Grade 7 Integrated Science

Terms 1, 2 and 3 - notes for 9 topics

IN EVERY TOPIC

- What you will learn and the key words.
- Short, clear notes with worked examples.
- Questions to try and a topic test, with the answers at the back.

TOPICS IN THESE NOTES

Topic	Name	Term
1.1	Introduction to Integrated Science	1
1.2	Laboratory Safety	1
1.3	Laboratory apparatus and instruments	1
2.1	Mixtures	2
2.2	Acids, bases and indicators	2
3.1	Human reproductive system	2
3.2	Human Excretory System	3
4.1	Electrical Energy	3
4.2	Magnetism	3

Elimu254
Learn • Grow • Build Tomorrow

A TASTE OF THE FIRST TOPIC

Science

Science is the study of the natural world through observation, asking questions and doing experiments. Scientists find out how things work and test their ideas with evidence.

CONTENTS

Topic	Name	Term	Page
1.1	Introduction to Integrated Science	1	3
1.2	Laboratory Safety	1	7
1.3	Laboratory apparatus and instruments	1	11
2.1	Mixtures	2	17
2.2	Acids, bases and indicators	2	23
3.1	Human reproductive system	2	29
3.2	Human Excretory System	3	34
4.1	Electrical Energy	3	40
4.2	Magnetism	3	46
	Answers		51

Elimu254
Learn • Grow • Build Tomorrow

Strand 1.0 Scientific Investigation | Term 1

1.1 Introduction to Integrated Science

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- outline the components of Integrated Science as a field of study
- explain the importance of science in daily life

KEY WORDS

science, biology, chemistry, physics, scientist, technology, career, pathway, STEM.

1. What is science?

Science

Science is the study of the natural world through observation, asking questions and doing experiments.
Scientists find out how things work and test their ideas with evidence.
Technology uses scientific knowledge to make tools and solve problems (a solar lamp, a water filter).
Integrated Science joins several branches of science into one learning area at junior school.

2. Components of Integrated Science: biology

Biology

Biology is the study of living things: plants, animals, microorganisms and humans.
It covers how living things feed, grow, reproduce, breathe and depend on their environment.
At junior school we study the human body systems and living things in the environment.
Activity: brainstorm living things around the school and one question biology could answer about each.

3. Components of Integrated Science: chemistry

Chemistry

Chemistry is the study of matter: what substances are made of, their properties and how they change.
Examples: rusting, cooking, burning, making soap, medicines and fertilisers.
This year: mixtures and how to separate them, and acids and bases.

Learn • Grow • Build Tomorrow

4. Components of Integrated Science: physics

Physics

Physics is the study of matter, energy, force and motion.
Examples: electricity, magnets, light, sound, heat and how machines move.
This year: electrical energy and magnetism.
Integrated Science joins biology, chemistry and physics: a doctor's X-ray machine (physics) shows bones (biology); medicines (chemistry) treat illness.

5. Sorting topics into components

Card sort

Biology: digestion, plant growth, diseases, reproduction.
Chemistry: rusting, burning, soap making, acids and bases.
Physics: electricity, magnets, falling objects, sound.
Some belong to more than one: cooking (heat is physics, the change in the food is chemistry).
Activity: use print or digital media to find one more example of each and share with a peer.

6. Importance of science in health

Science in health

Vaccines protect against diseases such as measles, polio and tetanus.
Medicines and antibiotics treat illness.
Machines such as X-ray and ultrasound help doctors see inside the body.
Knowledge of hygiene (handwashing, safe water) prevents diseases like cholera.

7. Importance of science in agriculture

Science in agriculture

Improved seeds that resist drought and disease.
Fertilisers and soil testing to improve yields.
Pest and disease control, and vaccines for livestock.
Irrigation, greenhouses and weather forecasts.
Food preservation: drying, cooling and storage.

8. Importance of science in industry

Science in industry

Making soap, cooking oil, sugar, cement, paint, medicines and plastics.
Generating electricity: geothermal at Olkaria, hydro-electric dams, wind and solar.
Testing products for quality and safety (labels, expiry dates).
Treating waste so that it does not pollute rivers.

9. Importance of science in transport

Science in transport

Engines burn fuel to move vehicles; electric vehicles use batteries.
Roads, bridges and railways (the Standard Gauge Railway) are designed using science.
Aeroplanes, ships and pipelines move people and goods.
Safety: seat belts, airbags, traffic lights and speed limiters.

10. Importance of science in food and textiles

Food: processing (milling, pasteurising milk), preservation (canning, refrigeration, drying), fortifying flour with vitamins, packaging and labelling.

Textiles: natural fibres (cotton, wool, silk) and synthetic fibres (nylon, polyester) made from chemicals.
Dyes give colour; science makes fabrics waterproof or crease-free.
Cotton grown in Kenya is spun and woven into cloth.

11. Careers and senior school pathways in science

Careers that use science

Health: doctor, nurse, pharmacist, clinical officer, laboratory technologist.
Agriculture: agronomist, veterinary officer, food scientist.
Engineering and technology: civil, electrical and mechanical engineers, ICT specialists, pilots.
Environment: meteorologist, geologist, conservationist.
At senior school, the STEM pathway (Science, Technology, Engineering and Mathematics) leads to these careers.
Search print or digital media to learn more.

12. Project: making a career chart

Project: a career chart

Materials: manila paper, markers, magazine pictures, glue.

In groups, choose one area: health, agriculture, industry, transport, or food and textiles.

List three careers, what each person does, and the science they use.

Add pictures or drawings and display the chart in class.

Each group presents its chart in two minutes.

