

Interesting Science fact #3

If the Sun were the size of a beach ball, then Jupiter would be the size of a golf ball, and the Earth would be as small as a pea.

NATURAL SCIENCES & TECHNOLOGY

LESSON PLAN
GRADE 6 TERM 2



A MESSAGE FROM THE NECT

NATIONAL EDUCATION COLLABORATION TRUST (NECT)

Dear Teachers

This learning programme and training is provided by the National Education Collaboration Trust (NECT) on behalf of the Department of Basic Education (DBE)! We hope that this programme provides you with additional skills, methodologies and content knowledge that you can use to teach your learners more effectively.

What is NECT?

In 2012 our government launched the National Development Plan (NDP) as a way to eliminate poverty and reduce inequality by the year 2030. Improving education is an important goal in the NDP which states that **90% of learners will pass Maths, Science and languages with at least 50% by 2030**. This is a very ambitious goal for the DBE to achieve on its own, so the NECT was established in 2015 to assist in improving education.

The NECT has successfully brought together groups of people interested in education to work together to improve education. These groups include the teacher unions, businesses, religious groups, trusts, foundations and NGOs.

What are the learning programmes?

One of the programmes that the NECT implements on behalf of the DBE is the 'District Development Programme'. This programme works directly with district officials, principals, teachers, parents and learners; you are all part of this programme!

The programme began in 2015 with a small group of schools called the **Fresh Start Schools (FSS)**. Curriculum **learning programmes** were developed for **Maths, Science and Language** teachers in FSS who received training and support on their implementation. The FSS teachers remain part of the programme, and we encourage them to mentor and share their experience with other teachers.

The FSS helped the DBE trial the NECT learning programmes so that they could be improved and used by many more teachers. NECT has already begun this scale-up process. NECT has already begun this scale-up process in its Universalisation Programme and in its Provincialisation Programme.

Everyone using the learning programmes comes from one of these groups; but you are now brought together in the spirit of collaboration that defines the manner in which the NECT works. Teachers with more experience using the learning programmes will deepen their knowledge and understanding, while some teachers will be experiencing the learning programmes for the first time.

Let's work together constructively in the spirit of collaboration so that we can help South Africa eliminate poverty and improve education!

www.nect.org.za

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PROGRAMME ORIENTATION

Welcome to the NECT Natural Sciences & Technology learning programme! This CAPS compliant programme consists of:

- A full set of lesson plans for the term (3 lessons per week)
- A resource pack with images to support the lesson plans
- A full colour poster for one topic
- A sample formal assessment task at the end of this booklet
- A tracker to help you monitor your progress

Lesson Plan Structure

1. The Term 4 lesson plan is structured to run for 9 weeks. The last week of the term is reserved for examinations. Week nine is reserved for revision. This is in alignment with CAPS.
2. Each week, there are three lessons, of the following notional time:
 - 1 x 1 hour 30 minutes
 - 2 x 1 hourAgain, this time allocation of 3.5 hours per week is CAPS aligned.

Lesson Plan Contents

1. The lesson plan starts with a **CONTENTS PAGE** that lists all the topics for the term, together with a breakdown of the lessons for that topic. You will notice that lessons are named by the week and lesson number, for example, Week 8 Lesson 8C.
2. Every topic begins with a 2 - 4 page **TOPIC OVERVIEW**. The topic overview pages are grey, making them easy to identify. The topic overview can be used to introduce the topic to learners. The topic overview includes:
 - a. A **general introduction** to the topic that states how long the topic runs for, the value of the topic in the final exam and the number of lessons in the topic.
 - b. A table showing the **position of the topic** in the term.
 - c. A **sequential table** that shows the prior knowledge required for this topic, the current knowledge and skills that will be covered, and how this topic will be built on in future years. Use this table to give learners an informal quiz to test their prior knowledge. If learners are clearly lacking in the knowledge and skills required, you may need to take a lesson to cover some of the essential content and skills. It is also useful to see what you are preparing learners for next, by closely examining the 'looking forward' column.
 - d. A glossary of **scientific and technological vocabulary**, together with an explanation of each word or phrase. It is a good idea to display these words and their definitions somewhere in the classroom, for the duration of the topic. It is also a good idea to allow learners some time to copy down these words into their personal dictionaries or science exercise books. You must explicitly teach the words and their meanings as and when you encounter these words in the topic. A good way to teach learners new vocabulary is to use 'PATS':

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- POINT – if the word is a noun, point at the object or at a picture of the object as you say the word.
 - ACT – if the word is a verb, try to act out or gesture to explain the meaning of the word, as you say it.
 - TELL – if the word has a more abstract meaning, then tell the learners the meaning of the word. You may need to code switch at this point, but also try to provide a simple English explanation.
 - SAY – say the word in a sentence to reinforce the meaning.
- e. Understanding the uses / value of science.** It is very important to give learners a sense of how science applies to their daily lives, and of the value that science adds to their lives. Hold a brief discussion on this point when introducing the topic, and invite learners to elaborate on the uses and value that this topic will have to their lives.
- f. Personal reflection.** At the end of every topic, come back to the topic overview, and complete this table. In particular, it is important to note your challenges and ideas for future improvement, so that you can improve your teaching the next year.
- 3.** After the topic overview, you will find the **INDIVIDUAL LESSONS**. Every lesson is structured in exactly the same way. This helps you and the learners to anticipate what is coming next, so that you can focus on the content and skills. Together with the title, each lesson plan includes the following:
- a. Policy and Outcomes.** This provides you with the CAPS reference, and an overview of the skills that will be covered in the lesson. You can immediately see the science process skills that will be covered, and whether they are lower or higher order skills.
 - b. Possible Resources.** Here, you will see the resources that you should ideally have for the lesson. If you need to use the poster or pages from the resource pack, this will be listed here. There is also a space for improvised resources, and you are invited to add your own ideas here.
 - c. Classroom Management.** Every lesson starts in the same way. Before the lesson, you must write a question that relates to the previous lesson on the chalkboard. Train your learners to come in to the classroom, to take out their exercise books, and to immediately try to answer this question. This links your lesson to the previous lesson, and it effectively settles your learners.
Once learners have had a few minutes to answer, read the question and discuss the answer. You may want to offer a small reward to the learner who answers first, or best. Get your learners used to this routine.
Next, make sure that you are ready to begin your lesson, have all your resources ready, have notes written up on the chalkboard, and be fully prepared to start. Remember, learners will get restless and misbehave if you do not keep them busy and focussed.
 - d. Accessing Information.** This section contains the key content that you need to share with learners. Generally, it involves sharing some new information that is written on the chalkboard, explaining this information, and allowing learners some time to copy the information

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into their exercise books. Train learners to do this quickly and efficiently. Learners must anticipate this part of the lesson, and must have their books, pens, pencils and rulers ready. Explain to learners that this is an important resource for them, because these are the notes they will revise when preparing for tests and exams.

Checkpoint 1. Straight after 'Accessing Information', you will find two checkpoint questions. These questions help you to check that learners understand the new content thus far.

- e. **Conceptual Development.** At this point, learners will have to complete an activity to think about and apply their new knowledge, or to learn a new skill. This is the most challenging part of the lesson. Make sure that you fully understand what is required, and give learners clear instructions.

Checkpoint 2. Straight after 'Conceptual Development, you will find two checkpoint questions. These questions help you to check that learners understand the new concepts and skills that they have engaged with.

- f. **Reference Points for Further Development.** This is a useful table that lists the relevant sections in each approved textbook. You may choose to do a textbook activity with learners in addition to the lesson plan activity, or even in place of the lesson plan activity. You may also want to give learners an additional activity to do for homework.

- g. **Additional Activities / Reading.** This is the final section of the lesson plan. This section provides you with web links related to the topic. Try to get into the habit of visiting these links as part of your lesson preparation. As a teacher, it is always a good idea to be more informed than your learners.

4. At the end of the week, make sure that you turn to the **TRACKER**, and make note of your progress. This helps you to monitor your pacing and curriculum coverage. If you fall behind, make a plan to catch up.

5. **POSTER AND RESOURCE PACK.** You will have seen that the *Possible Resource* section in the lesson plan will let you know which poster or reference pages you will need to use in a lesson.

Please note that you will only be given these resources once. It is important for you to manage and store these resources properly. Do this by:

- Writing your name on all resources
- Sticking resource pages onto cardboard or paper
- Laminating all resources, or covering them in contact paper
- Filing the resource papers in plastic sleeves once you have completed a topic

Have a dedicated wall or notice board in your classroom for Natural Science and Technology.

- Use this space to display the resources for the topic
- Display the vocabulary words and meaning here, as well as the resources
- Try to make this an attractive and interesting space
- Display learners' work on this wall – this gives learners a sense of ownership and pride

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- 6. SAMPLE ASSESSMENT TASKS.** At the end of the lesson plans, you will find a sample assessment task, an examination and memorandum. Feel free to implement this task with your learners in the first year of this programme. Thereafter, use it as a model to structure your own assessment tasks, in the same way.

Lesson Plan Routine

Train your learners to know and anticipate the routine of Natural Science and Technology lessons. You will soon see that a good knowledge of this routine will improve time-on-task and general classroom discipline and that you will manage to work at a quicker pace.

Remember, every Natural Science and Technology lesson follows this routine:

- 1. Classroom Management:** settle learners by having two questions written on the chalkboard. Learners take out their exercise books and pens, and immediately answer the questions. Discuss the answers to the questions, and reward the successful learner.
- 2. Accessing Information:** have key information written on the chalkboard. Explain this to learners. Allow learners to copy this information into their books.
- 3. Checkpoint 1:** ask learners two questions to check their understanding.
- 4. Conceptual Development:** complete an activity to apply new knowledge or skills.
- 5. Checkpoint 2:** ask learners two questions to check their understanding.
- 6. Reference Points for Further Development:** links to textbook activities – you may choose to use these activities as additional classwork activities, or as homework activities.
- 7. Tracker:** fill in your tracker at the end of the week to track your progress.

CAPS AND THE LESSON PLANS

A vehicle to implement CAPS

Teaching Natural Sciences and Technology can be exciting and rewarding. These lesson plans have been designed to guide you to implement the CAPS policy in a way that makes the teaching and learning experience rewarding for both the teacher and the learners.

To support the policy's fundamentals of teaching Natural Sciences and Technology, these lesson plans use the CAPS content as a basis and:

- provide a variety of teaching techniques and approaches
- promote enjoyment and curiosity
- highlight the relationship between Natural Science and Technology and other subjects
- where appropriate, draw on and emphasise cultural contexts and indigenous knowledge systems
- show the relationship between science, learners, their societies and their environments
- aim to prepare learners for economic activity and self-expression

Content and Time Allocation

These lessons plans have been developed to comply with CAPS in respect of both content and time allocation. In developing these lesson plans, we took into consideration the realities of teachers and to this end, we made some simple adjustments, without deviating from policy, to make the teaching of these lesson plans more achievable. The kinds of adjustments made include using some of the practical tasks in the lesson plans for assessment purposes; and building in time for revision and exams during terms 2 and 4.

CAPS assigns one knowledge strand to form the basis of content in each term. These strands are as follows:

- Term 1: ***Life and Living***
- Term 2: ***Matter and Materials***
- Term 3: ***Energy and Change***
- Term 4: ***Planet Earth and Beyond***

In most terms, there are Technology knowledge strands that complement the Natural Sciences strands. There are three Technology strands, they are:

- ***Structures***
- ***Systems and Control***
- ***Processing***

CAPS AND THE LESSON PLANS

The distribution of these strands across the year is summarised in the table below:

Grade 6							
Term 1		Term 2		Term 3		Term 4	
Strands NS & Tech		Strands NS & Tech		Strands NS & Tech		Strands NS & Tech	
Life and Living	Structures	Matter and Materials	Structures	Energy and Change	Systems and Control	Planet Earth and Beyond	Systems and Control
Living and non-living things	Structures for animal shelters	Materials around us	Strengthening materials	Energy and Energy transfer	Movement energy in a system	Planet Earth	Rocket Systems
Structures of plants and animals	Solid materials	Strong frame structures	Energy around us	The Sun	The Earth & the Sun	The Moon	
What plants need to grow			Energy and sound				
Habitats of animal							

These lesson plans have been designed against the stipulated CAPS requirements with topics being allocated for the time prescribed by CAPS. (Remember that some slight changes have been incorporated to accommodate time for revision, tests and examinations).

CAPS AND THE LESSON PLANS

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The time allocation by topic is summarised in the table below.

Remember that one week equates to 3,5 hours or three lessons: two lessons of 1 hour each; and one lesson of 1½ hours.

TERM	GRADE 4		GRADE 5		GRADE 6	
	Topic	Time in weeks	Topic	Time in weeks	Topic	Time in weeks
Term 1: Life and Living	• Living and non-living things	2	• Plants and animals on Earth	2½	• Photosynthesis	2½
	• Structures of plants and animals	2½	• Animal Skeletons	1½	• Nutrients in Food	1½
	• What plants need to grow	1	• Food Chains	2½	• Nutrition	1½
	• Habitats of animals	1	• Life cycles	1½	• Food Processing	2½
	• Structures for animal shelters	2½	• Skeletons and Structures	2	• Eco Systems and food webs	2
		(10 wks)		(10 wks)		(10 wks)
Term 2: Matter and Materials	• Materials around us	3½	• Metals and non-metals	2	• Solids, liquids and gases	½
	• Solid materials	2	• Uses of metals	2½	• Mixtures	1
	• Strengthening materials	2	• Processing materials	3½	• Solutions as special mixtures	2½
	• Strong frame structures	2½	• Processed materials	2	• Dissolving	1
		(10 wks)		(10 wks)	• Mixtures and water resources	2½
				• Processes to purify water	2½	
					(10 wks)	

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Term 3: Energy and Change	• Energy and Energy transfer	2½	• Stored energy in fuels	3	• Electric circuits	2½
	• Energy around us	2½	• Energy and electricity	3	• Electrical conductors and insulators	2
	• Movement energy in a system	2½	• Energy and movement	1	• Systems to solve problems	2½
	• Energy and sound	2½	• Systems for moving things	3	• Mains electricity	3
		(10 wks)		(10 wks)		(10 wks)
Term 4: Planet Earth and Beyond	• Planet Earth	2	• Planet Earth	1	• The solar system	2½
	• The Sun	1	• Surface of the Earth	2½	• Movements of the earth and planets	1
	• The Earth & the Sun	1	• Sedimentary Rocks	2	• The movement of the Moon	1
	• The Moon	2	• Fossils	2½	• Systems looking into space	1
	• Rocket Systems	2			• Systems to explore the Moon and Mars	2½
		(8 wks)		(8 wks)		(8 wks)
TOTALS	38 weeks		38 weeks		38 weeks	

CAPS AND THE LESSON PLANS

CAPS Assessment

Assessment is a continuous planned process that involves identifying, gathering, interpreting and diagnosing information about the performance of learners.

Assessment involves generating and collecting evidence of learner achievement and progress, and using this information to understand and provide assistance to the learner during the process of teaching and learning.

Assessment should be both *formal* and *informal*:

- a. **Informal Assessment** involves regular checking of learners' class work and practical tasks; asking questions; discussions; informal classroom interactions; and giving constructive feedback. Informal assessment marks do not need to be recorded, but the teacher can make notes for future reference.
- b. **Formal Assessment** provides teachers with a systematic way of evaluating how well learners are progressing. Formal Assessment consists of selected assessment tasks. These tasks are stipulated by CAPS and the marks need to be recorded. These tasks are done throughout the year, and include practical tasks, tests and examinations.

- i. **Tests and Examinations**

Examinations must include questions on both Natural Sciences and Technology. The weighting of the marks should reflect the time allocated to each section in the curriculum content. Tests and exams should consist of a range of questions that cover different cognitive levels: recall; understanding; application; evaluation; analysis; and synthesis. CAPS aligned tests and examinations, with accompanying memoranda, are provided with these lesson plans.

- ii. **Practical Tasks**

Practical tasks give learners the opportunity to demonstrate knowledge, skills and understanding. Practical tasks form part of the activities included in these lesson plans. Each term, one practical task has been selected for assessment. A rubric is provided to conduct the assessment.

A minimum mark allocation is prescribed in CAPS for tests, practical tasks and examinations for each grade. These are summarised, by grade, in the table below:

CAPS AND THE LESSON PLANS

Grade 6						
Programme of Formal Assessment						
Formal Assessments	TERM 1	TERM 2	TERM 3	TERM 4	TOTAL MARKS FOR THE YEAR	TOTAL
School-based assessments	1 test [15 marks] 1 selected practical task [10 marks]	1 exam or test on work from terms 1 & 2 [40 marks] 1 selected practical task [10 marks]	1 test [15 marks] 1 selected practical task [15 marks]	1 selected practical task [15 marks]	120 marks	Together make up 75% of the total marks of the year
Exams [60 minutes]				Exam on work from terms 3 & 4 [40 marks]	40 marks	Makes up 25% of the total marks of the year
Number of formal assessments	2	2	2	2	Total 8 assessments [160 marks]	Total: 100%

Refer to CAPS on the processes for converting marks to percentages and to the 7-point scale.

MANAGING A NATURAL SCIENCES CLASSROOM

The time you spend setting up your classroom at the beginning of the year is important. You are not only preparing for your learners, you are also mentally preparing yourself for the entire year. Your learners will follow your lead: if you are organised and in control, there is a good chance that they will be too. Learners feel comfortable and safe with order and routines. So with this in mind, you need to consider the following at the start of each term:

- Mentally preparing yourself
- Preparing your classroom

1. Mentally preparing yourself

Teaching is very demanding and holidays are an important time to rest your mind and your body. Use your holidays to get rest and reconnect with yourself. Toward the start of the new term start to reflect on your practice and begin to plan what you need to do.

a. *Reconnect with yourself*

By the end of a teaching term, teachers are always very tired. It is important that you take time to rest and build up your mental and physical energy.

Apart from rest, you should also make a plan to **do some exercise**. Although we don't always think so, physical exercise relaxes us and build up energy – it also makes us fit, and it is always nice to feel fit and healthy. You should also try and do some physical activity during the term as this will help you get rid of stress.

Make time to **see your family and friends**. Happy social time is also good for the mind, body and soul.

Find some quiet time to be by yourself and to **think about your life**...your family, your job and your goals. Thinking about your life and being in the moment is called **mindfulness**. Being mindful is very important because when we are mindful, we are fully present and aware of where we are and what we are doing. When we are mindful we don't over react to situations or to events around us.

b. *Reflect on your practice*

As you get closer to the start of a new year or new term, think about the kinds of things that you do and why you do them. Also think about what is good and successful about what you do, and what you could do better.

Think about what makes you stressed and what makes you happy.

Think about how you might do things better or differently to make your work more successful and rewarding.

