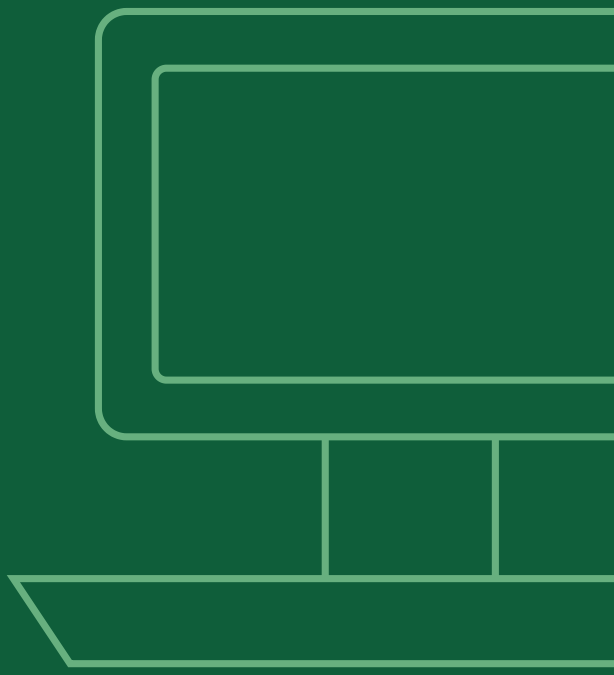
EXAM READY GENERAL SCIENCE

Exam Ready General Science

GRADE 7

Study Guide, Worked Examples and Practice Tests for Grade 7



✓ 7 units with clear key ideas, worked examples and “Watch out!” boxes
✓ 150 worked examples and 240+ practice questions at three levels
✓ 140 unit-quiz questions and 3 full mock exams (60 MCQ each)
✓ Diagnostic test · Key Facts Sheet · Top 20 Mistakes · teacher notes

Follows the units and order of the Ethiopian Grade 7 General Science textbook

ERMIAS WEDAJE TEGBARU

Exam Ready General Science

Grade 7 · Study Guide, Worked Examples and Practice Tests

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This is an independent study guide. It follows the units and order of the Ethiopian Grade 7 General Science student textbook, but it is not published or endorsed by the Ministry of Education. All explanations, examples and questions are original. Keep your textbook and your teacher's notes beside this book.

The answers were calculated and checked before printing, but no book is free of errors. If you find a mistake or disagree with an answer, please tell the author on Telegram (@Ermias_Wedaje) and it will be reviewed for the next edition.

How to Use This Book

Each unit follows the same pattern, so you always know where to look.

Key ideas
The rules and facts of the section, short and clear.

Worked examples
Step-by-step solutions. Cover the solution and try first.

⚠ Watch out!
The mistakes students make most often, and the right way.

Practice
Level 1 Basic · Level 2 Standard · Level 3 Challenge.

Unit quiz
20 multiple-choice questions in the style of the national examination.

For the Teacher
Timing, starters, misconceptions, activities and assessment.

For students

- Begin with the Diagnostic Test. It shows which units need the most work.
- Read the key ideas, then study each example with the solution covered.
- Do Level 1 and Level 2 practice for every section; try Level 3 when you are ready.
- Take each quiz in 30 minutes, mark it, and redo every question you got wrong.
- In the last weeks, learn the Key Facts Sheet and the Top 20 Mistakes page, and sit the three mock exams. Their answer keys show which unit each question comes from.

For teachers

- Each unit follows the textbook sections, so the book can sit beside your lessons.
- The “For the Teacher” page gives timing, starters, misconceptions and activities.
- The quizzes and mock exams can be used as class tests; every answer has a short reason.

For parents

- Ask your child to explain one worked example to you each day. Teaching is the best way to learn.
- Look at the quiz score after each unit, and celebrate progress, not only high marks.

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Diagnostic Test · Where Should I Start?

