated** in the new plant.

🛠 C. Other Language Work

1. "As" to Express Function

As = "in the role of / used for"

Examples:

- Water is used **as** a solvent.
- Plants act **as** natural filters.
- The river serves **as** a source of irrigation.
- Activated carbon works **as** a purifier.

---

2. Expressing Liquid Measures

Liquid volumes are very important in ecology and agronomy.

Common Units

Unit	Symbol	Example
liter	L	The tank holds 100 L of water.
milliliter	mL	The sample contains 20 mL.
cubic meter	m^3	The reservoir stores 200 m^3 of water.

Useful verbs

- measure
- contain
- hold
- pour

Examples:

- The bottle contains **2 liters** of water.
- **500 mL** of wastewater is being tested.

---

3. Expressing Chemical Formulae

Water pollution involves chemicals with formulas.

Examples

- **H_2O** – water
- **CO_2** – carbon dioxide
- **NO_3^-** – nitrate (from fertilizers)
- **NH_3** – ammonia
- **H_2SO_4** – sulfuric acid

Useful structure:

- *The formula for water is H_2O.*
- *Nitrates (NO_3^-) are found in polluted rivers.*

➖ D. Short Practice Activities

1. Present Continuous Passive

Complete:

1. The river _____ (pollute) by factories.
2. Wastewater _____ (treat) at the new station.
3. Fish _____ (kill) by toxic chemicals.

---

2. Use “as” to express function

Write one sentence:

- Water is used as _____.
- The plant acts as _____.

---

3. Liquid Measures

Write a sentence using **L**, **mL**, or **m^3**.

Example:
The sample contains 50 mL of wastewater.

---

4. Chemical Formulae

Write a sentence using one chemical formula:
H_2O, CO_2, NO_3^-, NH_3

Example:
CO_2 is produced by combustion.

UNIT 7 – The Uses of Mathematics

1. Introduction

Mathematics is an important tool in all scientific fields.
In agronomy, students and engineers use mathematics **to measure**, **to calculate**, **to compare**, and **to make decisions** about crops, soil, and farming systems.

---

2. The Uses of Mathematics

Mathematics helps us to:

- measure **areas** and **distances** in the field,
- calculate **fertilizer quantities**,
- estimate **crop yield**,
- record and analyze **climate data**,
- solve problems and make predictions.

Example:
We calculate the area of a plot **in order to** know how much fertilizer is needed.

---

3. Branch of Science: Mathematics

Mathematics is a branch of science that studies:

- numbers,
- shapes,
- quantities,
- relationships between variables,
- formulas and equations.

It is used in biology, chemistry, physics, economics, and agronomy.
It provides the **language of measurement** and the **methods** for scientific work.

---

4. Relationships of Knowledge to Its Application

Scientific knowledge becomes useful when it is **applied**.

Examples in agronomy:

- Knowledge of soil chemistry is applied **to choose** the right fertilizer.
- Knowledge of plant physiology is applied **to improve** irrigation.
- Mathematical knowledge is applied **to calculate** plant density, area, or yield.

So, theory helps practice, and practice gives meaning to theory.

---

5. The Scientific Method

Scientists follow a logical method to solve problems:

1. **Observation** – Noticing a problem (e.g., plants growing slowly).
2. **Question** – Why are the plants small?
3. **Hypothesis** – Maybe the soil lacks nutrients.
4. **Experiment** – Test the idea by adding nutrients to some plants.
5. **Analysis** – Compare the results with control plants.
6. **Conclusion** – Decide if the hypothesis is correct.

Example:
An experiment **can be carried out** to test if nitrogen increases yield.

---

6. Grammar Focus: Passive with *can*

We use: **can + be + past participle**
We use this structure to talk about **possibility**, **ability**, and **scientific processes**.

Examples:

- Soil samples **can be taken** from different plots.
- Measurements **can be recorded** every week.
- Fertilizer amounts **can be calculated** using formulas.
- Data **can be analyzed** by computer software.

---

7. Expression: *In order to* (expressing purpose or method)

In order to + base verb shows **why** something is done.

Examples:

- Farmers check soil moisture **in order to** plan irrigation.
- Researchers repeat experiments **in order to** get accurate results.
- We use equations **in order to** calculate plant density.

---

8. Calculating Dimensions (Simple Examples)

1. Area of a rectangle

Formula: **Area = length × width**
Example: A field is 40 m long and 25 m wide.
Area = 40 × 25 = **1000 m²**

2. Plant Density

Formula: **Density = number of plants ÷ area**
Example: 300 plants in 150 m²
Density = 300 ÷ 150 = **2 plants/m²**

3. Volume

For a rectangular tank: **Volume = length × width × height**

UNIT 8 – The Weather

1. Introduction

Weather is an important factor in agriculture.
Farmers and agronomists must understand weather conditions **in order to** plan planting, irrigation, fertilization, and harvesting.

---

2. Branches of Science: Meteorology and Physics

Meteorology

Meteorology is the science that studies:

- the atmosphere,
- temperature,
- humidity,
- wind,
- rainfall,
- storms and climate patterns.

