Grade 9 Integrated Science

Term 1 - 44 complete lesson plans

Ready to teach, in the KICD lesson-plan format | 40-minute lessons | PDF and editable Word

ABOUT THIS PACK

44 complete, ready-to-teach Grade 9 Integrated Science lesson plans for Term 1, covering structure of the atom, metals and alloys and water hardness.

TOPICS IN THIS PACK

Topic	Name	Lessons
1.1	Structure of the atom	14
1.2	Metals and Alloys	16
1.3	Water hardness	14

INSIDE EVERY LESSON PLAN

- The specific learning outcomes, key inquiry question, core competencies, values and PCIs, and the resources needed.
- A timed lesson flow: what the teacher does and what the learners do, from introduction to summary.
- The key content (a worked example, notes or a practical with its expected results), then four practice questions with the answers for the teacher.
- The common mistake to watch for, and ideas for learners who need support and for those ready for more.
- A four-level CBC assessment rubric (EE, ME, AE, BE), homework, and a blank reflection space to fill in after teaching.

A TASTE OF LESSON 1

Atoms and elements

By the end of the lesson, the learner should be able to: a) describe an atom as the smallest particle of an element; b) name and write symbols of some common elements

> **Atoms make up elements**
> An element is a substance made of only one kind of atom, such as copper, oxygen or carbon. An atom is the smallest particle of an element that can take part in a chemical change.
> Each element has a symbol: hydrogen H, carbon C, oxygen O, sodium Na, magnesium Mg, chlorine Cl, calcium Ca.

You also receive this pack as an editable Word file, so you can change any lesson to suit your class before you print it. Lessons follow the order of the KICD curriculum design.

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Atoms and elements

Strand 1.0 Mixtures, Elements and Compounds > Sub-strand 1.1 Structure of the atom | Lesson 1 of 14 | 40 minutes

SCHOOL	TEACHER	DATE
CLASS / STREAM	TIME	ROLL (B / G)

SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) describe an atom as the smallest particle of an element; b) name and write symbols of some common elements

KEY INQUIRY QUESTION(S)

- How is the structure of the atom important?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Communication and collaboration**	Learners explain their thinking to a partner and report their findings to the group.
COMPETENCY	**Creativity and imagination**	Learners make up their own examples, patterns or ways of showing the idea.
VALUE	**Unity**	Learners share materials fairly and work as one team.
VALUE	**Integrity**	Learners record their own honest results and mark work truthfully.
PCI	**Socio-economic issues (cyber security)**	Developed through the activities in this lesson.

LEARNING RESOURCES

Chart of the first 20 elements with symbols, atomic numbers and mass numbers | Charts or animations of atomic structure | Coloured beads, seeds or bottle tops; clay or plasticine; wire | Learners' exercise books

ORGANISATION OF LEARNING

Whole class for the introduction and the summary; pairs or groups of four to five for guided practice; individual work for the independent tasks.

KEY WORDS

atom | element | proton | neutron | electron | nucleus | energy level | atomic number | mass number | electron arrangement

THE LESSON AT A GLANCE

Introduction	Teacher models	Guided practice	On their own	Wrap-up
6 min	9 min	10 min	9 min	6 min

LESSON FLOW

Stage	Minutes	The teacher	The learners
Introduction	6	Greet the class and ask: "Key question: how is the structure of the atom important? If you keep cutting a piece of copper wire in half, could you go on forever?" Take two or three answers, link them to earlier work, then state today's outcome.	Answer the starter question, recall what they already know and read the outcome aloud.
Step 1: Teacher models	9	Take learners through "Atoms make up elements" (key ideas on the next page), explaining as you go. Use chart of the first 20 elements with symbols, atomic numbers and mass numbers, charts or animations of atomic structure, coloured beads, seeds or bottle tops; clay or plasticine; wire. Ask learners to predict what comes next before you show it.	Watch, predict the next step, ask questions and note the key steps in their exercise books.
Step 2: Guided practice	10	Give questions 1 and 2. Move round the groups, ask "How do you know?" and correct errors kindly on the spot.	Work in pairs or small groups, explain each step to a partner and check one another's answers.
Step 3: Independent practice	9	Set questions 3 and 4 for individual work. Mark as you walk round and note who needs help in the next lesson.	Work on their own, then swap books with a partner to check.
Summary and conclusion	6	Ask two or three learners to state the key idea in their own words. Give this exit question and check the answers: "Name two elements you use at home."	Say the key idea in their own words and answer the exit question in the exercise book.

KEY IDEAS

Atoms make up elements

An element is a substance made of only one kind of atom, such as copper, oxygen or carbon. An atom is the smallest particle of an element that can take part in a chemical change.

Each element has a symbol: hydrogen H, carbon C, oxygen O, sodium Na, magnesium Mg, chlorine Cl, calcium Ca.