Try asking yourself the following questions:

- What is it that I really enjoy about my work?
- What is it that I really don't enjoy? How can I try to make this not be such an issue for me?
- What am I good at?
- What can I do better?
- Why do I teach?

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- Do I use a variety of teaching methods and approaches? Which work well, and which don't?
- How can I make the experience of teaching and learning better for me and my learners?
- Am I good at connecting with my learners and colleagues? Is there anything I could improve?

Answering these questions should provide you with a lot of introspection, and should give you ideas on how to plan what you might do differently.

When you start to put your new strategies in place, remember that sometimes things are beyond our control – for example we can't control other people (learners, colleagues, parents), all that we can do is manage our reaction to people and circumstances. As teachers, we should always strive to be better and to give our learners a high-quality learning experience.

c. Plan what you need to do

After reflecting on your practice, it is time to put your thinking into action. The best actions and results come out of informed plans. Make sure that your plans are realistic and achievable. If your plans are too ambitious, you will become disappointed if you put them into action.

Your plans should:

- be specific with achievable outcomes
- not be overly ambitious
- help you use your time effectively
- help make your teaching more effective and efficient
- make your learners' experience exciting and safe
- address what you discovered during your personal reflection

Reflect on your plans from time-to-time, to see if you are in track of if you need to review them.

You can make plans about:

- the layout of your classroom
- how you will manage resources
- the kinds of resources that you need to collect
- marking learners' work
- the activities that you will do with learners
- when you will meet with parents
- finding time to do introspection and reflection

2. Preparing your classroom

Once you have mentally prepared yourself and planned the kinds of things you need to do, it is time to prepare your physical space. Organising your classroom can make your life much easier, and can enhance the teaching and learning experience. Your classroom needs to be functional and organised.

MANAGING A NATURAL SCIENCES CLASSROOM

These are the kinds of things that you should be thinking about:

a. *Cleaning Out*

Without even realising it, our classrooms become filled with things that we don't need. Take the time at the start of each term to do a big clean out. Throw away things that are no longer needed and sort and tidy things that need to be kept. Your learners will appreciate a clean learning environment and it will encourage them to be neat and tidy.

b. *Teacher's desk*

The teachers desk is usually a central place in the classroom. Different teachers will use their desks in different way. The teacher's desk can be used as a:

- working area to help learners
- place for marking
- place to store materials
- place to place teaching resources

Try not to teach from your chair. Good teachers are active and move around the classroom. This helps with discipline and it also allows you to stay connected with your learners and to provide help where necessary.

Depending on how you use your desk, will determine where you should place it. If it is used for storing resources, you could place it at the back of the class. If it is going to be the place where you assist learners and mark their work, you might want to put it in on the side of your classroom, somewhere down the middle. Try not to place your desk in a front corner of the classroom – this is very traditional and authoritarian, it also doesn't allow for the best management of your learners.

If you will spend time teaching around your desk – with resources and lesson plans placed on your desk – make sure that you place it where the whole class can see you.

Always make sure that your desk is organised, clean and tidy and provides a good example to your learners.

c. *Learners' desks*

Firstly, you need to ensure that all of your learner have a desk to work at and a chair to sit on. If there are shortages in your classroom, you need to escalate this problem to your Head of Department.

Ensure that desks and chairs are not broken and that they are clean. Organise that any broken or unused desks and chairs are removed from your classroom. It is a good idea to get learners to help clean desks and chairs on the last day of the term so that they are clean for the start of the new term.

There are many ways to arrange your classroom and these will be decided by the age of the learners, the subject being taught, and on issues like discipline.

Science is a subject that often requires group work and discussions in pairs. By placing learners in pairs or groups, you are providing an opportunity for resources to be shared. If you place learners in pairs, it is best to place two desks side by side in rows, or if you place

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learners in groups, you can seat them in groups of 4 or 6. It is important that you make sure that all learners can see the chalkboard.

d. Learners' workbooks

At the beginning of each year, you need to ensure that you provide each learner with a science workbook. Workbooks are simple 72-page lined books. Learner workbooks are important for learners as they provide a record of work for learners and they also contain the content that learners will use for revision and study. These lesson plans have been designed in such a way that your learners will have the opportunity to record much of the CAPS content into their workbooks.

You should encourage learners to cover their workbooks in paper and plastic, as these will make them more durable.

If you teach a number of classes, it is a good idea to buy a few rolls of different coloured insulation tape. Choose one colour or a combination of two colours and stick these on the bottom end of the spine of the learners' workbooks. This way, you will immediately be able to identify what class a learner's book belongs to. Store the learners' workbooks, by class, on a shelves in your classroom, with the spines showing, so that you can easily identify on which pile to place learner workbooks. The colour coding will also help learners with where to place the place their workbooks when handing them in.

e. Learner textbooks

You should have at least one set of textbooks, so that for each class that you teach, each learner will have a textbook to work from. Although it may seem like a big job, you should cover all of the textbooks in plastic as this will make them more robust and durable. You may also want to use coloured insulation tape to mark sets of learner textbooks. This will help you to easily separate books by grade and by title. Also dedicate a place on your book shelf for textbooks.

If you have sufficient textbooks to give each learner you teach one book, you should number each book with a school stamp and keep a list of the number of the textbook provided to each learner. You should instruct learners to cover their textbooks with plastic and to stick a label onto the textbook with their name on it.

At least once a term you should check that learners still have their textbooks and that the condition of textbooks is good. Provide praise and guidance where necessary and involve parents or guardians if necessary.

f. Science resources and equipment

You should ensure that all of your resources (including lesson plans, trackers, posters and any other science equipment) is stored safely and practically. This means that they should not be able to hurt learners; that they cannot be removed or stolen; and that they should be practically available for easy use.

You should create a register of all of your resources so that you know what you have. If you lend any resources to learners or colleagues, you should write this down so that you have a record of where all of your valuable resources are.

MANAGING A NATURAL SCIENCES CLASSROOM

For an ideal Natural Science & Technology classroom, there are certain resources that you should try to accumulate. Notify your SMT of these requirements, so that they can possibly be included in the school budget. The list that follows may be used as a guide:

Science:

- Cleaning cloths
- Cleaning detergent
- Large bowl
- Spoons and knives (different sizes)
- Scissors
- Beakers, jars and containers
- Eye protection glasses
- Prestick
- Batteries
- Circuit boards
- Litmus paper
- Map of the world or globe
- A torch
- Burner (Bunsen burner)
- Matches
- Candles
- Relevant newspaper articles, magazine articles and posters
- Bunsen Samples or examples of topics you teach (e.g. pieces of igneous rock, animals bones, topsoil, types of plants)
- Plasters and antiseptic ointment
- Fire extinguisher Wall displays

Technology:

- Pliers
- Hacksaw
- Variety of screwdrivers
- Hammer
- Glue (wood and metal)
- String
- Wire
- Paint and brushes
- A4 paper for design
- Dry waste (boxes, tubs, bottles, jars)

Before the first day of school, you should make sure that your classroom looks visually exciting and interesting. A print-rich and visually exciting classroom will stimulate learners and create opportunities for incidental learning.

MANAGING A NATURAL SCIENCES CLASSROOM

To make your classroom exciting, consider doing the following:

- Display **posters** relevant to the theme and topics for the year (you will receive a poster for each term as part of these science lesson plans).
- Display the pictures and diagrams included in your **resource pack** for the topic. Try to stick these pictures and diagrams onto cardboard, and laminate them or cover them in plastic.
- Create a NEWS CORNER where you display **newspaper and magazine articles** with a science interest of topic.
- Make **flashcards** of vocabulary words for the term (you may also want to include the definitions for the words).
- Make **posters or flow charts** that explain some topic for the term.

Once the term commences, you should also try to display **the work of learners**. This not only personalises the learning environment for your class, but it also boosts learner confidence.

g. Asserting discipline

Good discipline is central to a positive teaching and learning environment. It is important that learners know the rules of classroom and that these are communicated to them at the start of the year. Apart from telling the learners the rules, you should display these on the classroom wall in a place that is visible for everybody. Make sure that you write the rules in a font that is neat and large enough for learners to read. You might also want to get the learners to sign a pledge to say that they will abide by the rules of the class.

The pledge could be as simple as:

I, _____, in grade ____ know the rules of this class and I pledge to abide by them.

Signature: _____ Date: _____

Signature of teacher: _____

It is always good to get learners to help you design the rules, this way they are more likely to take ownership of the rules and stick to them.

MANAGING A NATURAL SCIENCES CLASSROOM

Classroom rules, could include things like:

1. Respect the person who is speaking
2. Be kind and patient with others
3. Don't bully
4. Keep your desk tidy
5. Always come to class on time
6. Write neatly in your book
7. Keep your cell phone off
8. Etc.

h. Establishing routines

You need to be consistent in how you present yourself to your class and how you teach your learners. Your learners should know what responses to expect from you, you cannot respond differently for the same thing on different days. Consistency will make your learners feel safe and secure. When learners feel psychologically safe, you will get the best out of them – both in behaviour and the work that they do.

Build in systems in your class that the learners will become familiar with. These are called *routines*. For example:

- insist that learners line up outside your classroom
- expect that learners walk in and sit down quietly
- let them understand (as is expected in these science lessons) that they need to immediately take out their books and write down the answer to the chalkboard
- Etc.

These science lessons have been designed to establish these kinds of routines.

Routines are known to improve learner behaviour and attitudes as well as overall classroom behaviour and discipline. Letting learners know what is expected and making this part of the cycle of what happens in your classroom will certainly assist with discipline and overall classroom management.

REFLECTING ON THE LESSONS THAT YOU TEACH

It is important to reflect on your teaching. Through reflection, we become aware of what is working and what is not, what we need to change and what we do not. Reflecting on your use of these lesson plans will also help you use them more effectively and efficiently.

These lesson plans have been designed to help you deliver the content and skills associated with CAPS. For this reason, it is very important that you stick to the format and flow of the lessons. CAPS requires a lot of content and skills to be covered – this makes preparation and following the lesson structure very important.

Use the tool below to help you reflect on the lessons that you teach. You do not need to use this for every lesson that you teach – but it is a good idea to use it a few times when you start to use these lessons. This way, you can make sure that you are on track and that you and your learners are getting the most out of the lessons.

LESSON REFLECTION TOOL			
Preparation			
1.	What preparation was done?		
2.	Was preparation sufficient?		
3.	What could have been done better?		
4.	Were all of the necessary resources available?		
Classroom Management			
		Yes	No
5.	Was the question written in the board?		
6.	Was the answer written on the board?		
7.	Was the answer discussed with the learners in a meaningful way?		
8.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

REFLECTING ON THE LESSONS THAT YOU TEACH

Accessing Information

		Yes	No
9.	Was the text and/ or diagrams written on the chalkboard before the lesson started?		
10.	Was the work on the board neat and easy for the learners to read?		
11.	Was the explanation on the content easy to follow?		
12.	Was the information on the board used effectively to help with the explanations?		
13.	Was any new vocabulary taught effectively? (in context and using strategies like PATS)		
14.	Were the learners actively engaged? (asked questions, asked for their opinions and to give ideas or suggestions)		
15.	Were the checklist questions used effectively?		
16.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

REFLECTING ON THE LESSONS THAT YOU TEACH

Conceptual Development			
		Yes	No
17.	Was the information taught in the 'Accessing Information' part of the lesson used to foreground the activity?		
18.	Were clear instructions given for the conceptual development activity?		
19.	Were the outcomes/answers to the activities explained to the learners?		
20.	Could the learners ask questions and were explanations given?		
21.	Was a model answer supplied to the learners? (written or drawn on the board)		
21.	Were the checklist questions used effectively?		
22.	At the end of the lesson, were the learners asked if they had questions or if they needed any explanations?		
23.	Overall reflection on this part of the lesson: What was done well? What could have been done better?		

TOPIC OVERVIEW:

Solids, liquids and gases

Term 2, Weeks 1A

A. TOPIC OVERVIEW

Term 2, Weeks 1a

- This topic runs for 1 lesson.
- It is presented over 1 lesson.
- This topic counts for 2% in the mid-year exam.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • Solid materials 	<ul style="list-style-type: none"> • Solids, liquids and gases 	<ul style="list-style-type: none"> • N/A

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	matter	A physical substance that occupies space; it is anything that has mass and takes up space.
2.	regular	Arranged in a definite pattern
3.	state	The physical condition that something is in

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Understanding the nature of solids, liquids and gases is important for working in the fields of physics and chemistry.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

1 A

Term 2, Week 1, Lesson A

Lesson Title: Solids, liquids and gases

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Arrangements of particles
CAPS Page Number	52

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe the different arrangement of particles of solids, liquids and gases
- draw and write about the arrangement of particles.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories		Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts		Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Solids, liquids and gases

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Poster: Solutions as special mixtures	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Is a herbivore a producer or a consumer?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

A herbivore is a consumer as it does not make its own food.

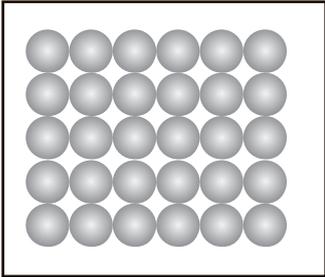
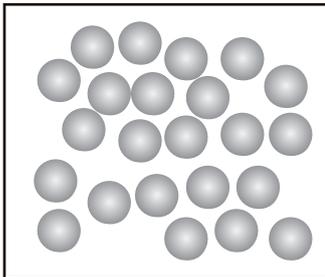
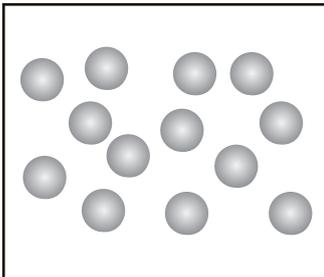
D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLIDS, LIQUIDS AND GASES

1. All **matter** is made of particles (very small parts).
2. Matter cannot be created (made) or destroyed.
3. It can only change from one **state** to another (like from ice to water).
4. Particles are arranged differently in solids, liquids and gases.
5. The particles for solids are closely packed together in a **regular** pattern with little spaces between them.
6. The particles vibrate very little in one place.
7. In liquids, the particles are closely packed in no fixed pattern.
8. The particles can move around each other.
9. In gases, the particles are far apart.
10. The spaces between the particles are big and particles move in all directions.

TOPIC: Solids, liquids and gases

Solids	Liquids	Gases
		
<p>Particles are close together and form a regular pattern. Particles are small and vibrate in one place.</p>	<p>Particles have more space between them and are not in a pattern. Particles are small but they move around each other.</p>	<p>Particles are far apart with big spaces between them. Particles are big and move in all directions.</p>
<p>Have a fixed shape</p>	<p>Flow and take the shape of the container they are in</p>	<p>Spread out and have no shape; they completely fill their container.</p>

2. Explain this to the learners as follows:

- a. Remind the learners that they studied solids, liquids and gases in Grade 4.
- b. They learnt that solids, liquids and gases make up all the materials around us.
- c. They also learnt that solids keep their shape, liquids flow and take the shape of their container; and gases, such as air, spread out and have no shape but they can be contained (held in a container).
- d. They also learnt that heating and cooling cause solids, liquids and gases to change their state (they can melt, evaporate, condense, or freeze).
- e. Show learners the poster: Solutions as special mixtures.
- f. Point out that in solids the particles are closely packed together and arranged in a regular pattern. The spaces between the particles are small and they vibrate (move backwards and forwards) in one place.
- g. In liquids the particles are closely packed but there is no pattern in the way they are arranged. The spaces between the particles are small but the particles can still move around each other.
- h. The particles for gases are arranged far apart from each other.
- i. The spaces between the particles are big and the particles move in all directions.

3. Give learners some time to copy this information into their workbooks.

TOPIC: Solids, liquids and gases

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. The particles of solids form a pattern: True or False?
- b. With gases, the particles do not move very much: True or False?

Answers to the checkpoint questions are as follows:

- a. True.
- b. False. With gases, the particles are far apart and the particles move in all directions.

E CONCEPTUAL DEVELOPMENT

1. Activity: Draw the arrangement of particles

Write the following on the chalkboard (always try to do this before the lesson starts):

THE ARRANGEMENT OF PARTICLES

1. Draw a diagram in your workbook to show the arrangement of water as:
 - a. ice (solid)
 - b. water (liquid)
 - c. steam (gas).

The particles must be the same size and the same number of particles must be used for each state. If the particles are the same size and the same number, it means that it is the same substance.

HOW TO DO SCIENTIFIC DRAWINGS

1. Use a sharp HB pencil.
2. Use a ruler.
3. Write headings in capital letters.
4. At first labels must be written lightly in print.
5. If labels and headings are correct, write them in black pen.

2. Explain the task to the learners:
 - a. Their drawings must be neat and tidy.
 - b. The particles must be drawn the same size. It might be a good idea to use a round object to draw your circles.
 - c. Headings and labels are very important as they tell the person looking at the drawing what they are about.
 - d. Look at the poster for the correct drawings. .
3. Activity: Identify materials as solids, liquids, gases.

TOPIC: Solids, liquids and gases

IDENTIFY MATERIALS AS SOLIDS, LIQUIDS OR GASES

1. Draw a table with three columns.
2. Write the following heading in each column: solids, liquids, gases.
3. Place the following items in the correct column:
water, stone, cooking oil, cooking gas, juice, wood, plastic, fabric, air, tea.

4. A model answer is:

IDENTIFY MATERIALS AS SOLIDS, LIQUIDS OR GASES

SOLIDS	LIQUIDS	GASES
<i>stone</i>	<i>water</i>	<i>cooking gas</i>
<i>wood</i>	<i>cooking oil</i>	<i>air</i>
<i>plastic</i>	<i>juice</i>	
<i>fabric</i>	<i>tea</i>	

5. ACTIVITY: FILL IN THE MISSING WORDS

Rewrite the sentences filling in the missing words from the list. Underline the words you fill in.

solids, matter, regular, big, small, liquids, gases, particles, move

1. All ____ is made up of particles.
2. In ____, the particles are closely packed in a ____ pattern.
3. In ____, the particles are ____ and far apart.
4. In ____, there are spaces between the ____ so they can ____ around each other.
5. In ____, the particles vibrate in one place.
6. In ____, the particles move in all directions.
7. In ____, the particles are ____ and move around each other.

ACTIVITY: FILL IN THE MISSING WORDS

solids, matter, regular, big, small, liquids, gases, particles, move

1. All matter is made up of particles.
2. In solids, the particles are closely packed in a regular pattern.
3. In gases, the particles are big and far apart.
4. In liquids, there are spaces between the particles so they can move around each other.
5. In solids, the particles vibrate in one place.
6. In gases, the particles move in all directions.
7. In liquids, the particles are small and move around each other.

TOPIC: Solids, liquids and gases

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Is air a solid, liquid or a gas?
- b. Which has particles arranged in a pattern – a solid, liquid or gas?