16 questions · 15 minutes. Take this test before you start the book. There are two questions on each unit. Your score only shows you where to spend your time.

1. The study of nature and natural laws is
   A. natural science
   B. art
   C. music
   D. social science

2. Photosynthesis involves
   A. history only
   B. music only
   C. none
   D. biology, chemistry and physics

3. Matter occupies
   A. only light
   B. only time
   C. space
   D. nothing

4. Which state is easiest to compress?
   A. Solid
   B. Liquid
   C. Ice
   D. Gas

5. Symbols of elements begin with a
   A. bracket
   B. number
   C. small letter
   D. capital letter

6. The symbol of calcium is
   A. C
   B. Ca
   C. Cl
   D. Co

7. A microscope helps us see
   A. heat
   B. distant stars
   C. very small objects
   D. sounds

8. The microscope abilities are magnification and
   A. sound
   B. heat
   C. resolution
   D. colour

9. Movement is
   A. death
   B. sleep
   C. a change of position by an organism
   D. a gas

10. Excretion removes
    A. waste products
    B. food
    C. light
    D. oxygen

11. The Earth is about 150 million km from the
    A. Sun
    B. Mars
    C. Venus
    D. Moon

12. The polar diameter is
    A. smaller than the equatorial diameter
    B. larger than it
    C. equal to it
    D. zero

13. Motion relative to a reference point means
    A. object is still
    B. position changes
    C. time stops
    D. nothing happens

Unit 1 · Basic Concepts of Science

By the end of this unit you will be able to:

- define science and its branches
- explain how science and technology affect our lives
- recognise famous scientists, including Ethiopian scientists
- identify common laboratory equipment and use it safely
- apply laboratory safety rules

Before you start — check yourself. (a) Name the three branches of natural science. (b) What is technology? (c) Which instrument measures volume?
Answers: (a) biology, chemistry, physics (b) using scientific knowledge to make life easier (c) graduated (measuring) cylinder

Key words: science · natural science · social science · biology · chemistry · physics · technology · indigenous science · laboratory · safety rules

How this unit is examined

Question types that appear again and again in Ethiopian model examinations:

- Science and Its Branches
- Science, Technology and Scientists
- Laboratory Equipment
- Laboratory Safety Rules

1.1 Science and Its Branches

Key ideas

- **Science** is a systematic method of gaining knowledge about the **physical and natural world and human society**, using observation and testing. **Indigenous science** is the knowledge people build from their own environment (for example traditional medicine); **conventional science** relies on laws established through the **scientific method**.
- Science has two major categories: **natural science** (nature) and **social science** (human society).
- **Natural science has three branches: biology** (the study of **living things**), **chemistry** (the **composition, properties and changes of matter**) and **physics** (the study of **matter, energy and their interaction**).
- The branches are **related** and share areas: for example, photosynthesis involves biology, chemistry and physics.

Example 1.1 — Define

What is science?

Solution. A systematic method of gaining knowledge about the natural world and human society.

Example 1.2 — Branches

Name the three branches of natural science and what each studies.

Solution. Biology: living things; chemistry: matter and its changes; physics: matter, energy and their interaction.

Example 1.3 — Classify

Which branch studies how a leaf makes food? Which studies the speed of a car?

Solution. Biology (and chemistry) for the leaf; physics for the speed.

Example 1.4 — Exam Booster · Categories

Is economics natural science or social science?

Solution. Social science.

Example 1.5 — Exam Booster · Relate

Show that the branches of science are related.

Solution. Photosynthesis needs biology (plants), chemistry (reactions) and physics (light energy).

⚠ Watch out!

× Wrong	✓ Right
Biology is the study of matter and energy.	That is physics; biology studies living things.
The branches of science are completely separate.	They share common areas.
Indigenous knowledge is not science at all.	It is knowledge built from the environment.