TRY THESE

1. What is science?
2. What is the difference between science and technology?
3. What is biology?
4. Name two things studied in biology.
5. What is chemistry?
6. Give two examples of chemistry at home.
7. What is physics?
8. Give two examples of physics in daily life.
9. Sort: photosynthesis.
10. Sort: a bulb lighting.
11. Name two diseases prevented by vaccines.
12. How does science help a doctor see a broken bone?
13. Give two ways science improves crop yields.
14. How does soil testing help a farmer?
15. Name two products made in factories using science.
16. Where in Kenya is geothermal power produced?
17. Name two kinds of transport that use engines.
18. Name one safety feature in vehicles.
19. Name two ways food is preserved.
20. Why is milk pasteurised?
21. What does STEM stand for?
22. Name two careers in health that need science.
23. Name the three components of Integrated Science.
24. Give one way science is important in health.

TOPIC TEST

T1. Write three questions about the world you would like science to answer.

T2. Why is biology important for a farmer?

T3. Why does food go bad faster when not refrigerated?

T4. Give one example that uses all three components.

T5. Explain why milk going sour belongs to two components.

T6. Why must antibiotics be taken exactly as prescribed?

T7. How do weather forecasts help farmers?

T8. Name one way factories could use less energy.

T9. Why are electric buses better for the environment?

T10. Read a food label and list what it tells the buyer.

Elimu254 Learn • Grow • Build Tomorrow

T11. Interview an adult about how they use science in their job.

T12. Write a paragraph: the science career I would like and why.

Elimu254
Learn • Grow • Build Tomorrow

Strand 1.0 Scientific Investigation | Term 1

1.2 Laboratory Safety

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- identify common hazards and their symbols in the laboratory
- explain the causes of common accidents in the laboratory
- describe First Aid measures for common laboratory accidents

KEY WORDS

hazard, flammable, corrosive, toxic, carcinogenic, radioactive, first aid, scald, ingestion, fire extinguisher.

1. The laboratory and why safety matters

The laboratory

A laboratory is a room equipped for scientific experiments.

It has chemicals, glassware, heat sources (Bunsen burners), gas and electricity, so mistakes can cause injuries.

Safety protects learners, teachers, equipment and the environment.

Locate: the exits, the fire extinguisher, the sand bucket, the first aid kit and the water taps.

2. Hazard symbols: flammable

Hazard symbols are pictures on labels that warn of danger. Most are a black picture in a red diamond (or an orange square on older labels).

Flammable: a flame. The substance catches fire easily.

Examples: paraffin, petrol, methylated spirit, cooking gas, alcohol.

Keep flammable substances away from flames and heat, and close their containers.



Hazard symbols

3. Hazard symbols: corrosive

Corrosive: liquid dripping from test tubes onto a hand and a surface, eating into them.

A corrosive substance burns skin, eyes and materials.

Examples: strong acids, strong bases, some toilet cleaners, battery acid, concentrated bleach.

Handle with gloves and goggles; if it touches skin, rinse with plenty of running water and tell the teacher.

4. Hazard symbols: toxic

Toxic: a skull and crossbones.

A toxic substance is a poison that can harm or kill if swallowed, breathed in or absorbed through the skin.

Examples: insecticides, rat poison, some pesticides, mercury.

Never taste anything in the laboratory; wash hands after experiments; store poisons locked away and labelled.

5. Hazard symbols: carcinogenic and radioactive

Carcinogenic: a person's outline with a star-like mark on the chest (health hazard). It can cause cancer or other long-term harm.
Examples: tobacco smoke, asbestos dust, some chemicals.
Radioactive: a black trefoil (three blades round a dot) on a yellow background. It gives off harmful radiation.
Found in X-ray rooms, some hospitals and power stations; school laboratories do not keep radioactive materials.
Review: flammable, corrosive, toxic, carcinogenic, radioactive.

6. Reading hazard labels on household products

Practical: reading labels
Materials: empty, rinsed containers; no chemicals.
Find the hazard symbol, the warning words ("keep out of reach of children", "do not swallow") and the first aid instructions.
Record in a table: product, symbol, hazard, safe use.
Example: paraffin, flame symbol, flammable, keep away from fire.

7. Common accidents in the laboratory and their causes

Common accidents and causes
Burns: touching hot apparatus or flames, loose hair or clothes near a burner.
Scalds: hot liquids or steam spilling.
Cuts: broken glassware, sharp blades.
Swallowing or inhaling chemicals: tasting, eating in the lab, smelling directly.
Other causes: running, overcrowding, not following instructions, poor labelling, wet floors.

8. First aid for burns and scalds

First aid is the immediate help given before medical care.
Burns and scalds: cool the area under cool, clean running water for about 20 minutes.
Remove rings or tight items near the burn, but not clothing stuck to the skin.
Cover loosely with a clean, non-fluffy cloth or cling film.
Do NOT apply oil, butter, toothpaste or ice, and do not burst blisters.
Tell the teacher; get medical help for large or deep burns.

9. First aid for cuts

First aid for cuts
Wear gloves if available to avoid contact with blood.
Press firmly on the cut with a clean cloth to stop bleeding; raise the injured part if possible.
For a small cut: rinse with clean water and cover with a clean plaster or bandage.
For a deep cut or glass in the wound: do not remove the glass, press around it and get medical help.
Clean up broken glass with a brush and dustpan, never bare hands.

10. First aid for swallowing harmful substances

First aid for swallowed chemicals
Tell the teacher or an adult immediately and get medical help.
Do NOT make the person vomit; the chemical can burn the throat again.
If the person is awake, rinse the mouth with water and spit it out.
Keep the container or label to show the health worker.
Chemicals in the eye: rinse with plenty of clean running water for at least 15 minutes.