Answers to the checkpoint questions are as follows:

- a. Air is a gas.
- b. A solid has particles arranged in a pattern.

7. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solids, liquids and gases	59-61
Viva	Solids, liquids and gases	54-57
Platinum	Solids, liquids and gases	56-60
Solutions for All	Solids, liquids and gases	89-93
Day-by-Day	Solids, liquids and gases	58-63
Oxford	Solids, liquids and gases	48-49
Spot On	Solids, liquids and gases	32
Top Class	Solids, liquids and gases	51-53
Sasol Inzalo Bk A	Solids, liquids and gases	104-117

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/Aw1VgN> (1min 50sec) [Arrangement of molecules in matter]
2. <https://goo.gl/j4MUXU> (5min 41sec) [3 States of matter]
3. <https://goo.gl/bq2AW6> (3min) [States of matter]

TOPIC OVERVIEW:

Mixtures

Term 2, Weeks 1B - 2A

A. TOPIC OVERVIEW

Term 2, Weeks 1b - 2a

- This topic runs for 3 lessons.
- It is presented over 1 lesson.
- This topic counts for 6% in the mid-year exam.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • Solid materials 	<ul style="list-style-type: none"> • Mixture of materials; a mixture consists of two or more different substances mixed together; the different substances can sometimes be visible; the substances can be separated by physical means such as sieving, filtering, hand sorting, settling and decanting; draw and write about mixtures. 	<ul style="list-style-type: none"> • Separating mixtures; methods of physical separation

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	visible	It is able to be seen.
2.	substances	Any material that has physical properties; it can be a solid, liquid or gas.
3.	filtering	Pass through something to remove unwanted material
4.	cordial	A fruit-flavoured concentrate to make fruit juice
5.	physical	Something that can be touched.
6.	decanting	Separating by pouring off the top of a liquid

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

It is important to know what a mixture is as it leads to an understanding of how to make certain mixtures and how to separate certain mixtures. Separating mixtures can be important in some circumstances, like knowing how to purify dirty water. Another example of where it is useful to separate mixtures is when metal, such as gold, is separated from ore. Metals are used in the production of many products, such as weapons, tools and household products.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

1 B

Term 2, Week 1, Lesson B

Lesson Title: A mixture of two solids

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Mixtures
CAPS Page Number	52

Lesson Objectives

By the end of the lesson, learners will be able to:

- define a mixture
- describe different types of mixtures.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	✓	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts		Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 1: Mixtures: Two solids	
Resource Page 2: Mixtures: Two solids	
Poster: Solutions as special mixtures	
Rice and beans	
Plastic cups/tubs and spoons	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Can you describe the arrangement of particles for gases?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

For gases, the particles are far apart from each other and they move all over the place.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

MIXTURES

1. A mixture is two or more different substances that have been mixed together.
2. Sometimes, when two substances are mixed, it looks like one substance.
3. The different substances are no longer **visible**.
4. Sometimes we can clearly see and identify the different substances.

TOPIC: Mixtures

2. Explain this to the learners as follows:
 - a. We often mix two **substances** together.
 - b. We mix soap with water to wash ourselves.
 - c. We mix sugar in the tea we drink.
 - d. Sometimes when substances are mixed, you cannot see the separate substances. They are not visible.
 - e. Sometimes when two substances are mixed, you can still clearly see the separate substances.
 - f. You would be able to pick out the separate substances after they were mixed.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is a mixture?
- b. What does it mean when we say that the substances are no longer **visible** when mixed?

Answers to the checkpoint questions are as follows:

- a. A mixture is two or more substances that have been mixed together.
- b. It means that the substances cannot be seen as separate substances once they are mixed.

E CONCEPTUAL DEVELOPMENT

1. Activity: Mixing solids

Write the following on the chalkboard (always try to do this before the lesson starts):

MIXING SOLIDS

MATERIALS:

- rice
- beans
- spoons
- small tubs or plastic cups for mixing

METHOD:

1. Place two spoons of rice in the cup/tub.
2. Place two spoons of beans in the cup/tub.
3. Stir the rice and beans until they are mixed.

QUESTIONS:

1. Is the rice a solid, liquid or a gas?
2. Are the beans a solid, liquid or a gas?
3. Can you separate the rice and beans from each other so that they are what they were before they were mixed?
4. Do they still look the same as before they were mixed?
5. Do they still feel the same as before they were mixed?

2. Explain the following to the learners:

- a. Show learners Resource Page 1: 'Mixtures: two solids' and Resource Page 2: 'Mixtures: two solids'.
- b. Explain to the learners that these are all mixtures of solids.
- c. Solids can be separated again once they have been mixed with each other.
- d. The solids do not change in any way.
- e. Can they think of other mixtures in which the different materials are still clearly visible after mixing? In other words, they do not change.
- f. Do this as a teacher demonstration or get each group of six learners to do this investigation.
- g. Show the learners Resource Page 1: 'Mixtures: Two solids' and Resource Page 2: 'Mixtures: Two solids'.
- h. Point out how the four mixtures are solids mixed together.
- i. Point out how the four solids are clearly visible after mixing.
- j. Explain how each of the solids can be separated again after they have been mixed.

TOPIC: Mixtures

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. From an earlier investigation in this lesson, can you give an example of two solids that were mixed together?
- b. In the Resource Pack that your teacher showed you, can you give an example of two solids that have been mixed together?

Answers to the checkpoint questions are as follows:

- a. We mixed rice and beans together.
- b. Any of these answers is correct: rice and beans, different frozen vegetables, different coloured daisies, wildebeest and zebra.

3. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures	62-63
Viva	Mixtures	58-59
Platinum	Mixtures	62-63
Solutions for All	Mixtures	95-97
Day-by-Day	Mixtures	64-71
Oxford	Mixtures	51-53
Spot On	Mixtures	35
Top Class	Mixtures	54
Sasol Inzalo Bk A	Mixtures	119-123

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. http://www.ducksters.com/science/chemistry/chemical_mixtures.php [Science mixtures]

1 C

Term 2, Week 1, Lesson C

Lesson Title: Mixtures with liquids

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Mixtures of materials
CAPS Page Number	52

Lesson Objectives

By the end of the lesson, learners will be able to:

- investigate different liquids mixed together
- give examples of different liquids that are often mixed.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories		Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 3: Mixtures: A solid and a liquid	
Poster: Solutions as special mixtures	
Sand, water, cooking oil, cordial , three paper cups or glasses per group, paper towel, spoon	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is a mixture?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

A mixture is two or more substances that have been mixed together.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

MIXTURES OF LIQUIDS AND SOLIDS

1. We can mix substances that are in different states (solids, liquids and gases).
2. For example, we can mix a solid and a liquid together.
3. Sometimes a mixture of a liquid and a solid can be separated by **filtering**.
4. We can also make mixtures of two or more liquids.
5. Sometimes you will not be able to see (observe) the different liquids that have been mixed.
6. Sometimes you will still be able to see the different liquids.

TOPIC: Mixtures

2. Explain this to the learners as follows:
 - a. Mixtures can be made from different states of matter.
 - b. This means you can mix a solid and a liquid, or a gas and a liquid.
 - c. They will investigate this in the next part of the lesson.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. True or False: Mixtures cannot be made with different states of matter?
- b. True or False: Sometimes a mixture of a solid and liquid can be separated by filtering?

Answers to the checkpoint questions are as follows:

- a. False. Mixtures can be made with different states of matter, like a solid with a liquid.
- b. True.

E CONCEPTUAL DEVELOPMENT

1. Activity: Mixing solids and liquids

Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATION: OBSERVING WHEN SOLIDS ARE MIXED WITH LIQUIDS

YOU WILL NEED:

1. sand
2. water
3. a paper cup or glass
4. a paper towel
5. a spoon

METHOD

1. Place five spoons of sand in the cup/glass.
2. Pour in water until it is half-full.
3. Stir the sand and water until they are mixed.

ACTIVITY AND QUESTIONS

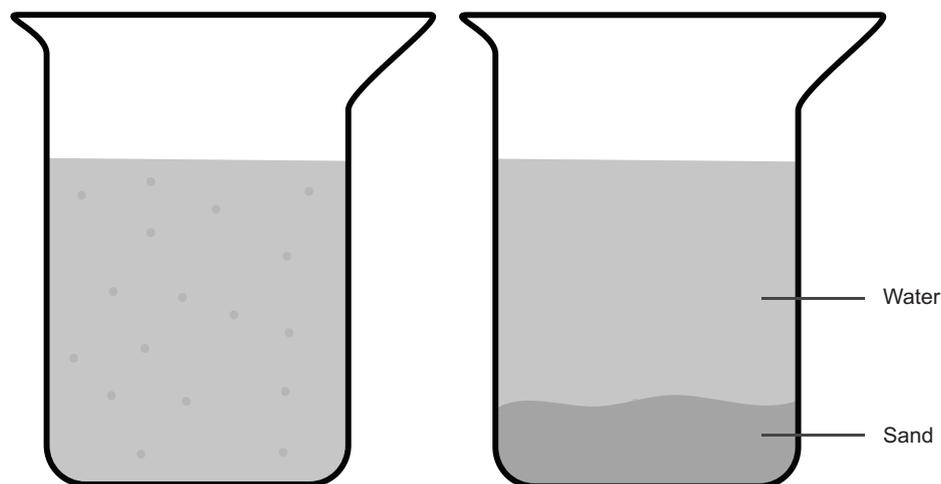
1. Draw two pictures of the mixture in the glass: one straight after the mixture is stirred and one after the mixture has been left to stand for five minutes
2. Can you see the sand grains?
3. Can you separate the mixture into sand grains and water? Think about how you could use the paper towel

TOPIC: Mixtures

4. If you mixed sugar and water together, would you be able to separate these two substances using a paper towel? Say why or why not.

2. Explain the following to the learners:
 - a. Read through the investigation on the chalkboard with the learners.
 - b. Make sure the learners understand the instructions.
 - c. Read through the questions with the learners.
 - d. Get groups of learners to do the investigation.
 - e. Show learners the poster.
 - f. Point out the sugar going into the tea cup. The sugar will dissolve into the tea.
3. Give learners time to answer the questions in their workbooks.
4. Go through some of the answers with the learners and discuss these with the class.

MODEL ANSWER



Sand and water mixed

Sand settled at bottom of glass

2. *Yes, the sand grains are still visible.*
3. *Yes, the sand and water can be separated. You could pour the mixture through a paper towel into another glass. The paper towel would keep the sand from going through with the water.*
4. *No, the sugar and water cannot be separated as the sugar will have dissolved into the water.*

5. Activity: Mixing liquids and liquids

Write the following on the chalkboard (always try to do this before the lesson starts):

TOPIC: Mixtures

INVESTIGATION: OBSERVING WHEN LIQUIDS ARE MIXED WITH LIQUIDS

YOU WILL NEED:

- cooking oil
- cordial (concentrated juice to be mixed with water)
- water
- two paper cups or glasses
- a spoon

METHOD

1. Place one spoon of oil in one of the cups/glasses.
2. Pour in water until it is half-full.
3. Stir the oil and water until they are mixed.
4. Place one spoon of cordial in the other cup/glass.
5. Pour in water until it is half-full.
6. Let them stand for two minutes.
7. Observe what happens.

QUESTIONS

1. Are the oil and water mixed or separate in the first cup/glass?
 2. Draw a picture of the mixture in the glass. Give the drawing a heading.
 3. Are the cordial and water mixed or separate in the second cup/glass?
 4. Draw a picture of the mixture in the second cup/glass. Give the drawing a heading.
 5. Write two sentences about what you found out in this investigation.
6. Explain the following to the learners:
 - a. Read through the investigation on the chalkboard with the learners.
 - b. Make sure the learners understand the instructions.
 - c. Read through the questions with the learners.
 - d. Get groups of learners to do the investigation.
 - e. Show learners the poster.
 - f. Point out the oil being mixed with water.
 7. Give learners time to answer the questions in their workbooks.
 8. Go through some of the answers with the learners and discuss these with the class.

MODEL ANSWER

1. *The oil and water are separate.*

2.



3. *The cordial and water are mixed.*

4.



5. *The oil and water did not mix together. The cordial and water did mix.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What happens when oil is mixed with water?
- b. What happens when cordial is mixed with water?

Answers to the checkpoint questions are as follows:

- a. Oil and water do not mix.
- b. The cordial mixes with water and does not stay separate.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures	63
Viva	Mixtures	58-59
Platinum	Mixtures	64-65
Solutions for All	Mixtures	98-100
Day-by-Day	Mixtures	64-71
Oxford	Mixtures	51-53
Spot On	Mixtures	-
Top Class	Mixtures	55-56
Sasol Inzalo Bk A	Mixtures	124-128

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/ufMRz5> (6min 26sec) [Matter - liquids]
2. <https://goo.gl/isoQjV> (2min 39sec) [Explore activity: mixtures and solutions]

2 A

Term 2, Week 2, Lesson A

Lesson Title: Separating mixtures

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Mixtures of materials
CAPS Page Number	52

Lesson Objectives

By the end of the lesson, learners will be able to:

- suggest a few ways to separate mixtures
- demonstrate different methods of separating mixtures.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Poster: Solutions as special mixtures	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Which two liquids do not mix?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Oil and water do not mix.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SEPARATING MIXTURES BY PHYSICAL MEANS

1. Mixtures can be separated using simple **physical** methods.
2. Sieve separate solids with different particle sizes.
3. The larger particles cannot get through the sieve.
4. Sand is sieved for building purposes.
5. Filtering separates a solid and a liquid.
6. The solid particles collect in the filter and the liquid goes through.
7. **Decanting** is used for two liquids that do not mix well and separate when left.
8. Oil can be poured off water.
9. Settling is used for a mixture of a solid and a liquid.
10. The heavier particles settle and collect at the bottom of the container.
11. The liquid can be poured out.
12. Hand sorting is used for two or more solids that are big enough to be picked out by hand.

TOPIC: Mixtures

2. Explain this to the learners as follows:
 - a. Remind learners that a mixture is two or more substances mixed together.
 - b. In mixtures where these substances are still visible when mixed, these substances can be separated by physical means.
 - c. Read through the information on the chalkboard.
 - d. Make sure the learners understand this information.
 - e. Learners need to know about hand sorting, sieving, settling, decanting and filtering.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is decanting?
- b. What is sieving?

Answers to the checkpoint questions are as follows:

- a. Decanting is when two liquids do not mix together. They can be separated by letting the liquids settle, and then pouring off the top liquid.
- b. Sieving is used in mixtures that consist of solid substances with particles of different sizes. The mixture is pushed through a sieve and only the smaller particles get through.

E CONCEPTUAL DEVELOPMENT

1. Activity: Choose the best method of separation.

Write the following on the chalkboard (always try to do this before the lesson starts):

CHOOSE THE BEST METHOD OF SEPARATION BY PHYSICAL MEANS

hand sorting, sieving, settling, decanting, filterings

From the above list, choose the best method of separation for the following:

- a. water and oil
- b. peanuts and raisins
- c. salt and sand
- d. sand and water
- e. crushed chalk and water.

TOPIC: Mixtures

2. Explain the following to the learners:
 - a. Read through the activity on the chalkboard.
 - b. Make sure the learners understand what they should do.
 - c. The learners must use their notes from earlier on in this lesson to help them.
3. Give learners time to complete this activity.
4. When all learners have completed the activity, get them to pair up and discuss their answers with each other. Give them three minutes to do this.
5. Go over the correct answers with the learners. Learners must go back and look at the reasons for each method in their notes if they made an error.

CHOOSE THE BEST METHOD OF SEPARATION BY PHYSICAL MEANS

- a. *water and oil - decanting*
- b. *peanuts and raisins – hand sorting*
- c. *salt and sand - sieving*
- d. *sand and water - settling*
- e. *crushed chalk and water - filtering*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Which method of separation would you use for different size buttons?
- b. Which method of separation would you use for chalk and water?

Answers to the checkpoint questions are as follows:

- a. Hand sorting would be the best method for separating buttons of different sizes.
- b. Filtering would be the best method used to separate chalk and water.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures	63-64
Viva	Mixtures	60-61
Platinum	Mixtures	66-67
Solutions for All	Mixtures	101-104
Day-by-Day	Mixtures	71-72
Oxford	Mixtures	53-55
Spot On	Mixtures	34
Top Class	Mixtures	53-57
Sasol Inzalo Bk A	Mixtures	128-130

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/9kg7v3> [Tom Newby School - Grade 6]
2. <https://goo.gl/igRpWC> (5min 12sec) [Science - separation and mixture]
3. <https://goo.gl/4YtY8x> (6min 9sec) [Separation of mixtures]

TOPIC OVERVIEW:

Solutions as special mixtures

Term 2, Weeks 2B - 4C

A. TOPIC OVERVIEW

Term 2, Weeks 2b - 4c

- This topic runs for 2½ weeks.
- It is presented over 8 lessons.
- This topic counts for 16% in the mid-year exam.
- This topic's position in the term is as follows::

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • Solutions as mixtures: what a solution is; appearance of solutions • Soluble substances: cannot be separated; some recovered by evaporation, dissolving • Saturated solutions: when no more solute can dissolve • Insoluble substances: some solids will not form a solution in water 	<ul style="list-style-type: none"> • Separating mixtures • Acids, bases and neutrals: taste, properties and acid-based indicators • Atoms: pure substances • Chemical reactions: reactants and products

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	predict	To guess what will happen in the future
2.	uniform	The same throughout
3.	soluble	Describes a solid that will dissolve in a liquid
4.	insoluble	Describes a solid that will not dissolve in a liquid
5.	solute	The solid or liquid that dissolves in a liquid
6.	solvent	The liquid in which the solid (solute) dissolves
7.	dispersed	Spread over a wider area
8.	saturated	When no more of a solute can dissolve in a solution
9.	dissolves	When the particles of a solute become evenly dispersed between those of the solvent
10.	crystallisation	The solid left behind after evaporation

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

The air we breathe, and what we drink as well as products in our homes and work environments contain examples of solutions that we come across every day. Knowing how to separate solutions and mixtures has an impact on many industries, such as mining and recycling.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

2 B

Term 2, Week 2, Lesson B

Lesson Title: Solutions are mixtures

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Solutions
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- suggest a few ways to separate mixtures
- demonstrate different methods of separating mixtures.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Five measuring cylinders, teaspoons, water, salt, sugar, sand, flour, oil	Five glass jars or yoghurt tubs, teaspoons

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Name two physical methods of separating mixtures.