Meteorologists observe and predict weather **to help** farmers protect crops and plan agricultural activities.

Physics

Physics explains the forces and energy involved in weather processes, such as:

- heat transfer,
- pressure changes,
- air movement (wind),
- evaporation and condensation.

---

3. Theme: Cause and Effect Processes

Cause and effect describe **why something happens** and **what results from it**.

Examples in weather:

- The air heats → **causes** it to rise.

- Warm air rises → **results in** cloud formation.
- Low pressure → **causes** strong winds.
- Heavy rain → **results in** soil erosion.

Examples in agriculture:

- Lack of rainfall **causes** low crop growth.
- Excess moisture **results in** plant diseases.

---

4. Grammar Focus

A. Connective: *until*

"**Until**" shows a limit in time.
It means "up to the time when…"

Examples:

- The soil stays wet **until** the sun dries it.
- The plants cannot grow well **until** they receive enough light.
- Farmers wait **until** the weather becomes warm to plant seeds.

B. Passive with agent (expressing cause)

Structure: **subject + is/are + past participle + by + agent**

We use this to show what causes an effect.

Examples:

- Strong winds **are produced by** differences in air pressure.
- Clouds **are formed by** the cooling of humid air.
- Floods **are caused by** heavy or continuous rainfall.
- Soil erosion **is increased by** strong runoff.

---

5. Other Language Work

A. General and Particular Statements

General statements talk about things that are always or usually true:

- “Weather affects agriculture.”
- “Warm air rises.”
- “Plants need sunlight.”

Particular statements talk about a specific situation:

- “The weather today is windy.”
- “This field received 20 mm of rain yesterday.”
- “These plants need more sunlight.”

B. *Too* and *Enough*

Too + adjective

= more than necessary (negative)

Examples:

- It is **too hot** for planting.
- The soil is **too dry** for germination.
- The wind is **too strong** to spray pesticides.

Adjective + enough

= sufficient (positive)

Examples:

- It is warm **enough** for seed germination.
- There is **enough** rainfall for crop growth.
- The soil is moist **enough** to plant.

---

6. Interpreting Graphs

Students often read graphs about temperature, rainfall, or humidity.

When interpreting graphs:

- Identify the **axes** (x-axis = time, y-axis = measurement).
- Look for **increases** (goes up).
- Look for **decreases** (goes down).
- Compare values between months or years.
- Explain trends in simple sentences.

Example:

- “Rainfall increased in June.”
- “Temperature fell in October.”
- “July was hotter than May.”

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7. Comparing

To compare weather conditions, use:

- **higher / lower**
- **more / less**
- **warmer / cooler**
- **stronger / weaker**

Examples:

- July is **warmer than** April.
- This region receives **more rainfall** than the north.
- Today’s wind is **stronger than** yesterday’s wind.

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8. Identifying and Classifying

Agronomy students often identify and classify types of weather.

Examples:

Identifying

- “This is a humid climate.”
- “These clouds indicate rain.”

Classifying

- “Rainfall is classified into light, moderate, and heavy.”
- “Winds are classified by speed

UNIT 9 – The Power of the Lens

1. Introduction

Lenses are important tools in science.
In agronomy and biology, lenses help us observe **plants**, **soils**, **microorganisms**, and **insects**.
Modern microscopes and optical instruments are based on the basic invention of the **lens**.

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2. Branch of Science: Physics (Light)

The study of lenses belongs to **physics**, especially **optics**, the science of light.

Optics studies:

- how light moves,
- how light is bent (refracted),
- how lenses form images.

Types of lenses:

- **Convex lens** (thicker in the middle) – used in magnifying glasses and microscopes.
- **Concave lens** (thinner in the middle) – used in correcting lenses for short-sightedness.

---

3. Themes

A. Invention and Technological Development

The lens is a simple invention that led to many modern technologies:

- microscopes,
- telescopes,
- cameras,
- eyeglasses,
- scientific instruments.

These tools help scientists make detailed observations **in order to** understand biological and physical processes.

B. Application of Basic Invention

A simple lens can:

- magnify small objects,
- help us see microorganisms,
- improve vision,
- focus light in cameras or projectors.

In agronomy:

- magnifying lenses help identify **pests**, **fungi**, and **seed characteristics**.
- microscopes help classify **soil particles** and observe **plant cells**.

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4. Grammar Focus

A. Present Perfect with *since*

Structure: **have/has + past participle + since + point in time**

Use: to show an action that started in the past and continues until now.

Examples:

- Scientists **have used** lenses **since** the 17th century.
- Farmers **have relied on** microscopes **since** new diseases appeared.
- Optical technology **has improved** greatly **since** 1900.

B. Connectives: *because, as, since*

These words express **cause and reason**.

Examples:

- Lenses magnify objects **because** they bend light.
- **As** the sample is very small, a microscope is needed.
- **Since** modern lenses are very precise, images are clearer.

C. Contracted Relative Clauses

We can make relative clauses shorter by using the **-ing** or **-ed** form.