Practice 1.1

Level 1 — Basic

1. Define science.
2. Name a branch of natural science.
3. What does biology study?

Level 2 — Standard

4. What does chemistry study?
5. Name the two categories of science.

6. What is indigenous science?

Level 3 — Challenge

7. Explain the branches of natural science.
8. Discuss how they are related.

1.2 Science, Technology and Scientists

Key ideas

- **Technology** is the use of scientific knowledge to **help people work more easily, live better and enjoy their environment more**. A person who studies technology is a **technologist**. Mobile phones, medicines, machines and irrigation tools are examples.
- Science and technology affect **daily life, beliefs, practices and ways of thinking**: they improve health, farming, transport and communication, but must be used responsibly. **Scientific values** such as honesty, curiosity, open-mindedness and respect for evidence help decision making and problem solving.
- **Famous Ethiopian scientists: Dr Aklilu Lemma** (the plant endod used against bilharzia/snail fever), **Engineer Kitaw Ejigu**, **Dr Gebisa Ejeta** (improved sorghum) and **Prof. Yalemtsehay Mekonnen**.
- **Famous world scientists: Albert Einstein, Michael Faraday, Marie Curie and Isaac Newton**.

Example 1.6 — Define

What is technology?

Solution. The use of scientific knowledge to make work easier and life better.

Example 1.7 — Example

Give two examples of technology that help health.

Solution. Medicines and X-ray machines (thermometers).

Example 1.8 — Scientists

Name two Ethiopian scientists.

Solution. Dr Aklilu Lemma and Dr Gebisa Ejeta.

Example 1.9 — Exam Booster · Values

Give two scientific values.

Solution. Honesty and curiosity (open-mindedness, respect for evidence).

Example 1.10 — Exam Booster · World

Which scientist is linked with gravity?

Solution. Isaac Newton.

⚠ Watch out!

× Wrong	✓ Right
Technology is the same as science.	Technology applies scientific knowledge.
Science has no effect on beliefs.	It affects beliefs, practices and thinking.
Only foreign scientists matter.	Ethiopia has outstanding scientists too.

Practice 1.2

Level 1 — Basic

1. Define technology.
2. Name an Ethiopian scientist.
3. Name a world scientist.

Level 2 — Standard

4. Who is a technologist?
5. What did Gebisa Ejeta improve?
6. Give a scientific value.

Level 3 — Challenge

7. Explain how science and technology help us.
8. Discuss why scientific values matter.

1.3 Laboratory Equipment

Key ideas

- A **laboratory** is a place for experiments. **Laboratory equipment** is the set of tools designed for tasks in the laboratory.
- **Common tools and uses: triple-beam balance**: mass of an object; **beaker**: holding and heating liquids; **tongs**: carrying hot beakers and removing lids from a crucible; **thermometer**: temperature; **test tube**: holding small amounts of liquid for mixing or heating; **Petri dish**: growing and counting bacteria; **graduated (measuring) cylinder**: volume in millilitres (mL); **Bunsen burner**: heating.
- **Laboratory report:** explains **what you did, what you learnt and what the results mean**.
- Learners can make simple tools from **locally available materials** (for example a bottle with marks as a measuring cylinder).

Example 1.11 — Match

Which tool measures the mass of an object? Which measures temperature?

Solution. Triple-beam balance; thermometer.

Unit 2 · Matter in Our Surrounding

By the end of this unit you will be able to:

- define matter and describe its states
- explain the particle theory and diffusion
- distinguish physical and chemical properties
- classify substances into elements, compounds and mixtures
- distinguish physical from chemical changes
- describe methods of separating mixtures

Before you start — check yourself. (a) Define matter. (b) Name the three states of matter. (c) Is salt solution a mixture or a pure substance?
Answers: (a) anything that has mass and occupies space (b) solid, liquid, gas (c) a mixture

Key words: matter · particle theory · diffusion · melting · evaporation · element · compound · mixture · physical change · filtration

How this unit is examined

Question types that appear again and again in Ethiopian model examinations:

- Matter and Its States
- Properties of Matter
- Classification of Substances
- Physical and Chemical Changes
- Separation of Mixtures

Key Facts Sheet

Learn these by heart. Cover the right-hand side and say each fact from memory.