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Any two of the following: sieving, filtering, hand sorting, settling or decanting

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLUTIONS ARE MIXTURES

1. A solution is a special type of mixture.
 2. Some solutions are a mixture of a solid and a liquid.
 3. When a solid looks as if it has disappeared into the liquid, this mixture is called a solution.
 4. The solid dissolves in the liquid.
 5. The solid and liquid can be mixed together in any amounts.
 6. The different substances of the mixture are not visible.
2. Explain this to the learners as follows:
 - a. A solid and a liquid together make a solution.
 - b. The solid must dissolve in the liquid for it to be a solution.
 - c. Dissolving occurs when a solid is mixed with a liquid until the solid is no longer visible.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- Is a solution a mixture: True or False?
- Is a solution created when salt dissolves in water: True or False?

Answers to the checkpoint questions are as follows:

- True. A solution is a special type of mixture.
- True. If salt dissolves in water, a solution is created.

E CONCEPTUAL DEVELOPMENT

- Activity: When is a mixture a solution?

WHEN IS A MIXTURE A SOLUTION?

Before you start the investigation, draw the following table in your workbooks to record your observations and predictions.

	sugar	salt	flour	oil	sand
Prediction					
Is the mixture a solution before stirring?					
Is the mixture a solution after stirring?					

YOU WILL NEED:

five cylinders or glass jars or yoghurt tubs
teaspoons
water
sugar, salt, flour, oil, sand.

METHOD

- Fill each container with half a cup of water.
- Predict whether you think each of the solids will dissolve or not. Write this down in the table.
- Add one teaspoon of each solid to a container. Do not stir or shake yet.
- Observe all five containers. In the table, write down whether or not the mixtures are solutions or not.
- Then stir or shake each container.
- Does the solid dissolve or not? Write the results down in the table.
- Write down a conclusion in your workbooks.
- Tidy and clear up your workspace.

TOPIC: Solutions as special mixtures

2. Explain the following to the learners:
 - a. Learners must first copy the table into their workbooks.
 - b. Learners must then work in groups to do the investigation (or this can be done as a teacher demonstration).
 - c. Read through the instructions on the chalkboard. Make sure all learners understand the instructions.
 - d. Collect all materials.
 - e. Conduct the investigation.
 - f. Fill in the table at the appropriate time.
3. A model answer:

	sugar	salt	flour	oil	sand
Prediction	<i>will dissolve</i>	<i>will dissolve</i>	<i>will dissolve</i>	<i>will not dissolve</i>	<i>will not dissolve</i>
Is the mixture a solution before stirring?	<i>most of the sugar dissolved</i>	<i>most of the salt dissolved</i>	<i>did not dissolve but water turned cloudy</i>	<i>did not dissolve</i>	<i>did not dissolve</i>
Is the mixture a solution after stirring?	<i>dissolves</i>	<i>dissolves</i>	<i>does not dissolve</i>	<i>does not dissolve</i>	<i>does not dissolve</i>

CONCLUSION

Salt and sugar dissolve in water. Flour, oil and sand do not dissolve in water.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Which of the following solids will make a solution with water: oil, sugar, salt?
- b. What does 'predict' mean?

Answers to the checkpoint questions are as follows:

- a. Sugar and salt will make a solution with water.
- b. To 'predict' something means to guess or work out what will happen before it has happened. .

3. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	65-66
Viva	Solutions as special mixtures	63-65
Platinum	Solutions as special mixtures	70-71
Solutions for All	Solutions as special mixtures	107
Day-by-Day	Solutions as special mixtures	74-75
Oxford	Solutions as special mixtures	56-57
Spot On	Solutions as special mixtures	37
Top Class	Solutions as special mixtures	58-59
Sasol Inzalo Bk A	Solutions as special mixtures	134-141

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <http://www.tomnewbyschool.co.za/wp-content/uploads/2016/04/Grd-6-NS-TECH-T2-2016-approved.pdf> [Thomas Newby Gr 6 Term 2]
2. <https://goo.gl/ty15pc> [Solutions]
3. <https://k12opened.com/ebooks/sci/ebook-mixtures-solutions/index.html> [Mixtures and solutions]

2 C

Term 2, Week 2, Lesson C

Lesson Title: Solutions have a uniform appearance

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Solutions
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe the uniformity of solutions
- contrast mixtures that are not uniform.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 4: Solutions have a uniform appearance	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Will sand and water make a solution?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

No, sand will not dissolve in water and therefore it will not be a solution.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLUTIONS HAVE A UNIFORM APPEARANCE

1. When you mix salt with water, the salt dissolves in the water.
2. The salt seems to have disappeared, but we know it is there because the water will taste salty.
3. This mixture of salt dissolved in water is called a solution.
4. **Uniform** means that things are the same.
5. When we say a solution is uniform, it means that it looks the same all the way through.
6. It is uniform as you cannot see any part of the solid in the solution.
7. The particles of salt cannot be seen.

2. Explain this to the learners as follows:
 - a. Uniform means something that is the same throughout.
 - b. A solution will have a uniform appearance.
 - c. A mixture of salt dissolved in water will have a uniform appearance.
 - d. A mixture of sand and water will not have a uniform appearance.
 - e. Show learners Resource Page 4: 'Solutions have a uniform appearance'.
 - f. Solutions look the same throughout; they have a uniform appearance. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- Is a mixture of sugar and water a solution? Give a reason.
- Is a mixture of oil and water a solution? Give a reason.

Answers to the checkpoint questions are as follows:

- Yes. Sugar dissolves in water and the mixture has a uniform appearance.
- No. Oil does not dissolve in water and the mixture does not have a uniform appearance.

E CONCEPTUAL DEVELOPMENT

1. Activity: Draw and write about solids in solutions.

Write the following on the chalkboard (always try to do this before the lesson starts):

SOLIDS IN SOLUTIONS

- Aachal mixed four teaspoons of salt with water in a glass.
- Draw and label the results of her investigation. Give your drawing a heading.
- Sarah mixed four teaspoons of sand with water in a glass.
- Draw and label the results of her investigation. Give your drawing a heading.
- Write a statement about which of these is a solution and why.

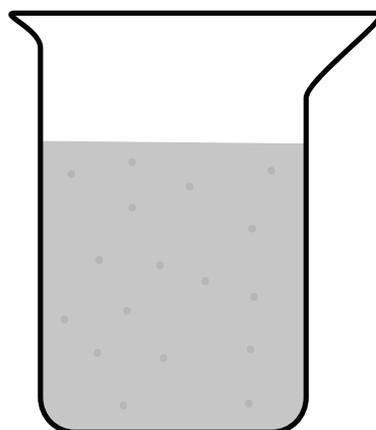
2. Explain the following to the learners:

- Draw the two mixtures and give each drawing a heading.
- Write a statement about which of these is a solution and why.

3. A model answer:

AACHAL'S INVESTIGATION

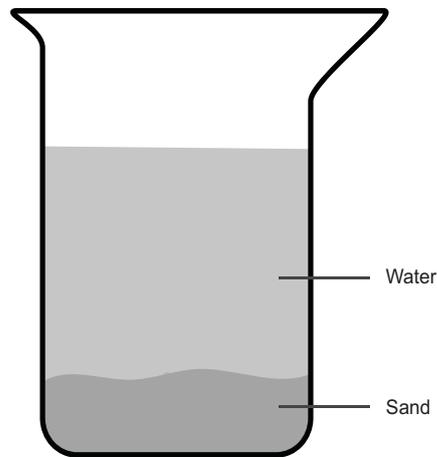
Drawing of a mixture of salt and water



TOPIC: Solutions as special mixtures

SARAH'S INVESTIGATION

Drawing of a mixture of sand and water A model answer:



5. *Aachal's mixture is a solution as the salt dissolves in the water and the mixture is uniform. With Sarah's mixture, the sand does not dissolve in the water and the mixture is not uniform; therefore, the mixture is not a solution.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- Will flour and water make a solution?
- Will maize meal and water make a solution?

Answers to the checkpoint questions are as follows:

- No, flour does not dissolve in water.
- No, maize meal does not dissolve in water.

4. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	65-66
Viva	Solutions as special mixtures	63-65
Platinum	Solutions as special mixtures	70-71
Solutions for All	Solutions as special mixtures	107
Day-by-Day	Solutions as special mixtures	76-77
Oxford	Solutions as special mixtures	56-57
Spot On	Solutions as special mixtures	37
Top Class	Solutions as special mixtures	58-59
Sasol Inzalo Bk A	Solutions as special mixtures	134-141

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <http://www.tomnewbyschool.co.za/wp-content/uploads/2016/04/Grd-6-NS-TECH-T2-2016-approved.pdf> [Thomas Newby Gr 6 Term 2]
2. <https://goo.gl/ty15pc> [Solutions]
3. <https://k12opened.com/ebooks/sci/ebook-mixtures-solutions/index.html> [Mixtures and solutions]

3 A

Term 2, Week 3, Lesson A

Lesson Title: Solutes can dissolve

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Solutions
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe the uniformity of solutions
- contrast mixtures that are not uniform.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Three beakers, sand, oil, salt, water, teaspoons	Glasses instead of beakers

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

If a solution has a uniform appearance, what does this mean?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

It means that the solution looks the same throughout.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLUBLE SUBSTANCES

1. Solids can be **soluble** or **insoluble**.
2. A soluble solid will dissolve in water.
3. Salt and sugar are soluble in water.
4. When a solid is soluble in a liquid, the appearance of the solution will be uniform.
5. It will look the same throughout the mixture.
6. The salt or the sugar is called the **solute**.
7. The solute is the solid that dissolves in the liquid.
8. The water is called the **solvent**.
9. The solvent is the liquid in which the solid dissolves.
10. The mixture of the solute and the solvent is called the solution.

DEFINITIONS

1. A solute is what we call the solid or liquid that dissolves in a liquid.
2. A solvent is what we call the liquid in which the solid (solute) dissolves.
3. The mixture of a solute and a solvent is called a solution.
4. A solid is soluble if it can dissolve in a liquid.
5. A solid is insoluble if it cannot dissolve in a liquid.

TOPIC: Solutions as special mixtures

2. Explain this to the learners as follows:
 - a. Read through the first section on the chalkboard.
 - b. The vocabulary is important in this section of work.
 - c. A solute is what we call the solid or liquid that dissolves in a liquid.
 - d. The solute is the substance that looks as if it has disappeared.
 - e. A solvent is what we call the liquid in which the solid (solute) dissolves.
 - f. The solvent is the substance that you can still see in a solution.
 - g. The mixture of a solute and a solvent is called a solution.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What words do we use to describe the solid that dissolves in liquid?
- b. What is a solution?

Answers to the checkpoint questions are as follows:

- a. We say it is a soluble solid.
- b. A solution is a mixture of a solute and a solvent.

E

CONCEPTUAL DEVELOPMENT

1. Draw the following table on the chalkboard (always try to do this before the lesson starts):

TABLE OF MIXTURES

Complete the table:

Mixture	Is the mixture a solution after stirring? Yes/No	Which substance is the solvent in all the solutions?	Which substance is the solute in all the solutions?
oil and water			
vinegar and water			
sand and water			
sugar and water			
salt and water			

TOPIC: Solutions as special mixtures

2. Explain the following to the learners:
 - a. Remind learners of a previous lesson in which they mixed different solids and liquids.
 - b. The first column has a list of mixtures.
 - c. In the second column, write 'yes' if the mixture is a solution (if the solid dissolves in water); otherwise write 'no'.
 - d. In the next column, state what the solvent is (the liquid in which the solid dissolves) for each solution.
 - e. In the last column, state what the solute is (the solid or liquid that dissolves) for each solution.
3. Give learners time to complete this task in their workbooks.
4. A model answer:

TABLE OF MIXTURES

Mixture	Is the mixture a solution after stirring? Yes/No	Which substance is the solvent in all the solutions?	Which substance is the solute in all the solutions?
oil and water	No		
vinegar and water	Yes	<i>water</i>	<i>vinegar</i>
sand and water	No		
sugar and water	Yes	<i>water</i>	<i>sugar</i>
salt and water	Yes	<i>water</i>	<i>salt</i>

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What is a mixture of salt and water called?
- b. Which is the solvent in this solution?

Answers to the checkpoint questions are as follows:

- a. A mixture of salt and water is called a solution.
- b. Water is the solvent in this solution.

5. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	67
Viva	Solutions as special mixtures	63
Platinum	Solutions as special mixtures	72-73
Solutions for All	Solutions as special mixtures	107
Day-by-Day	Solutions as special mixtures	78
Oxford	Solutions as special mixtures	56-57
Spot On	Solutions as special mixtures	36
Top Class	Solutions as special mixtures	58-61
Sasol Inzalo Bk A	Solutions as special mixtures	134-142

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/brzXzZ> (4min 10sec) [The Great Picnic Mix-up]
2. <https://goo.gl/HUHP3v> (6min 33sec) [Solution Solvent Solute]
3. <https://goo.gl/8jZgJz> [Solutions]

3 B

Term 2, Week 3, Lesson B

Lesson Title: Separating solutions

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Soluble substances
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- state which solutes can be separated from solvents
- investigate solutions to see if the solute can be separated.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
A beaker or a glass, water, sugar, salt, teaspoons, evaporating dish, a Bunsen burner, matches	saucer, gas burner

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Is water a solvent or a solute?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Water is a solvent as substances dissolve in it.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SEPARATING SOLUTIONS

1. The different substances in a solution have different properties.
2. They can be separated.
3. Hand sorting, sieving, decanting, filtering and settling are not suitable for separating solutions.
4. The particles in a solution are too small for hand sorting, sieving or filtering.
5. The solid particles do not settle to the bottom for decanting or settling.
6. Evaporation is a process where a liquid is heated so that the liquid changes into a gas.
7. This will separate the solid from the liquid.
8. This is how salt is separated from sea water.

TOPIC: Solutions as special mixtures

2. Explain this to the learners as follows:
 - a. Separating a solid from the solvent in a solution cannot be done by hand sorting, sieving or filtering.
 - b. The particles are too small.
 - c. Evaporation is a separation process.
 - d. When the solution is heated, the liquid turns into a gas.
 - e. The solid is left behind.
 - f. The solid forms crystals.
 - g. This is known as crystallisation.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. Can you name a method of separation that will not work for a solution?
- b. Can you name a separation method that will work to separate a solid from a liquid in a solution?

Answers to the checkpoint questions are as follows:

- a. Either of the following: hand sorting, sieving, filtering, decanting or settling
- b. Evaporation will separate a solid from a liquid in a solution.

E

CONCEPTUAL DEVELOPMENT

1. Activity: Investigate solutions to see if the solute can be recovered by evaporation.
Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATION

YOU WILL NEED:

a beaker or a glass
water
sugar
teaspoon
evaporating dish or a saucer
a Bunsen burner
matches.

METHOD 1

1. Make a solution from three teaspoons of sugar and a small amount of warm water.
2. Place the dish on a sunny window sill.
3. Check the dish every day until all the water has evaporated.

TOPIC: Solutions as special mixtures

METHOD 2

1. Make a sugar solution.
2. Your teacher will place the sugar solution in a dish on a tripod over the Bunsen burner.
3. The solution will be heated slowly until all the liquid has changed into a gas.

2. Explain the following to the learners:
 - a. The first method of using the sun for evaporation can be done by the learners.
 - b. The second method of separation done by boiling will need to be a teacher demonstration.
3. Activity: Evaporation as a separation process
Write the following on the chalkboard (always try to do this before the lesson starts):

EVAPORATION AND BOILING AS A SEPARATION PROCESSES

1. What was left at the bottom of the evaporation dish after these two methods of separation were used?
2. Which method was the best and why?

4. Explain the following to the learners:
 - a. Answer the two questions.
 - b. The second question needs a reason.
5. A model answer:

EVAPORATION AND BOILING AS A SEPARATION PROCESSES

1. Sugar crystals were left at the bottom.
2. Either of the following:
 - Evaporation is the best method as little equipment is needed.
 - Boiling is the best method as it is much faster than evaporation.

6. Repeat the process with a salt solution.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can a solute be separated from a solvent by evaporation: True or False?
- b. Can a solute be separated from a solvent by hand sorting: True or False?

Answers to the checkpoint questions are as follows:

- a. True
- b. False. The particles are too small for hand sorting.

7. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	68-71
Viva	Solutions as special mixtures	64-65
Platinum	Solutions as special mixtures	74-77
Solutions for All	Solutions as special mixtures	107-108
Day-by-Day	Solutions as special mixtures	79-81
Oxford	Solutions as special mixtures	60
Spot On	Solutions as special mixtures	37
Top Class	Solutions as special mixtures	60-61
Sasol Inzalo Bk A	Solutions as special mixtures	22-23

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/uNnVff> (5min 12 sec) [Science - separation and mixtures]
2. <https://goo.gl/ja8tyf> (6min 24sec) [Science - separating substances]
3. <https://goo.gl/kS37Js> (4min 11sec) [Methods of separating substances from mixtures]

3 C

Term 2, Week 3, Lesson C
Lesson Title: Crystallisation
Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Soluble substances
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- draw and write about crystallization
- give examples of solutions that will crystallise.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	✓	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas		Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Sugar; water; saucepan; wooden spoon; medium-sized glass jar; cotton string long enough to hang in the jar; screw to hold the string down; pencil to tie the string to; wax paper	Use newspaper instead of wax paper.
Resource Page 5: Making crystals	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What method of separation is used to separate a solute from a solution?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Either answer: Evaporation or boiling are methods of separating a solute from a solution.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

CRYSTALLISATION

1. Crystallisation is the process of forming crystals from a solution.
 2. Evaporation is a process where liquid is heated so that the liquid changes to a gas.
 3. The solvent evaporates.
 4. Crystals of the solute are left behind.
2. Explain this to the learners as follows:
 - a. In the previous lesson, they learnt about the process of separation by evaporation or boiling.
 - b. Evaporation is when the solution is heated to that the liquid changes to a gas and leaves crystals of the solute behind.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What do we call the process of forming crystals from a solution?
- b. What separation method do we use for this?

Answers to the checkpoint questions are as follows:

- a. This is called crystallisation.
- b. We use evaporation for crystallisation.

E CONCEPTUAL DEVELOPMENT

1. Activity: Investigation: making crystals.

Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATION MAKING CRYSTALS

YOU WILL NEED:

two cups of sugar
one cup of water
saucepan
wooden spoon
medium-sized glass jar
cotton string long enough to hang in the jar
screw to hold the string down
pencil to tie the string to
wax paper.

METHOD 1

1. Place water in the saucepan and bring to the boil.
2. Add sugar and stir continually.
3. Stir until the mixture becomes clear.
4. Pour slowly into the glass jar.
5. Tie the string to the pencil.
6. Tie the screw to other end of the string.
7. Dip the string into the jar for a few minutes.
8. Take out and place it on the wax paper to dry.
9. Dip the string in the mixture again.
10. Place the jar on the window sill. It is important that you do not touch the string.
11. Leave for 24 hours.