Atoms are far too small to see even with a school microscope; scientists learned about them through experiments.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	What is an element?	**A substance made of only one kind of atom.**
2	Write the symbol for oxygen.	**O**
3	Which element has the symbol Na?	**Sodium**
4	Name two elements you use at home.	**For example iron (in nails), aluminium (in sufurias), copper (in wires), carbon (in charcoal).**

WATCH OUT FOR

Learners think symbols always come from the English name. Some come from Latin, such as Na (natrium, sodium) and K (kalium, potassium).

ASSESSMENT RUBRIC - THE FOUR CBC LEVELS

Level	What the learner can do
Exceeds expectations (EE)	Can describe an atom as the smallest particle of an element confidently and accurately, explain the method used, and apply the idea to new or unfamiliar problems.
Meets expectations (ME)	Can describe an atom as the smallest particle of an element accurately in familiar situations; notices and corrects slips without help.
Approaches expectations (AE)	Can partly describe an atom as the smallest particle of an element, or does so with prompts from the teacher or a partner; makes some errors.
Below expectations (BE)	Cannot yet describe an atom as the smallest particle of an element without direct help; needs the idea taught again with concrete objects.

SUPPORT AND EXTENSION

Learners who need support	Make flash cards of element names and symbols for the first 20 elements.
Learners ready for more	Find out which element's symbol comes from the Latin word "ferrum". (Answer: Iron, Fe)
Inclusion	Seat learners with low vision near the board and read aloud whatever you write; use large, clear, tactile materials; allow extra time; pair with a patient partner; use gestures or Kenyan Sign Language for the key words.

HOMEWORK AND FOLLOW-UP

Redo questions 3 and 4 neatly in the exercise book. Then tell someone at home what you learned about "atoms and elements" and bring one question of your own to ask next lesson.

TEACHER SELF-CHECK

- Did every learner get a turn to handle materials or explain their thinking?
- Did most learners meet the outcome? Write down the names of those who did not.
- Was the pace right — did any step take too long or too short a time?
- Which competency and value did I see learners showing?
- What will I change the next time I teach this lesson?

REFLECTION ON THE LESSON / SELF-REMARKS

Write this after teaching - what worked, what to change, which learners need follow-up.

Protons, neutrons and electrons

Strand 1.0 Mixtures, Elements and Compounds > Sub-strand 1.1 Structure of the atom | Lesson 2 of 14 | 40 minutes

SCHOOL	TEACHER	DATE
CLASS / STREAM	TIME	ROLL (B / G)

SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) name the three sub-atomic particles; b) state the charge, relative mass and location of each

KEY INQUIRY QUESTION(S)

- How is the structure of the atom important?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Communication and collaboration**	Learners explain their thinking to a partner and report their findings to the group.
COMPETENCY	**Creativity and imagination**	Learners make up their own examples, patterns or ways of showing the idea.
VALUE	**Unity**	Learners share materials fairly and work as one team.
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KEY WORDS

atom | element | proton | neutron | electron | nucleus | energy level | atomic number | mass number | electron arrangement

THE LESSON AT A GLANCE

Introduction	Teacher models	Guided practice	On their own	Wrap-up
6 min	9 min	10 min	9 min	6 min

LESSON FLOW

Stage	Minutes	The teacher	The learners
Introduction	6	Greet the class and ask: "An atom has no overall charge, yet it contains charged particles. How can that be?" Take two or three answers, link them to earlier work, then state today's outcome.	Answer the starter question, recall what they already know and read the outcome aloud.
Step 1: Teacher models	9	Take learners through "The sub-atomic particles" (key ideas on the next page), explaining as you go. Use chart of the first 20 elements with symbols, atomic numbers and mass numbers, charts or animations of atomic structure, coloured beads, seeds or bottle tops; clay or plasticine; wire. Ask learners to predict what comes next before you show it.	Watch, predict the next step, ask questions and note the key steps in their exercise books.
Step 2: Guided practice	10	Give questions 1 and 2. Move round the groups, ask "How do you know?" and correct errors kindly on the spot.	Work in pairs or small groups, explain each step to a partner and check one another's answers.
Step 3: Independent practice	9	Set questions 3 and 4 for individual work. Mark as you walk round and note who needs help in the next lesson.	Work on their own, then swap books with a partner to check.
Summary and conclusion	6	Ask two or three learners to state the key idea in their own words. Give this exit question and check the answers: "An atom has 8 protons. How many electrons does the neutral atom have?"	Say the key idea in their own words and answer the exit question in the exercise book.

KEY IDEAS

The sub-atomic particles

Protons: positive charge (+1), relative mass 1, in the nucleus. Neutrons: no charge, relative mass 1, in the nucleus.
Electrons: negative charge (-1), very small mass (about 1/1840), moving around the nucleus in energy levels.
In a neutral atom the number of electrons equals the number of protons, so the charges cancel.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	Which particle has a positive charge?	**The proton**
2	Which particle has no charge?	**The neutron**
3	Where are electrons found?	**In energy levels (shells) around the nucleus**
4	An atom has 8 protons. How many electrons does the neutral atom have?	**8**