Unit 1 · Basic concepts

Natural science: biology, chemistry, physics

Technology = applied science

Beaker heats ; cylinder measures volume (mL)

Balance: mass ; thermometer: temperature ; tongs: hot items

Never taste or eat ; report accidents ; tie hair

Ethiopian scientists: Aklilu Lemma, Gebisa Ejeta

Unit 2 · Matter

Matter has mass and takes space ; solid, liquid, gas

Melting, freezing, evaporation, condensation

Diffusion = particles spreading

Element, compound, mixture (homogeneous / heterogeneous)

Physical change: no new substance ; chemical: new substance

Filtration, evaporation, distillation, sieving, magnet

Unit 3 · Elements and reactions

Symbol: 1st capital, 2nd small ; Na, K, Fe, Cu, Ag, Au

Valence: H, Na, K, Cl = 1 ; Mg, Ca, O = 2 ; Al = 3

Binary names: metal first, non-metal -ide

Reactants → products ; signs: gas, colour, heat, precipitate

Conservation of mass

Balance with coefficients, never subscripts

Unit 4 · The cell

Light and electron microscopes ; magnification × resolution

Total magnification = eyepiece × objective

Cell membrane, cytoplasm, nucleus, ribosomes

Plant cell: wall, chloroplast, vacuole

Cell → tissue → organ → system → organism

Photosynthesis: chloroplast ; respiration: mitochondria

Unit 5 · Living things

7 characteristics of life

Kingdom → phylum → class → order → family → genus → species

Binomial name: Genus species (Linnaeus)

Animalia: heterotrophs ; Plantae: autotrophs

Fungi: chitin walls, spores ; Protista: amoeba

Monera: prokaryotic bacteria

Unit 6 · Earth in space

Oblate spheroid ; 1 AU = 150 million km

Circumference 40 075 km ; diameter 12 756 km

Spheres: litho-, hydro-, bio-, atmo-

Crust, mantle, core

Rotation 24 h: day, night, tides ; revolution 365¼ days: seasons

Water cycle: evaporation, condensation, precipitation

Mock Examination 1

60 multiple-choice questions · 90 minutes · one mark each. Circle one answer. Mark with the answer key at the back and use the unit number to see where to revise.

1. The study of nature and natural laws is
   A. natural science
   B. art
   C. music
   D. social science

2. Which is NOT a branch of natural science?
   A. Physics
   B. Biology
   C. History
   D. Chemistry

3. Which branch studies the interaction of matter and energy?
   A. Geography
   B. Biology
   C. Civics
   D. Physics

4. Photosynthesis involves
   A. history only
   B. music only
   C. none
   D. biology, chemistry and physics

5. Technology makes life
   A. easier and more productive
   B. darker
   C. harder
   D. colder

6. Science that uses established laws and the scientific method is
   A. conventional science
   B. social talk
   C. indigenous science
   D. magic

7. Traditional herbal knowledge of a community is
   A. technology
   B. astronomy
   C. conventional science
   D. indigenous science

8. Albert Einstein was a famous
   A. athlete
   B. king
   C. physicist
   D. poet

9. Isaac Newton is linked with the study of
   A. bacteria
   B. rocks only
   C. plants
   D. gravity and motion

10. Matter occupies
    A. only light
    B. only time
    C. space
    D. nothing

11. Which is matter?
    A. Sound
    B. Air
    C. Light
    D. Heat

12. Particles of a liquid
    A. are far apart
    B. are fixed
    C. do not exist
    D. slide past one another

13. Which state is easiest to compress?
    A. Solid
    B. Liquid
    C. Ice
    D. Gas

14. Which state has a fixed shape?
    A. Vapour
    B. Gas
    C. Solid
    D. Liquid