TOPIC: Solutions as special mixtures

2. Explain the following to the learners:
 - a. The method written on the chalkboard is aimed at making sugar crystals.
 - b. An adult must be present at all times, as water will be brought to boiling point.
 - c. This can be done as a teacher demonstration.
 - d. Show the learners Resource Page 5: 'Making crystals'.
 - e. Explain how the string must have a pencil attached on one end to keep the one end of the string out of the jar.
 - f. The other end must be attached to a screw to keep the string in the solution.
 - g. The picture shows the sugar crystals that you should get after leaving the solution for 24 hours.
3. Activity: Draw the crystal-making process.

Write the following on the chalkboard (always try to do this before the lesson starts):

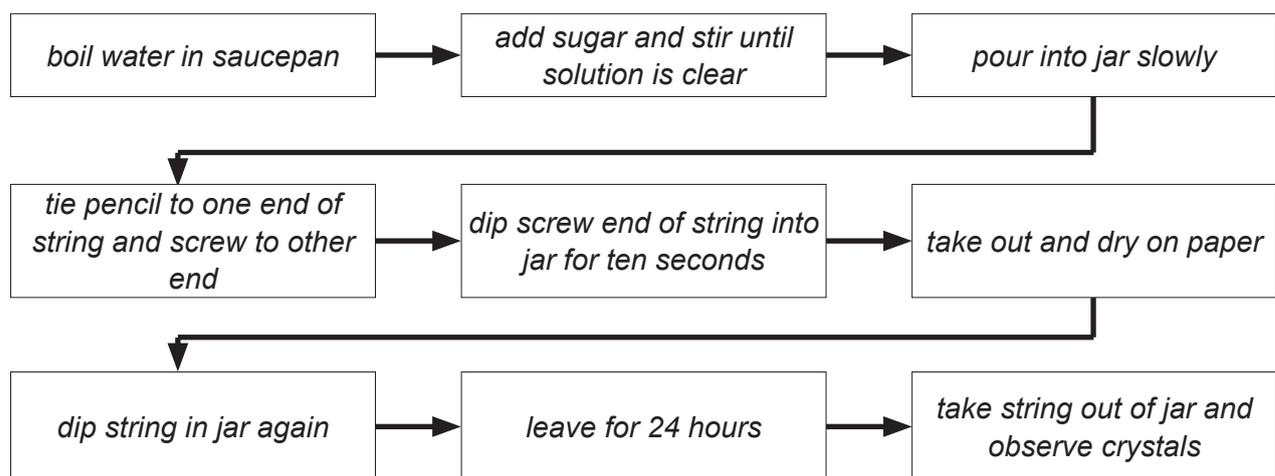
THE CRYSTAL MAKING PROCESS

1. Draw a flow diagram to show the method to make crystals.
2. Draw the crystals that were formed by the investigation.

4. Explain the following to the learners:
 - a. Draw a flow diagram showing the process of making crystals.
 - b. Learners can only draw the crystals that were formed, in the next lesson. .
5. A model answer:

THE CRYSTAL MAKING PROCESS

- a. Flow Diagram of the Making of Sugar Crystals



TOPIC: Solutions as special mixtures

b. Drawing of sugar crystals:



Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What is the solvent in the solution for making sugar crystals?
- b. What is the solute in the solution for making sugar crystals?

Answers to the checkpoint questions are as follows:

- a. Water is the solvent used for the solution for sugar crystals.
- b. Sugar is the solute used for the solution for sugar crystals.

7. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	67
Viva	Solutions as special mixtures	-
Platinum	Solutions as special mixtures	-
Solutions for All	Solutions as special mixtures	108
Day-by-Day	Solutions as special mixtures	81
Oxford	Solutions as special mixtures	60-61
Spot On	Solutions as special mixtures	-
Top Class	Solutions as special mixtures	61-62
Sasol Inzalo Bk A	Solutions as special mixtures	22-23

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/Ce5YTz> (1min) [Crystallisation]
2. <https://goo.gl/r5YxiB> (4min 58sec) [Crystallisation]
3. <https://www.education.com/science-fair/article/sugar-crystallization> [Crystallisation]

4 A

Term 2, Week 4, Lesson A

Lesson Title: Soluble particles

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Soluble substances
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- draw and write about crystallization
- give examples of solutions that will crystallise.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	✓	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts		Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas		Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 7: Soluble particles	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What method of separation is used to make crystals?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Evaporation is used to make crystals.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLUBLE PARTICLES

1. In a solution, the salt is the solute and water is the solvent.
 2. When the salt dissolves in the water, it seems as if the salt disappears.
 3. We can taste that the salt is there.
 4. The solute (salt) particles are spread in between the particles of water (solvent).
2. Explain this to the learners as follows:
 - a. In a solution, it seems as if the solute disappears into the solvent.
 - b. In a solution, the solute particles are spread between the solvent particles.
 - c. Show learners Resource Page 7: 'Soluble particles'.
 - d. A salt solution and a sugar solution are examples.
 - e. Evidence of the salt and sugar still being in the solution is that we can taste them.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- How do we know that salt particles are soluble?
- How do we know that salt is still in a salt solution even if we cannot see it?

Answers to the checkpoint questions are as follows:

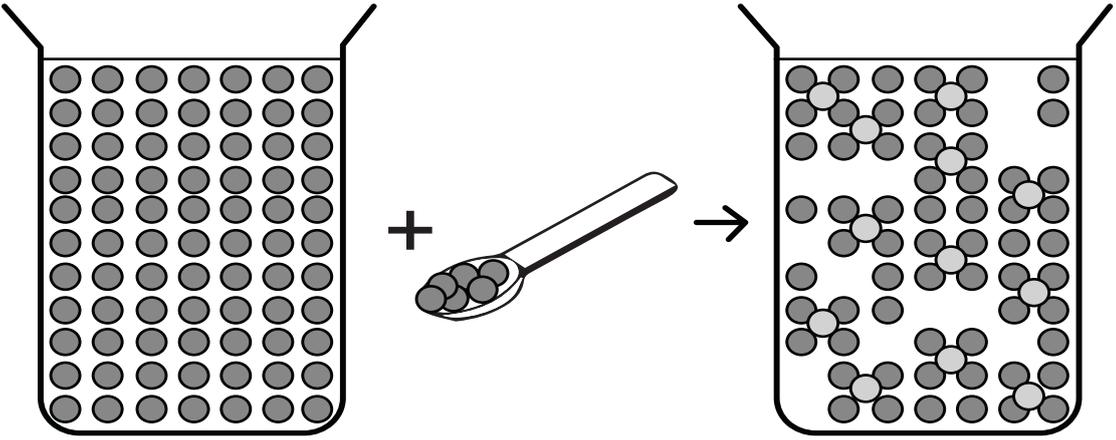
- The salt dissolves in the water.
- We can taste the salt.

E CONCEPTUAL DEVELOPMENT

1. Activity: Soluble particles

Draw the following on the chalkboard (always try to do this before the lesson starts):

SOLUBLE PARTICLES



Water particles Salt particles Salt & water particles

Salt particles move into the spaces between water particles

2. Explain the following to the learners:

- When salt (the solute) is dissolved in water (the solvent), the salt is not visible.
- The salt particles are **dispersed** between the water particles.
- Remind learners that substances in a solution cannot be separated by physical means, like hand sorting, sieving, filtering, settling or decanting.
- Substances can be separated by evaporation or boiling.
- Ask the learners to draw the diagram in their workbooks.

3. Give learners time to complete this activity in their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What separation methods would not work for a solution?
- b. What separation methods will work for a solution?

Answers to the checkpoint questions are as follows:

- a. Any of the physical methods such as hand sorting, sieving, filtering, settling or decanting
- b. Evaporation and boiling are methods used to separated solutions.

4. Ask the learners if they have any questions and provide answers and explanations.

F

REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	67
Viva	Solutions as special mixtures	63
Platinum	Solutions as special mixtures	-
Solutions for All	Solutions as special mixtures	108
Day-by-Day	Solutions as special mixtures	81
Oxford	Solutions as special mixtures	60
Spot On	Solutions as special mixtures	-
Top Class	Solutions as special mixtures	61
Sasol Inzalo Bk A	Solutions as special mixtures	139-141

G

ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/pqAFZx> (1min 50sec) [Soluble and insoluble]
2. <https://goo.gl/R6MdAL> (4min 9sec) [What happens when stuff dissolves?]

4 B

Term 2, Week 4, Lesson B

Lesson Title: Saturated solutions

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Soluble substances
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe a saturated solution
- demonstrate how to make a saturated solution.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	✓	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Salt, teaspoons, water, a glass beaker	a glass

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Which two separation methods would you use to separate a solution?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

I would use evaporation and boiling to separate a solution.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SATURATED SOLUTIONS

1. When the particles of a solute spread throughout the particles of a solvent, we say the solute **dissolves** in the solvent.
 2. This is called a solution.
 3. If more and more solute is mixed into the solution, the solute begins to settle at the bottom.
 4. We say the solution has become **saturated**.
 5. More solute can be dissolved in a solvent that is heated than in a cold solvent.
 6. A saturated solution is one that has no more space for any more particles of the solute.
2. Explain this to the learners as follows:
 - a. A solution is saturated when no more solute can dissolve in it.
 - b. When solute starts collecting at the bottom of a beaker, then the solution has become saturated.
 - c. More salt can dissolve in hot water than in cold water.
 - d. More sugar can dissolve in hot water, like tea, than in cold water.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is a solution?
- b. What is a saturated solution?

Answers to the checkpoint questions are as follows:

- a. A solution is made up of a solute dissolved in a solvent.
- b. A saturated solution is when there is no more space in the solvent for any more particles of the solute.

E

CONCEPTUAL DEVELOPMENT

1. Activity: Make a saturated solution of salt.

Write the following on the chalkboard (always try to do this before the lesson starts):

MAKE A SATURATED SOLUTION OF SALT

YOU WILL NEED:

salt
teaspoons
water
a glass beaker

METHOD 1

1. Fill the beaker a quarter full with water.
2. Add flat teaspoons of salt one by one to the water, stirring after each teaspoonful has been added.
3. Count the number of teaspoons of salt that you have added until the salt does not dissolve anymore.
4. When the salt does not dissolve any more, it will start settling on the bottom of the beaker.
5. This is a saturated solution.

2. Explain the following to the learners:
 - a. This activity can be done as a teacher demonstration or with learners in groups.
 - b. Read through the list of what is needed and the method.
 - c. The number of teaspoons of salt must be recorded (this can be done on the chalkboard if the teacher demonstrates, or in workbooks if learners are working in groups).
 - d. After each teaspoon is added, the solution must be stirred until the salt is dissolved.
 - e. When the salt cannot dissolve any more, then stop adding more salt.

TOPIC: Solutions as special mixtures

3. Activity: Make a saturated solution of salt with a heated solvent.

Write the following on the chalkboard (always try to do this before the lesson starts):

MAKE A SATURATED SOLUTION OF SALT

YOU WILL NEED:

salt
teaspoons
water
a glass beaker
a Bunsen burner with a tripod

METHOD

1. Fill the beaker a quarter full with water.
 2. Heat the water over a Bunsen burner until the water boils.
 3. Take the beaker off the Bunsen burner.
 4. Add flat teaspoons of salt one by one to the water, stirring after each teaspoonful has been added.
 5. Count the number of teaspoons of salt that you have added until the salt does not dissolve any more.
 6. When the salt does not dissolve any more, it will start settling on the bottom of the beaker.
 7. This is a saturated solution.
4. Explain the following to the learners:
- a. This activity can be done as a teacher demonstration or with learners in groups.
 - b. Read through the list of what is needed and the method.
 - c. If there is no Bunsen burner, water can be heated in a kettle.
 - d. If you use a Bunsen burner, be very careful of the beaker and boiling water.
 - e. The beaker needs to be taken carefully off the Bunsen burner.
 - f. The number of teaspoons of salt must be recorded (this can be done on the chalkboard if the teacher is demonstrating, or in workbooks if learners are working in groups).
 - g. After each teaspoon is added, the solution must be stirred until the salt is dissolved.
 - h. When the salt cannot dissolve any more, then stop adding more salt.
 - i. Compare the number of teaspoons of salt that make a saturated solution in cold water to that of heated water.
 - j. Learners must write a conclusion in their workbooks.

TOPIC: Solutions as special mixtures

5. Activity: Write a conclusion

Write the following on the chalkboard:

CONCLUSION:

6. Explain the following to the learners:

- a. Write a conclusion about the saturated solutions in cold water and in heated water.

7. A model answer:

CONCLUSION

The saturated solution that was heated had three more teaspoons of salt added to it, compared to the saturated solution with cold water.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. When is a solution saturated?
- b. Can you name a solute that you used to dissolve in water to make a saturated solution?

Answers to the checkpoint questions are as follows:

- a. A solution is saturated when it cannot hold any more solute (the extra solute will settle at the bottom of the beaker).
- b. We used salt to make a saturated solution.

8. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	71
Viva	Solutions as special mixtures	70
Platinum	Solutions as special mixtures	80
Solutions for All	Solutions as special mixtures	109-112
Day-by-Day	Solutions as special mixtures	82
Oxford	Solutions as special mixtures	62-63
Spot On	Solutions as special mixtures	38
Top Class	Solutions as special mixtures	63
Sasol Inzalo Bk A	Solutions as special mixtures	145-147

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/aKXRWh> (37sec) [Unsaturated solutions and saturated solutions]
2. <https://goo.gl/ETjpYa> (3min 33sec) [Saturated solutions]
3. <https://goo.gl/mdK2Us> (1min 12sec) [Saturated and unsaturated solutions]

4 C

Term 2, Week 4, Lesson C

Lesson Title: Insoluble substances

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Insoluble substances
CAPS Page Number	53

Lesson Objectives

By the end of the lesson, learners will be able to:

- define what an insoluble substance is
- describe how to find out whether a substance is insoluble.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	✓	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Solutions as special mixtures

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 8: Insoluble substances	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is a saturated solution?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

A saturated solution is when there is no more space in the solvent for any more particles of the solute.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

INSOLUBLE SUBSTANCES

1. There are many substances that do not dissolve in liquid.
 2. Sand does not dissolve in water.
 3. Oil does not dissolve in water.
 4. We describe these solids as 'insoluble'.
2. Explain this to the learners as follows:
 - a. In lesson 2A, learners wrote down information about separating mixtures by physical means.
 - b. These methods were hand sorting, sieving, filtering, settling, filtering and decanting.
 - c. Remind the learners of these different separation methods.
 - d. These methods separate mixtures that have an insoluble solid mixed with another substance.
 - e. Show the learners Resource Page 8: 'Insoluble substances'.
 - f. The first image is of a muddy river: the sand does not dissolve in the water.
 - g. The second image shows that oil does not dissolve in water.
 - h. Both sand and oil are insoluble solids.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Solutions as special mixtures

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is an insoluble substance?
- b. Can you give an example of an insoluble substance?

Answers to the checkpoint questions are as follows:

- a. It is a substance that does not dissolve in water.
- b. Any appropriate answer: examples are oil and sand.

E CONCEPTUAL DEVELOPMENT

1. Activity: Filtering an insoluble solid from a liquid.

Write the following on the chalkboard (always try to do this before the lesson starts):

FILTERING AN INSOLUBLE SOLID FROM A LIQUID

YOU WILL NEED:

two beakers
filter paper
a funnel
flour
water

METHOD

1. Make a solution of one teaspoon of flour and 20 ml of water.
2. Stir the solution for one minute.
3. Place the filter paper in the funnel.
4. Place the funnel over the second beaker.
5. Pour the flour and water solution through the funnel.

QUESTIONS

1. What is left on the filter paper?
2. What does the water look like that has gone through the filter?

2. Explain the following to the learners:
 - a. Read through the activity with the learners.
 - b. This can be done as a teacher demonstration or by arranging learners in groups of four to six.
 - c. The solution of flour and water must be well stirred before putting it through the funnel.
 - d. When they have finished the activity, the learners must answer the questions in their workbooks.

TOPIC: Solutions as special mixtures

3. A model answer:

FILTERING AN INSOLUBLE SOLID FROM A LIQUID

1. *Flour is left on the filter paper.*
2. *The water is much clearer than when it was mixed with the flour.*

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you name two ways of separating an insoluble solid from a liquid?
- b. What separation method would you use to separate flour and water?

Answers to the checkpoint questions are as follows:

- a. Filtering and settling are two ways of separating an insoluble solid from a liquid.
- b. Filtering is the method used for separating flour and water.

3. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Solutions as special mixtures

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Solutions as special mixtures	72-74
Viva	Solutions as special mixtures	71-72
Platinum	Solutions as special mixtures	-
Solutions for All	Solutions as special mixtures	115-119
Day-by-Day	Solutions as special mixtures	83
Oxford	Solutions as special mixtures	64-65
Spot On	Solutions as special mixtures	39
Top Class	Solutions as special mixtures	64
Sasol Inzalo Bk A	Solutions as special mixtures	149-150

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <http://k8schoollessons.com/insoluble-and-soluble-materials/> [Insoluble and soluble materials]
2. <https://goo.gl/5YSHta> (5min 50sec) [Separation techniques for insoluble substances]
3. <https://goo.gl/LGxAF7> (2min 20sec) [Dissolving experiment]

TOPIC OVERVIEW:

Dissolving

Term 2, Weeks 5A - 5B

A. TOPIC OVERVIEW

Term 2, Weeks 5a - 5b

- This topic runs for ½ week.
- It is presented over 2 lessons.
- This topic counts for 4% in the mid-year exam.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Rates of dissolving: factors such as temperature, stirring, shaking and the grain size of the solute all affect the rate 	<ul style="list-style-type: none"> • Properties of acids, bases and neutrals

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	rate	How fast something happens
2.	conditions	The state of something according to its appearance, quality and working order

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Understanding the nature of solids, liquids and gases is important for working in the fields of physics and chemistry.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

5 A

Term 2, Week 5, Lesson A

Lesson Title: Factors that affect dissolving

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Rates of dissolving
CAPS Page Number	54

Lesson Objectives

By the end of the lesson, learners will be able to:

- define what dissolving is
- describe how to find out whether solid can dissolve or not.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	✓
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	✓
Recognise relationships between existing knowledge and new ideas		Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Dissolving

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Two glass beakers, water, fine salt, coarse salt, teaspoon, measuring cylinder (250ml), watch or clock with a second hand or stopwatch	Use a cellphone as a stopwatch; use jam jars for glass beakers, use a teacup to measure 250 ml.

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Is oil a soluble substance?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

No, oil does not dissolve in water so it is insoluble.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

FACTORS AFFECTING THE RATE OF DISSOLVING

1. When salt is added to water, the salt dissolves.
2. How quickly the salt dissolves in the water is called the **rate** of dissolving.
3. Stirring can make sugar dissolve in tea faster than without stirring.
4. Heating up the solution can increase the speed at which the solute dissolves.
5. Heating a solution adds energy to the particles of the substances.
6. This makes the particles move faster.
7. It also allows the particles of the solute to disperse faster through the solvent.
8. Sugar will dissolve quickly in hot tea but slowly in cold water.
9. The grain size of the solute can also affect the rate of dissolving.
10. The larger the grain size the slower the rate of dissolving.
11. Coarse salt will dissolve at a slower rate than fine salt.