1. Active meaning (…that/which + verb)

- *A lens **that focuses** light* → **A lens focusing light**

- *Farmers use tools **that help** identification* → **tools helping identification**

2. Passive meaning (…that/which + is + past participle)

- *The light **that is bent** by the lens* → **The light bent by the lens**
- *The technology **that is used** in microscopes* → **technology used in microscopes**

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5. Other Language Work

A. General and Particular Statements

General statements (always true):

- "A lens bends light."
- "Microscopes magnify very small objects."

Particular statements (specific case):

- "This lens produces a clear image."
- "The microscope in the lab is new."

B. Definitions

A definition states what something is.

Examples:

- **A lens is a transparent object that bends light.**
- **A microscope is an instrument used to magnify very small objects.**
- **Refraction is the bending of light when it passes through a medium.**

C. Dimensions

Dimensions describe size, length, width, height, or thickness.

Examples:

- "The lens has a diameter of 5 cm."
- "The microscope slide is 25 mm long and 75 mm wide."
- "This optical instrument is 20 cm high."

D. Identifying and Classifying

In agronomy and biology, we often identify and classify samples.

Identifying

- “This is a convex lens.”
- “These microorganisms are fungi.”

Classifying

- “Lenses are classified into convex and concave.”
- “Soil particles are classified by size: sand, silt, clay.”

UNIT 10 – Rocks

1. Introduction

Rocks are natural materials that form the Earth's crust.
Understanding rocks helps agronomists study **soil formation**, **minerals**, and **landscape evolution**.
Rocks are important in geology, construction, industry, and agriculture.

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2. Branches of Science: Geology and Technology

Geology

Geology is the science that studies:

- rocks and minerals,
- Earth's structure,
- geological time,
- natural processes such as erosion, sedimentation, and volcanism.

Technology

Technology uses scientific knowledge to create tools, machines, and industrial processes.
Rock materials (limestone, clay, sand, gravel) are used in:

- building materials,
- cement production,
- soil amendments,
- fertilizers (e.g., phosphate rock).

---

3. Themes

A. Concepts of Time and Prehistory

Geologists study events that happened **millions of years ago**.
Rocks give information about:

- ancient climates,
- early life forms,
- the formation of mountains and oceans.

Example:
Sedimentary rocks can show fossils that lived **before human history**.

B. Natural Processes

Natural processes that form or change rocks include:

- **Weathering** – rocks break down into smaller pieces.
- **Erosion** – wind, water, or ice transports rock material.
- **Sedimentation** – layers of sediments accumulate.
- **Volcanism** – magma cools to form igneous rocks.
- **Metamorphism** – heat and pressure change existing rocks.

C. Industrial Processes

Industries use rocks to produce:

- cement (from limestone and clay),
- glass (from sand),
- ceramics (from clay),
- fertilizers (from phosphate rock),
- construction materials.

Example:
Limestone is heated **in order to** make cement.

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4. Grammar Focus

A. "If" Sentences (Conditionals)

Type 1 (Real, possible)

If + present simple → will + base verb

- If rocks weather, they **will form** soil.
- If rainfall increases, erosion **will become** stronger.

Type 2 (Unreal, hypothetical)

If + past simple → would + base verb

- If the rock were softer, it **would break** easily.
- If farmers understood geology better, they **would manage** soils more effectively.

B. Connectives: *both… and* / *neither… nor*

Both … and … = two things are true

- Limestone contains **both** calcium **and** carbon.
- Weathering depends on **both** climate **and** rock type.

Neither … nor … = both things are NOT true

- Granite is **neither** soft **nor** easy to break.
- This rock layer has **neither** fossils **nor** minerals.

C. Relatives with Prepositions

We use **whom**, **which**, **where**, etc., after prepositions.

Examples:

- The process **by which** rocks are formed is slow.
- The geologist **to whom** we spoke explained erosion.
- The place **from which** the samples were taken is volcanic.

D. Passive with *have to*

Structure: **have to + be + past participle**

Examples:

- Rock samples **have to be crushed** before analysis.
- Data **has to be collected** from different layers.
- Sediments **have to be dried** before weighing.

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5. Other Language Work

A. Identifying and Classifying

Identifying

- "This is a sedimentary rock."
- "These minerals are quartz and feldspar."

Classifying

Rocks are classified into:

- **Igneous** (formed from cooled magma),
- **Sedimentary** (formed from layers of sediments),
- **Metamorphic** (changed by heat and pressure).

B. Interpreting Graphs

Geology and agronomy often use graphs to show:

- erosion rates,
- sediment thickness,
- soil formation over time.

When reading graphs, students should:

- identify the **x-axis** (time, distance, etc.),
- identify the **y-axis** (quantity, height, percentage),
- describe **increases**, **decreases**, **peaks**, and **steady periods**.

Examples:

- "Sediment thickness increased after rainfall."
- "Erosion rates decreased in the dry season."
- "The graph shows a gradual rise in soil depth."

I wish you all the best and success my dear students.