2. Explain this to the learners as follows:
 - a. Remind the learners that, when a solute dissolves in a solvent, the solute particles move in between the solvent particles.
 - b. We cannot see the salt because it has dissolved.

TOPIC: Dissolving

- c. We can taste the salt in the water.
 - d. The rate of dissolving means how fast a solute will dissolve in a solvent.
 - e. Three things affect the rate that a solid will dissolve in a liquid: stirring, heating and grain size.
 - f. Read through the information on the chalkboard explaining these three things.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is meant by 'rate'?
- b. Can you name three things that can affect the rate of dissolving?

Answers to the checkpoint questions are as follows:

- a. Rate means how fast something happens.
- b. Stirring, heating and grain size can affect the rate of dissolving.

E CONCEPTUAL DEVELOPMENT

1. Activity: Investigate how grain size affects the rate of dissolving.

Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATE HOW GRAIN SIZE AFFECTS THE RATE OF DISSOLVING

YOU WILL NEED:

two beakers
water
fine salt
coarse salt
teaspoon
measuring cylinder (250ml)
watch or clock with a second hand or stopwatch.

METHOD 1

1. Use the measuring cylinder to pour exactly 200 ml of water into each of the two beakers.
2. Measure a flat teaspoon (5ml) of fine salt.
3. Add it to the first beaker.
4. Stir the solution and time how long it takes for all the salt to dissolve.
5. Record the time in minutes and seconds.
6. Repeat the above four steps but use coarse salt.

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- Copy and complete the table in your workbooks.
- Write a conclusion by completing the sentence.

TABLE OF RESULTS

Type of Salt	Time taken to dissolve
fine salt	
coarse salt	

CONCLUSION

- The fine salt dissolved in ___ minutes and ___ seconds.
- The coarse salt dissolved in ___ minutes and ___ seconds.
- Therefore the ___ salt took the shortest time to dissolve.
- The ___ salt had the fastest rate of dissolving.

- Explain the following to the learners:
 - This can be done in groups or as a teacher demonstration.
 - Gather all the equipment first.
 - They should draw the table in their workbooks before they start.
 - To make this a fair test, the amount of salt must be the same.
 - Accurate recording of time is important: start timing as soon as the salt is tipped into the beaker.
 - Learners must write the conclusion by completing the sentences in their workbooks.
- Times for the table will differ. The coarse salt will take longer to dissolve.
- Model answer for the conclusion:

CONCLUSION

(Times must be taken from the recorded times on the table.)

- Therefore, the fine salt took the shortest time to dissolve.*
- The fine salt had the fastest rate of dissolving.*

TOPIC: Dissolving

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- Coarse salt will dissolve faster than fine salt: True or False?
- In the experiment, the same amount of water had to be used in both beakers. Why?

Answers to the checkpoint questions are as follows:

- False. Fine salt will dissolve faster than coarse salt.
- For the experiment to be fair, the same amount of water had to be used.

5. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Dissolving	75-76
Viva	Dissolving	73-75; 77-78
Platinum	Dissolving	81-83
Solutions for All	Dissolving	127-128
Day-by-Day	Dissolving	86-87
Oxford	Dissolving	66-69
Spot On	Dissolving	40-41
Top Class	Dissolving	66-67; 71
Sasol Inzalo Bk A	Dissolving	156-160

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

- <http://e-classroom.co.za/wp-content/uploads/2015/05/EngGr6T2-NS-Matter-and-materials-Dissolving-Rates-of-dissolving.pdf> [Dissolving]
- <https://goo.gl/y72oK6> (2min 44sec) [Factors that affect dissolving]
- <https://goo.gl/tEMx7R> (7min 37sec) [Rate of dissolving]

5 B

Term 2, Week 5, Lesson B

Lesson Title: Investigating rates of dissolving

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Rates of dissolving
CAPS Page Number	54

Lesson Objectives

By the end of the lesson, learners will be able to:

- investigate the effects of three factors on the rate of dissolving
- record the results of the investigations in a table
- draw a bar graph to display the results of an investigation.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps		Recognise patterns and trends	✓
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	✓
Recognise relationships between existing knowledge and new ideas		Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Dissolving

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Three beakers, cold water, warm water, hot water, a teaspoon, salt	Glass jars for beakers

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What are the three factors that affect the rate of dissolving?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Stirring, temperature and grain size affect the rate of dissolving.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

A FAIR TEST

1. Scientists plan their investigations carefully.
 2. This means that **conditions** must be the same so that they do not affect the results.
 3. For example, the containers must be the same size.
 4. The same amounts of liquids and solids must be used for each test.
 5. The same samples might need to be tested for the same time.
2. Explain this to the learners as follows:
 - a. To do a scientific investigation, the tests must be fair.
 - b. This means the same amount of liquids and solids should be used.
 - c. If you used twice the amount of salt in the same amount of liquid for a test, it would not be a fair test.
 3. Give learners time to copy this information into their workbooks.

TOPIC: Dissolving

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. In an investigation of the rates of dissolving, the amount of liquid used should be kept the same: True or False?
- b. In an investigation of the rates of dissolving, the amounts of solids used should be kept the same: True or False?

Answers to the checkpoint questions are as follows:

- a. True
- b. True

E

CONCEPTUAL DEVELOPMENT

1. Activity: Investigate how grain size affects the rate of dissolving.

Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATE THE RATE OF DISSOLVING AT DIFFERENT TEMPERATURES

YOU WILL NEED:

three beakers
cold water
warm water
hot water
a teaspoon
salt.

METHOD 1

1. Label the beakers COLD, WARM and HOT.
2. Add 125ml of cold water to the beaker marked COLD.
3. Add one flat teaspoon (5ml) of salt to this beaker.
4. Stir the mixture until all the salt dissolves.
5. Record the time it takes to dissolve fully.
6. Repeat steps 2 to 5 with warm water and hot water.
7. Work carefully and safely with the hot water.
8. Fill the results in on the table.
9. Record how long it takes for all the salt to dissolve.

TOPIC: Dissolving

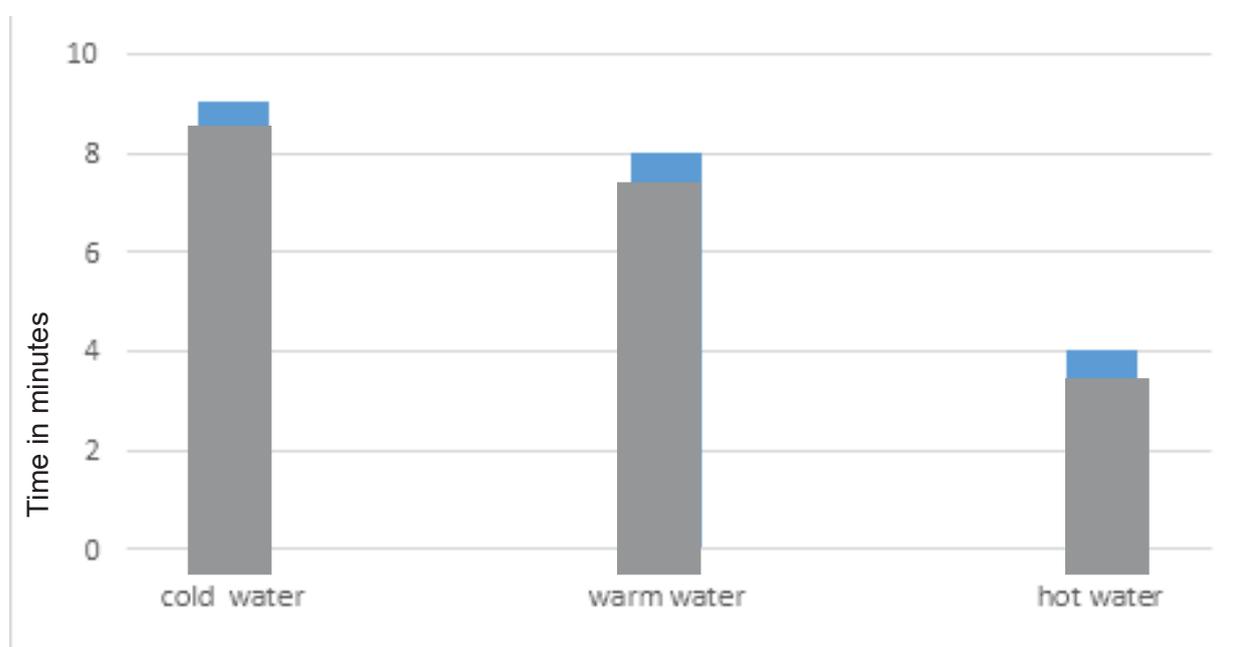
Table to record time taken for salt to dissolve:

Water temperature	Time (minutes and seconds)
cold water	
warm water	
hot water	

10. Write a conclusion in your workbooks.

11. Display the results in a bar graph similar to the one below. Fill in the times from your investigation.

Results of dissolving practical task



2. Explain the following to the learners:
 - a. This investigation can be done by groups of learners or as a teacher demonstration.
 - b. Make sure that the investigation is carried out accurately.
 - c. Learners must draw the table in their workbooks before they start the investigation.
 - d. A conclusion must be written on completion of this investigation.
 - e. Explain to the learners how to draw a bar graph.
 - f. The temperature must be on the vertical axis.
 - g. The types of water must be on the horizontal axis.
 - h. Learners must then fill in the data from their investigations.
 - i. Learners must complete the bar graph by drawing in the bars.
 - j. The left axis must be given a label: Time (minutes).

TOPIC: Dissolving

3. A model answer:

Conclusion:

The rate of dissolving was fastest with the hot water and slowest with the cold water.

4. Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATE THE RATE OF DISSOLVING WHEN A MIXTURE IS STIRRED

YOU WILL NEED:

two beakers
water
a teaspoon
salt.

METHOD 1

1. Label the beakers STIRRED and NOT STIRRED.
2. Add 125ml of water to each beaker.
3. Add one flat teaspoon (5ml) of salt to each beaker.
4. Stir the mixture of the beaker marked STIRRED until all the salt dissolves.
5. Record the time it takes to dissolve fully.
6. Repeat steps 4 to 5 but do not stir the mixture.
7. Write a conclusion in your workbooks.

5. A model answer:

Conclusion:

The rate of dissolving was fastest when the mixture was stirred.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What is the temperature of the water in which salt dissolves at the fastest rate: hot, warm or cold?
- b. What else will make the rate of dissolving faster?

Answers to the checkpoint questions are as follows:

- a. Salt will dissolve the fastest in hot water.
- b. Stirring will make salt dissolve faster.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Dissolving

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Dissolving	77-80
Viva	Dissolving	75-80
Platinum	Dissolving	86-87
Solutions for All	Dissolving	131-143
Day-by-Day	Dissolving	87-90
Oxford	Dissolving	67-6
Spot On	Dissolving	40-41
Top Class	Dissolving	72-73
Sasol Inzalo Bk A	Dissolving	161-169

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/XnmGnV> [Rates of dissolving]
2. <https://goo.gl/BkdK3Y> (1min 34sec) [How water dissolves salt]
3. <https://goo.gl/QjZ7ep> (1min 37sec) [Rate of dissolving wrt temperature]

TOPIC OVERVIEW:

Mixtures as water resources

Term 2, Weeks 5C - 7A

A. TOPIC OVERVIEW

Term 2, Weeks 5c - 7a

- This topic runs for 1½ weeks.
- It is presented over 5 lessons.
- This topic counts for 10% in the mid-year exam.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • Living and non-living things • What plants need to grow 	<ul style="list-style-type: none"> • Water pollution: pollution by insoluble substances, soluble substances, living germs • Importance of wetlands: natural wetlands remove soluble and insoluble substances, regulate flow of water 	<ul style="list-style-type: none"> • Requirements for sustaining life • Sorting and recycling materials • Ecosystems: balance of ecosystems; conservation of ecosystems • Micro-organisms: harmful micro-organisms

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	precious	Of great value, not to be wasted
2.	threat	A person or thing likely to cause damage or danger
3.	essential	Absolutely necessary, or extremely important
4.	suffocate	Die from lack of air or inability to breathe
5.	fertilisers	Substances put into soil to make crops grow
6.	insecticides	Chemicals used to kill insect pests
7.	filter	A sieve that can separate solid substances from a liquid and so making the liquid cleaner
8.	brainstorm	A group discussion to think of as many ideas as you can in order to solve a problem
9.	slogan	Short, catchy saying
10.	visual	A picture or drawing
11.	harm	Cause damage or hurt

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

Water is one of our most precious resources. Our lives depend on the availability of clean water. If we pollute our water, it will not be safe for us to drink. Preventing water pollution is necessary. Wetlands promote biodiversity as they provide habitats to a variety of animals and plants.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

5 C

Term 2, Week 5, Lesson C

Lesson Title: Water pollution

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Water pollution
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- investigate the effects of three factors on the rate of dissolving
- record the results of the investigations in a table
- draw a bar graph to display the results of an investigation.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps		Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	✓	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 9: Water pollution: A river in Grabouw	
Resource Page 10: iSimangaliso Wetland Park	
Resource Page 11: Stop water pollution poster	
Resource Page 12: Water pollution poster	
A piece of A4 blank paper for each pair of learners	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Will sugar dissolve faster in cold water, warm water or hot water?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Sugar will dissolve faster in hot water.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

WATER POLLUTION

1. South Africa is a dry country.
2. Water pollution is when water is made dirty.
3. Polluted water cannot be used as it is unhealthy.
4. South Africa's water is a precious resource.
5. It is under **threat**.
6. Water in an ecosystem is essential because living things need it to live.
7. Water also provides a place to live.
8. There are many water habitats: the ocean, rivers, ponds, wetlands and lakes.

TOPIC: Mixtures as water resources

2. Explain this to the learners as follows:
 - a. South Africa gets an average rainfall of 450mm per year.
 - b. The world average is 860mm per year.
 - c. South Africa gets just over half the world average.
 - d. South Africa's water is a **precious** resource.
 - e. You have already learnt about the importance of water for plants and animals.
 - f. Animals and plants need water to survive.
 - g. We need to look after our water and not pollute it.
 - h. Water in an ecosystem is **essential** because living things need it to live.
 - i. Water also provides a place to live.
 - j. There are many water habitats: the ocean, rivers, ponds, wetlands and lakes.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is water pollution?
- b. Can you name three water habitats?

Answers to the checkpoint questions are as follows:

- a. Water pollution is when water is made dirty.
- b. Any three of the following: the ocean, rivers, ponds, wetlands, lakes.

E CONCEPTUAL DEVELOPMENT

1. Activity: Investigate how grain size affects the rate of dissolving.
Write the following on the chalkboard (always try to do this before the lesson starts):

WATER POLLUTION

1. Water pollution affects drinking water.
2. People can catch diseases and die from drinking polluted water.
3. Cholera and diarrhoea are common diseases caused by polluted water.
4. Keeping our water clean is important for our health.
5. Everyone can get involved in dealing with water pollution.

TOPIC: Mixtures as water resources

ACTIVITY

1. Design a poster to encourage everyone to keep our water clean.
 2. With a friend, **brainstorm** ideas about a poster.
 3. Write down or draw these ideas.
 4. You must have a **slogan**.
 5. A slogan is a short phrase used in advertising.
 6. Make your poster **visual** with not too much writing.
2. Explain to the learners the following:
 - a. A poster can have a lot of impact on the people who read it.
 - b. A poster should have a large drawing and not too much writing.
 - c. Show learners Resource Page 11: 'Stop water pollution poster'.
 - d. If this poster was put up near a river, it would make people think that they should not dump their rubbish into the river.
 - e. Show learners Resource Page 12: 'Water pollution poster'.
 - f. This poster shows that anything put into our rivers will affect our drinking water.
 - g. Let learners work in pairs.
 - h. Give each pair of learners a blank A4 piece of paper on which to draw their poster.
 3. Give learners time to copy the information about water pollution into their workbooks.
 4. Give learners time to design and draw their poster.
 5. When all learners have completed their posters, put these up around the classroom.
 6. These posters could also be put up around the school.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you name one disease that it is possible to get from polluted water?
- b. What is a slogan?

Answers to the checkpoint questions are as follows:

- a. Either cholera or diarrhoea is an acceptable answer.
- b. A slogan is a short phrase used in advertising.

7. Ask the learners if they have any questions and provide answers and explanations

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures and water resources	81
Viva	Mixtures and water resources	82-83
Platinum	Mixtures and water resources	91-92
Solutions for All	Mixtures and water resources	145-147
Day-by-Day	Mixtures and water resources	94
Oxford	Mixtures and water resources	70
Spot On	Mixtures and water resources	42-43
Top Class	Mixtures and water resources	74-75
Sasol Inzalo Bk A	Mixtures and water resources	174-178

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <http://eschooltoday.com/pollution/water-pollution/what-is-water-pollution.html> [Your cool facts and tips on water pollution]
2. <https://goo.gl/CyyCCW> (2min 6sec) [What is pollution?]
3. <https://goo.gl/cdzqG2> (2min 46sec) [Water pollution for kids]
4. <https://goo.gl/ckWUTN> (2min 49sec) [What is pollution? Lessons for kids]

6 A

Term 2, Week 6, Lesson A

Lesson Title: Water pollution: insoluble substances

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Water pollution
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe how insoluble substances pollute our waters
- find ways to lessen the impact of insoluble substances causing water pollution.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 9: A river in Grabouw	
Resource Page 13: A dead bird in an oil spill	
Resource Page 14: A whale caught in a fishing net	
Resource 16: Dead fish and plastic bottles	
A piece of A4 blank paper for each pair of learners	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is water pollution?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Water pollution occurs when water is made dirty.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

INSOLUBLE SUBSTANCES THAT POLLUTE WATER

1. Insoluble substances do not dissolve in water.
2. In water, these substances make the water look dirty and smell bad.
3. Examples are plastic bags, tyres, broken bottles, oil, and tin cans.
4. People pollute water by dumping insoluble waste into rivers, dams or the sea.
5. Plastic waste kills many animals every year.
6. Oil spills from ships pollute the sea and **harm** sea life.
7. Oil does not wash off the birds' feathers.
8. Birds cannot fly with oil on their feathers.
9. They then starve and die.
10. Fish, seals, penguins and whales get tangled in fishing lines.
11. This causes injuries to their bodies.
12. Insoluble substances are visible – you can see that they are waste.

TOPIC: Mixtures as water resources

2. Explain this to the learners as follows:
 - a. Remind learners that they learnt that an insoluble substance is one that will not dissolve in a liquid.
 - b. Insoluble substances cause a lot of water pollution when they are dumped into rivers and the oceans.
 - c. Show learners Resource Page 9: 'A river in Grabouw'.
 - d. Point out all the insoluble substances dumped in the river.
 - e. Show learners Resource Page 14: 'A whale caught in a fishing net'.
 - f. Point out how the fishing net prevented the whale from opening its mouth in order for it to breathe and eat.
 - g. Show learners Resource Page 16: 'Dead fish and plastic bottles'.
 - h. Point out how the water becomes polluted and the habitat for living things is then **threatened**.
 - i. Plastic, oil, glass, and tins are examples of insoluble substances.
 - j. Oil spills from ships cause a lot of water pollution.
 - k. Oil gets onto the wings of water birds and they cannot fly.
 - l. Show learners Resource Page 13: 'A dead bird in an oil spill'.
 - m. Oil also stops oxygen from mixing with the water so fish and mammals die.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. Can you give an example of an insoluble substance that causes water pollution?
- b. What insoluble substance does not wash off birds' feathers?

Answers to the checkpoint questions are as follows:

- a. Any of the following answers are correct: any plastic item, oil, glass, and tins.
- b. Oil does not wash off birds' feathers.

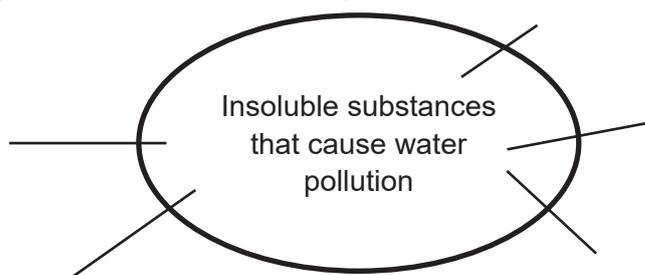
TOPIC: Mixtures as water resources

E CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY: INSOLUBLE SUBSTANCES CAUSE WATER POLLUTION

1. Draw and fill in the diagram below.
2. Add in as many lines as you need.
3. At the end of each line, write in an insoluble substance that pollutes our waters. Write as many insoluble substances as you can.

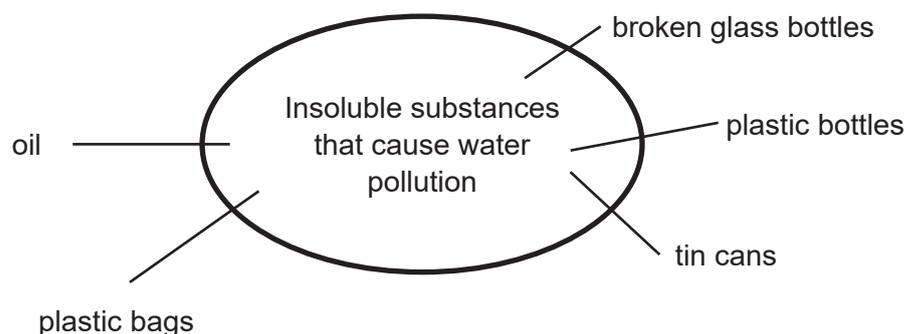


4. Write down two sentences describing two ways in which you could help stop water pollution caused by insoluble substances.

2. Explain the following to the learners:
 - a. Ask learners to draw the diagram and to fill in as many insoluble substances that pollute our waters as possible.
 - b. Learners must then write two sentences with suggestions on what they could do to stop water pollution.
 - c. When learners have completed this activity, discuss the answers in class.
3. A model answer:

ACTIVITY: INSOLUBLE SUBSTANCES CAUSE WATER POLLUTION

1. Answers may vary. Check that all answers are insoluble substances.



4. Discuss the answers that learners have written down. Possible answers are:
 - a. I could get a group of friends, give them gloves and we could do a clean-up.
 - b. We could write a letter to packaging companies asking them to use paper and cardboard for packaging instead of plastic.
 - c. We could put up posters around the school to educate learners about water pollution.

TOPIC: Mixtures as water resources

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you describe how an insoluble substance can kill a whale?
- b. How does an oil spill kill fish?

Answers to the checkpoint questions are as follows:

- a. A fishing net can get caught around the mouth of the whale which will then suffocate or starve.
- b. Oil stops oxygen from mixing with the water, and the fish then suffocate.

5. Ask the learners if they have any questions and provide answers and explanations.

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures and water resources	82
Viva	Mixtures and water resources	84
Platinum	Mixtures and water resources	92-93
Solutions for All	Mixtures and water resources	147
Day-by-Day	Mixtures and water resources	95
Oxford	Mixtures and water resources	71
Spot On	Mixtures and water resources	43
Top Class	Mixtures and water resources	75-76
Sasol Inzalo Bk A	Mixtures and water resources	174-177

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/3eZZao> [e-classroom Water Pollution]
2. <https://goo.gl/mUTvNN> (2min 49sec) [Save water to help the Earth]
3. <https://goo.gl/9pio8D> (1min 55sec) [What is water pollution?]
4. <https://goo.gl/De95sW> (2min 8sec) [The life of water]

6 B

Term 2, Week 6, Lesson B

Lesson Title: Water pollution:soluble substances and germs

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Water pollution
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe how soluble substances and living germs pollute our waters
- find ways to lessen the impact of soluble substances and living germs causing water pollution.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps		Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 15: Dirty water flowing into a river	
Resource 17: Washing on a river bank	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why is an oil spill dangerous for birds?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Oil does not wash off the birds' feathers and then they cannot fly, so they die.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SOLUBLE SUBSTANCES THAT POLLUTE WATER

1. Washing powder and dishwashing liquid are soluble.
2. When these substances go into our natural water, they pollute the water.
3. Farmers use chemical **fertilisers**.
4. These fertilisers make crops grow.
5. Farmers spray chemicals on their crops to kill pests.
6. These chemicals are called **insecticides**.
7. Fertilisers and chemicals dissolve in rainwater and get washed into rivers and the ocean.
8. These soluble substances pollute water and kill many animals that live in water habitats.
9. Factories and mines produce waste materials that pollute water.
10. These waste materials contain acid and other poisonous substances.
11. Living organisms are harmed by these poisonous substances.

TOPIC: Mixtures as water resources

2. Explain this to the learners as follows:
 - a. Living organisms are affected by water pollution.
 - b. Harmful substances get washed into rivers and oceans.
 - c. These poisonous substances harm and also kill living organisms.
 - d. Show learners Resource Page 17: 'Washing on a river bank'.
 - e. Washing powder gets mixed into the water and this pollutes the river.
 - f. Washing needs to be done elsewhere and the dirty water should not be thrown into the river.
 - g. Show learners Resource Page 15: 'Dirty water flowing onto a river'.
 - h. Factories put a lot of polluted water back into our rivers.
 - i. The water needs to be treated before this happens.
 - j. Read through the information on the chalkboard.
 - k. Make sure the learners understand this information.
3. Give learners time to copy this information into their workbooks.
4. Write the following on the chalkboard (always try to do this before the lesson starts):

GERMS THAT POLLUTE WATER

1. Germs are living organisms that cannot be seen.
2. In many places in South Africa, there are no proper toilets or washing facilities.
3. Human waste gets dumped or washed into nearby rivers.
4. Human waste has living germs that can cause diseases.
5. Diarrhoea and cholera can occur.

5. Explain this to the learners as follows:
 - a. Germs are living creatures that are invisible.
 - b. Germs in drinking water cause diseases.
 - c. Diarrhoea causes a person to lose lots of water.
 - d. Young children can die from this.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What two things do farmers use that pollute water?
- b. Can you name one disease that is caused by polluted water?

Answers to the checkpoint questions are as follows:

- c. Farmers use fertilisers and insecticides which pollute water.
- d. Either of the following answers: diarrhoea or cholera.

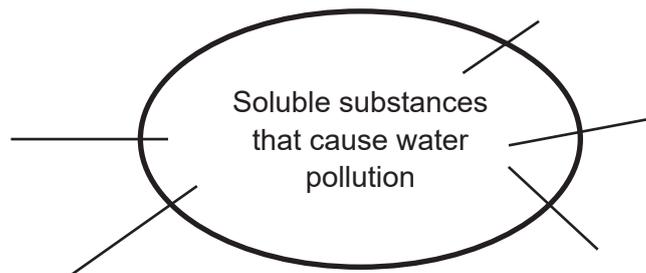
E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY: INSOLUBLE SUBSTANCES CAUSE WATER POLLUTION

1. Draw and fill in the diagram below.
2. Add in as many lines as you need.
3. At the end of each line, write in an insoluble substance that pollutes our waters. Write as many insoluble substances as you can.

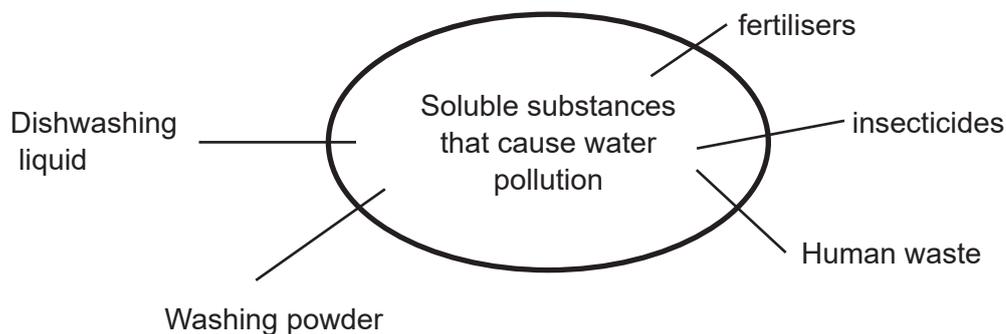


4. Write down two sentences describing two ways in which people could help stop water pollution caused by soluble substances or germs.

2. Explain the following to the learners:
 - a. Ask learners to draw the diagram and to fill in as many soluble substances that pollute our waters as possible.
 - b. Learners must then write two sentences with suggestions on what they could do to stop water pollution caused by soluble substances or germs.
 - c. When learners have completed this activity, discuss the answers in class.
3. A model answer:

ACTIVITY: INSOLUBLE SUBSTANCES CAUSE WATER POLLUTION

1. Answers may vary. Check that all answers are insoluble substances.



2. Discuss the answers that learners have written down. Possible answers are:
 - a. People could use as little soap and detergents as possible.
 - b. Farmers need to use as little fertiliser and insecticides as possible.
 - c. Farmers should try to use natural fertilisers and insecticides instead of chemical ones.

TOPIC: Mixtures as water resources

- d. Children must not play or drink polluted water.
- e. Everyone must wash their hands with soap after going to the toilet.
- f. Broken toilets should be reported.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you name two soluble substances that pollute our water?
- b. Can you give one action that can be taken with soluble substances to make our waters less polluted?

Answers to the checkpoint questions are as follows:

- a. Any of the following two: washing powder, dishwashing liquid, human waste, insecticides, and fertilisers.
- b. Any one of the following: People could use as little soap and detergents as possible; farmers need to use as little fertiliser and insecticides as possible; farmers should try to use natural fertilisers and insecticides, instead of chemical ones; and broken toilets should be reported.

- 4. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures and water resources	82-83
Viva	Mixtures and water resources	83-84
Platinum	Mixtures and water resources	94-95
Solutions for All	Mixtures and water resources	147-152
Day-by-Day	Mixtures and water resources	95-97
Oxford	Mixtures and water resources	72-73
Spot On	Mixtures and water resources	42-43
Top Class	Mixtures and water resources	76-78
Sasol Inzalo Bk A	Mixtures and water resources	175-177

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/uPpFgG> [Mixtures and water resources]
2. <https://goo.gl/NgBGnJ> (2min 29sec) [Why care about water?]
3. <https://goo.gl/9yPmnH> (4min 15sec) [The basics of freshwater]

6 C

Term 2, Week 6, Lesson C

Lesson Title: Wetlands: removing substances from water

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Importance of wetlands
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe what a wetland is
- describe how wetlands remove harmful substances from water.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 18: The Okavango Delta: Botswana	
Resource Page 19: A natural wetland in Cape Town	
Resource Page 33: How a wetland works	
Resource Page 34: How a wetland works	
Resource Page 35: How a wetland works	
Resource Page 36: How a wetland works	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is one soluble substance that pollutes our waters?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Any of the following answers: fertilisers, insecticides, washing powder, dishwashing liquid.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

WETLANDS

1. A wetland is a flat piece of land covered in shallow pools of water for most of the year.
2. Swamps, vleis and shallow lakes are examples of wetlands.
3. The water can be fresh or salty.
4. Wetlands are the habitat for many animals and plants.
5. They are important centres of biodiversity.
6. Some animals, like crocodiles and frogs, live there all the time.
7. Others, like fish and some birds, visit the area from time to time.
8. Wetlands can be large or small.
9. Wetlands clean our water.

TOPIC: Mixtures as water resources

10. When water passes over a wetland, it slows down.
11. Some of the substances and particles in the water settle on the soil.
12. The plants in the wetland act as a **filter**.
13. They trap the larger dirt particles.
14. In wetlands, substances are separated from water by settling and filtering.

2. Explain this to the learners as follows:
 - a. Wetlands are important as they clean water.
 - b. Wetlands are flat pieces of land that are covered by water.
 - c. They can be large, like the Okavango Swamp.
 - d. They can be small, like a large puddle.
 - e. They are filled with water for most of the year.
 - f. Wetlands are filters.
 - g. The plants trap large particles of dirt in the water.
 - h. The slowing down of the flowing water makes some substances settle on the soil.
 - i. Show learners Resource Page 18: 'The Okavango Delta: Botswana'.
 - j. This is one of the seven natural wonders of Africa.
 - k. It covers a large area.
 - l. Water is cleaned as it moves through the swamp area because the soluble substances settle when the flow of water slows down.
 - m. Show learners Resource Page 19: 'A natural wetland in Cape Town'.
 - n. Point out the plants around the water.
 - o. These plants act as a filter to clean dirty water.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is a wetland?
- b. What two methods of separating do wetlands use to remove substances from water?

Answers to the checkpoint questions are as follows:

- a. A wetland is a flat piece of land that is covered in shallow water for most of the year.
- b. Wetlands separate substances from water by filtering and settling.

TOPIC: Mixtures as water resources

E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY: HOW WETLANDS CLEAN WATER

Rewrite and complete the sentences by choosing a word from the list.

biodiversity, filtering, settling, salty, plants

1. Wetlands are important centres for ____ as many different animals and ____ live there.
2. Wetlands separate substances from the water by ____ and ____.
3. The water in wetlands can be fresh or ____.

2. Explain the following to the learners:

- c. Read through the list of words to make sure the learners understand their meaning.
- d. Learners must rewrite the sentences and underline the word they have chosen.

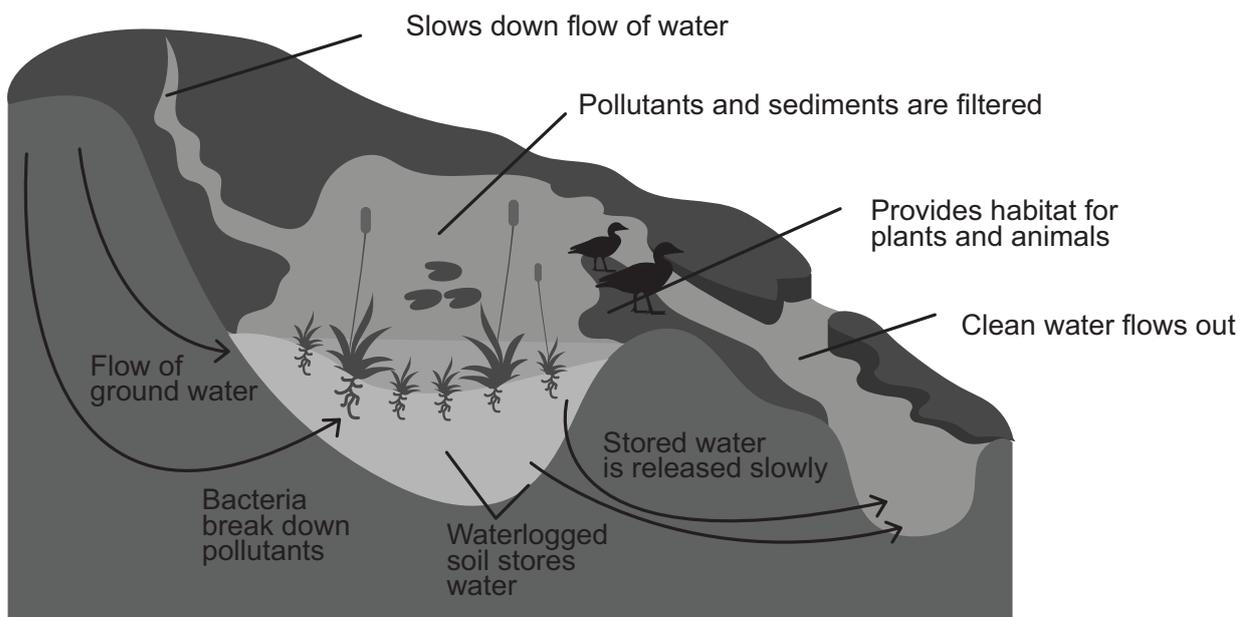
3. A model answer:

ACTIVITY: HOW WETLANDS CLEAN WATER

1. Wetlands are important centres of biodiversity as many different animals and plants live there.
2. Wetlands separate substances from the water by filtering and settling.
3. The water in wetlands can be fresh or salty.

4. Draw the following on the chalkboard (always try to do this before the lesson starts):

HOW A WETLAND WORKS



How a wetland works

TOPIC: Mixtures as water resources

5. Explain this to the learners as follows:
 - a. A wetland slows down the flow of water.
 - b. Insoluble substances are filtered by the plants.
 - c. Particles settle on the soil.
 - d. The soil holds water and stops flooding.
 - e. The stored water is released slowly.
 - f. Learners must do the drawing in their workbooks and include the arrows and labels.
 - g. Their drawing must have a heading.
 - h. Resource Pages 33 – 36 needs to be handed out for learners to copy the drawing.
Draw it onto the chalkboard if you can.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What type of water is found in wetlands?
- b. What two animals live in wetlands all year?

Answers to the checkpoint questions are as follows:

- a. Water found in wetlands is salty or fresh.
- b. Crocodiles and frogs live in wetlands all year.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures and water resources	81-83
Viva	Mixtures and water resources	82-85
Platinum	Mixtures and water resources	92-95
Solutions for All	Mixtures and water resources	146-151
Day-by-Day	Mixtures and water resources	98-99
Oxford	Mixtures and water resources	74-75
Spot On	Mixtures and water resources	42-43
Top Class	Mixtures and water resources	74-77
Sasol Inzalo Bk A	Mixtures and water resources	174-176

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/uPpFgG> [Mixtures and water resources]
2. <https://goo.gl/NgBGnJ> (2min 29sec) [Why care about water?]
3. <https://goo.gl/9yPmnH> (4min 15sec) [The basics of freshwater]

7 A

Term 2, Week 7, Lesson A

Lesson Title: Wetlands: Regulating the flow of water

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Importance of wetlands
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe how wetlands control floods
- name some of South Africa's wetlands

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 18: The Okavango Delta: Botswana	
Resource 19: A wetland area in Cape Town	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What is a wetland?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

A wetland is flat piece of land covered in shallow water for most of the year.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

WETLANDS CONTROL THE FLOW OF WATER

1. The mud and plants in a wetland act like a sponge.
2. They soak up water like a sponge.
3. When there is heavy rain, the wetland holds the water.
4. This prevents places downstream from being flooded.
5. This water slowly leaves the wetland and runs into the river.
6. Wetlands help to keep a steady flow of clean water.
7. They **reduce** the effects of floods and droughts.
8. The help to slow down soil erosion.

2. Explain this to the learners as follows:
 - a. Wetlands soak up water when it rains.
 - b. Long after the rains, the wetlands still hold this water in the soil and plants.
 - c. This water leaves the wetland slowly.
 - d. Wetlands are important as they make water available all year and they lessen the effect of flooding.
 - e. Show learners Resource 18: The Okavango Delta: Botswana.
 - f. The rains arrive in this area in late November and December.

TOPIC: Mixtures as water resources

- g. The Delta contains the water from these rains and releases them slowly throughout the rest of the year.
 - h. Show learners Resource 19: A wetland area in Cape Town.
 - i. This area is important for biodiversity and to clean the water that runs through it.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. How do wetlands act like a sponge?
- b. Can you name two good things that wetlands do?

Answers to the checkpoint questions are as follows:

- a. Wetlands soak up water like a sponge.
- b. Either two of the following: Wetlands help keep a steady flow of water throughout the year; Wetlands help reduce the effect of floods; Wetlands help to slow down soil erosion.

E CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

THREATS TO WETLANDS

1. About half of South Africa's wetlands have been lost.
2. They are often cleared for farmland.
3. Buildings are built on the flat piece of land in cities and towns.
4. The animals have to move away.
5. The plants normally die.
6. This will affect the quality of water in the river.
7. The water will not be as clean.
8. The flow of water will not be steady.

2. Explain the following to the learners:
- a. Wetlands are an important resource as they keep our water clean.
 - b. We need to protect our wetlands.
 - c. If wetlands are lost, then biodiversity will be lost too.

TOPIC: Mixtures as water resources

3. Write the following on the chalkboard (always try to do this before the lesson starts):

TASK: THE IMPACT OF LOSS OF WETLANDS

1. Write a report about the impact of loss of wetlands.
2. Give your report a title.
3. Include the following in your paragraph:
 - what a wetland is
 - why they are important for biodiversity
 - why they are important for water quality
 - why wetlands have been destroyed
 - how this loss affects biodiversity and water quality.

4. Explain the following to the learners:

- e. Wetlands are an important resource as they keep our water clean.
- f. We need to protect our wetlands.
- g. If wetlands are lost, then biodiversity will be lost too.
- h. A report is a piece of writing that states the facts.
- i. Tell learners to collect their facts first.
- j. They can include diagrams.
- k. The report must have a heading and clear paragraphs.
- l. Read through the points to be included in the report to the learners.
- m. If there is a wetland near the school, take the learners out to note the animals and plants that live in the habitats provided by the wetland.
- n. Their report can be written about this particular habitat.

5. A model answer (answers will vary):

REPORT ON THE LOSS OF WETLANDS

A wetland is a flat piece of land covered by water for most of the year. It provides a habitat for many different animals and plants. Wetlands have high biodiversity. Animals like crocodiles and frogs live in wetlands throughout the year. Other animals visit the area at certain times of the year.

Wetlands also clean the water. They are natural filtration systems. Dirty water gets filtered as it moves through plants. Plants trap particles and disease-carrying organisms (germs) which would make the water unsafe.

Wetlands control the flow of water by storing rain water. This water is then released slowly to the rivers. This keeps rivers flowing at a steadier rate throughout the year.

TOPIC: Mixtures as water resources

Nearly half of South Africa's wetlands have been destroyed. Farmers clear the area to plant crops. Builders clear the flat piece of land as it is ideal for shopping centres or other buildings. Without wetlands, the quality of our water will not be as good as wetlands filter dirty water. The habitats of many different animals and plants will be destroyed and this is not good for the environment. It is very important that we protect wetland areas and do not allow them to be destroyed.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you name two reasons why wetlands are destroyed?
- b. If a wetland is destroyed, will the flow of water be steady?

Answers to the checkpoint questions are as follows:

- a. Wetlands are destroyed by farmers to make land available for crops and builders destroy wetlands as they need flat pieces of ground for building.
- b. No, as wetlands control the flow of water so that water flows more steadily.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Mixtures and water resources	83-84
Viva	Mixtures and water resources	85-91
Platinum	Mixtures and water resources	96-99
Solutions for All	Mixtures and water resources	152-154
Day-by-Day	Mixtures and water resources	99
Oxford	Mixtures and water resources	75
Spot On	Mixtures and water resources	44-45
Top Class	Mixtures and water resources	79-80
Sasol Inzalo Bk A	Mixtures and water resources	177-185

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/WeUZ5d> (6min 50sec) [Fabulous Wetlands with Bill Nye the Science Guy]
2. <https://goo.gl/pNh2nc> (3min 44sec) [What makes a wetland a wetland?]
3. <https://goo.gl/WJn3bA> (5min 55sec) [Wetlands SABC Digital News]

TOPIC OVERVIEW:

Processes to purify water

Term 2, Weeks 7B - 8C

A. TOPIC OVERVIEW

Term 2, Weeks 7b - 8c

- This topic runs for 1½ weeks.
- It is presented over 5 lessons.
- This topic counts for 10% in the mid-year exam.
- This topic's position in the term is as follows:

LESSON	WEEK 1			WEEK 2			WEEK 3			WEEK 4			WEEK 5		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
LESSON	WEEK 6			WEEK 7			WEEK 8			WEEK 9			WEEK 10		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C

B. SEQUENTIAL TABLE

GRADE 4 & 5	GRADE 6	GRADE 7 & 8
LOOKING BACK	CURRENT	LOOKING FORWARD
<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • The importance of a clean supply of water to people, plants, animals • Methods of cleaning water: sieving, filtering, settling, decanting, boiling, adding chemicals • Municipal water cleaned before and after use • Design, make and evaluate a water filter 	<ul style="list-style-type: none"> • Micro-organisms: harmful micro-organisms

C. SCIENTIFIC AND TECHNOLOGICAL VOCABULARY

Ensure that you teach the following vocabulary at the appropriate place in the topic:

	TERM	EXPLANATION
1.	purify	Remove dirt from something; to make clean
2.	plant	A place where industrial or manufacturing processes take place
3.	fine	Very thin or narrow; very small particles
4.	sediment	Matter that settles to the bottom of a liquid
5.	aquifers	An underground water supply
6.	murky	Cloudy, not clear
7.	coagulation	A process which leads to solid particles sticking together. Chemicals must first be added.
8.	disinfection	The process of cleaning something to destroy bacteria or germs

D. UNDERSTANDING THE USES / VALUE OF SCIENCE

A clean, unpolluted supply of water is important for all living things. Polluted water increases the risk of disease which would impact heavily on a country's health system. Knowing how to purify water will be hugely beneficial to anyone, in case the need ever arises that a clean supply of water is not easily available.

E. PERSONAL REFLECTION

Reflect on your teaching at the end of each topic:

Date completed:	
Lesson successes:	
Lesson challenges:	
Notes for future improvement:	

7 B

Term 2, Week 7, Lesson B

Lesson Title: The importance of clean water

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Clean water
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- give reasons as to why clean water is important for living things
- list some of the diseases associated with unclean water.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 20: Clean drinking water	
Resource Page 21: Woman carrying water	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Why is it important that a wetland acts like a sponge?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

It is important that a wetland acts like a sponge because it stores water during rains and then releases this water slowly. It regulates the flow of water.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

CLEAN WATER IS IMPORTANT

1. Fresh water is found in streams, rivers and lakes.
2. All other water is either too salty (from the sea), frozen (in glaciers) or stored underground.
3. We can only use 1% of all the water on Earth.
4. Many people on Earth do not have access to clean drinking water.
5. Many people, especially children, die from diarrhoea each year.
6. These deaths could be prevented by increasing access to clean water.
7. Many people have to walk far to fetch clean drinking water.
8. All living things need clean water to survive.
9. Animals need water to digest food and remove waste.
10. Plants need nutrients that have dissolved in the water.

2. Explain this to the learners as follows:
 - a. All living things need clean water to survive.
 - b. We would dehydrate without water and eventually die.
 - c. Show learners Resource Page 20: 'Clean drinking water'.

TOPIC: Mixtures as water resources

- d. Explain that clean drinking water is necessary for survival.
 - e. Many children die from diarrhoea each year.
 - f. They get this disease from drinking dirty water and living in unhygienic conditions.
 - g. Washing hands after going to the toilet is an important habit to get into.
 - h. Plants get some of their nutrients from water.
 - i. Many people on Earth do not have access to clean drinking water.
 - j. Show learners Resource Page 21: 'Woman carrying water'.
 - k. Many people have to walk a long way each day to get clean water.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. Where is fresh water found?
- b. Why do plants need water?

Answers to the checkpoint questions are as follows:

- a. Fresh water is found in streams, rivers and lakes.
- b. Plants get some of their nutrients from water.

E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

A WATER TREATMENT PLANT

1. Municipalities are responsible for looking after the water treatment facilities in towns and cities.
2. This plant must purify water to keep people healthy.
3. A water treatment plant cleans water from rivers, dams and aquifers.
4. Water is pumped to the water treatment plant.
5. The dirty water first settles in big tanks.
6. Large particles sink to the bottom of the tanks.
7. The water is filtered through a big sieve.
8. It is then filtered through a very fine material called a membrane.
9. A chemical called chlorine is added to kill germs.
10. Other chemicals are added to remove bad tastes or smells from the water.
11. The water is pumped to houses and factories.
12. Water is also cleaned after we use it.
13. Untreated sewerage can cause pollution and disease.

TOPIC: Mixtures as water resources

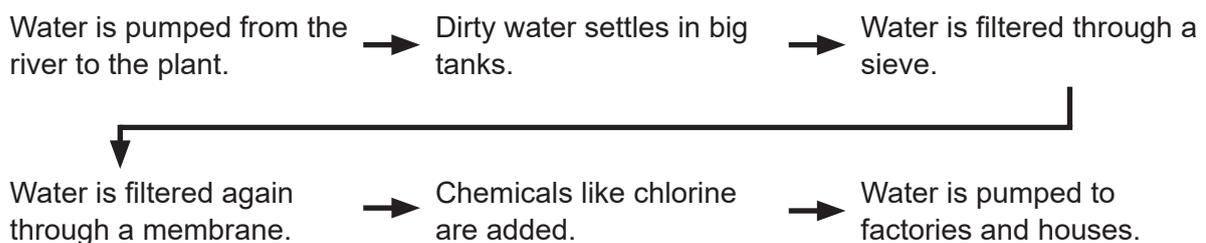
2. Explain this to the learners as follows:
 - a. Water goes through a process which makes it clean.
 - b. It settles first so that large particles can sink to the bottom.
 - c. Then it is filtered twice.
 - d. Finally, chlorine is added to it to kill germs.
3. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY: THE PROCESS OF CLEANING WATER IN A WATER TREATMENT PLANT

Draw a flow diagram to show the process that water goes through before it reaches houses and factories.

4. Explain the following to the learners:
 - a. Using the information on the chalkboard, the learners must draw a flow diagram in their workbooks to show the process of cleaning water in a water treatment plant. A model answer (answers will vary):
 - b. A model answer:

THE PROCESS OF CLEANING WATER IN A TREATMENT PLANT



Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Where does a water treatment plant get its water from?
- b. What chemical is added to the water to kill germs?

Answers to the checkpoint questions are as follows:

- a. The plant pumps water from rivers, dams and aquifers.
- b. Chlorine is added to the water to kill germs.

6. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Processes to purify water	88-90
Viva	Processes to purify water	92-95
Platinum	Processes to purify water	102
Solutions for All	Processes to purify water	165-169
Day-by-Day	Processes to purify water	104
Oxford	Processes to purify water	76-77
Spot On	Processes to purify water	46
Top Class	Processes to purify water	-
Sasol Inzalo Bk A	Processes to purify water	188-189

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/kVzJEL> [Processes to purify water]
2. <https://goo.gl/TFjX6W> (14min 15sec) [Water - who needs it?]
3. <https://goo.gl/h5agiH> (2min 29sec) [Why care about water?]

7 C

Term 2, Week 7, Lesson C

Lesson Title: Cleaning processes

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Clean water
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- list different cleaning processes
- investigate some of these processes.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Four beakers, a jug, a sieve or tea strainer, filter paper or a cloth, a funnel, a tablespoon, garden soil, water	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What disease do people get from drinking dirty water?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

People get diarrhoea from drinking dirty water.

D ACCESSING INFORMATION

1. Write the following onto the chalkboard (always try to do this before the lesson starts):

SIEVING, FILTERING, SETTLING AND DECANTING TO REMOVE SOLIDS

1. Water can be cleaned.
2. Sieving cleans dirty water that contains large, insoluble substances.
3. The holes in a sieve allow water to pass through while keeping larger substances behind.
4. The smaller the holes in the sieve are, the cleaner the water will be.
5. Filtering is like sieving but the dirty water will go through some sort of material, like a cloth or paper filter.
6. Settling occurs when dirty water is left for some time. The heavier, solid substances then sink to the bottom.
7. Decanting separates a liquid into different containers.
8. The settled substances must not be disturbed.
9. After all the solid substances are taken from the water, the germs must be removed.

BOILING AND ADDING CHEMICALS TO KILL GERMS

1. Boiling water kills the germs and parasites in the water.
2. The water must be boiled for three minutes.
3. It takes a long time to cool down.

TOPIC: Mixtures as water resources

4. Chemicals, such as chlorine, kill germs.
 5. To kill germs, one teaspoon of bleach can be added to 20 litres of water.
 6. Leave the water to stand for two hours.
2. Explain this to the learners as follows:
- a. Water can be cleaned to make it safer to drink.
 - b. Sieving, filtering and decanting all remove solid substances from the water.
 - c. Sieving depends on the size of the holes which allow solid particles of various sizes to be separated.
 - d. Filtering can be done through a cloth.
 - e. The finer the cloth, the cleaner the water will be.
 - f. Decanting must be done carefully so that the solids do not mix when the container is lifted.
 - g. These methods do not remove germs, though.
 - h. In order to get rid of germs, these three methods must be used together with boiling or adding chemicals to the water.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. Which four methods of separation remove solid particles from the liquid in water?
- b. Which two methods of cleaning water remove germs from water?

Answers to the checkpoint questions are as follows:

- a. Sieving, filtering, settling and decanting remove solid particles.
- b. Boiling and adding chemicals will kill the germs in water.

E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

ACTIVITY: INVESTIGATE SETTLING, FILTERING, SIEVING AND DECANTING

YOU WILL NEED:

four beakers
a jug
a sieve or tea strainer
filter paper or a cloth
a funnel
a tablespoon
garden soil
water

TOPIC: Mixtures as water resources

METHOD

1. Place two heaped tablespoons of soil into the jug.
2. Add two cups of water to the jug and stir.
3. Label the beakers A, B, C and D.
4. For Beaker A, stir the mixture in the jug and fill the beaker.
5. Let Beaker A stand for 15 minutes.
6. For Beaker B, place the sieve or tea strainer over the beaker.
7. Stir the mixture in the jug, pour it into the sieve and into Beaker B.
8. For Beaker C, place the filter paper or cloth in the funnel.
9. Stir the mixture in the jug and pour it into the funnel.
10. Describe what has happened to the water in Beaker A.
11. Write this in your workbooks.
12. Take the mixture in Beaker A (you might need to remove leaves and twigs first) and carefully pour the liquid into Beaker D.
13. Observe what happens in each beaker.

2. Explain this to the learners as follows:
 - a. This can be done as a teacher-led demonstration or in groups.
 - b. Read through what is needed and the method for this investigation.
 - c. Conduct the investigation.
 - d. Tell the learners to observe each beaker carefully.
3. Write the following task on the chalkboard (always try to do this before the lesson starts):

TASK: RESULTS OF INVESTIGATION

1. Copy and complete the following table:

	Beaker A	Beaker B	Beaker C	Beaker D
Describe the colour of the water (clear, murky , has solid particles)				
Method used to clean water				

2. Which method/s is the best to clean water? Explain your answer.
3. Is the water in any of the beakers safe for humans to drink? Explain your answer.
4. Explain how to kill germs in water using bleach.

TOPIC: Mixtures as water resources

4. Model answer:

TASK: RESULTS OF INVESTIGATION

- Answers might vary depending on the size of the holes in the sieve and the filter paper or cloth used.

	Beaker A	Beaker B	Beaker C	Beaker D
Describe the colour of the water (clear, murky , has solid particles)	<i>Water is murky and has solid particles.</i>	<i>Water is murky and solid particles are small.</i>	<i>Water is clear.</i>	<i>Water is slightly murky with no solid particles.</i>
Method used to clean water	<i>settling</i>	<i>sieving</i>	<i>filtering</i>	<i>decanting</i>

- Which method is the best to clean water? Explain your answer.
Filtering is the best method as the water was the clearest after it had been filtered.
- No, none of the water is safe to drink as it might have germs. The water would have to be boiled or have chemicals added to kill the germs.
- You add one teaspoon of bleach to a bucket of 20 litres of water.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- Is water safe to drink after it has been filtered?
- How would you kill germs in water?

Answers to the checkpoint questions are as follows:

- No, water is not safe to drink after it has been filtered as it will still contain germs.
- To kill germs, water must be boiled or have chemicals added to it. A teaspoon of bleach can be added to 20 litres of water.

- Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Processes to purify water	89
Viva	Processes to purify water	95
Platinum	Processes to purify water	102-105
Solutions for All	Processes to purify water	170-173
Day-by-Day	Processes to purify water	104-107
Oxford	Processes to purify water	77
Spot On	Processes to purify water	46
Top Class	Processes to purify water	86-87
Sasol Inzalo Bk A	Processes to purify water	190-192

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/ZX8SWj> (5min 45sec) [Science: separation methods]
2. <https://goo.gl/CUVbYt> (8min 10sec) [Environment: ways of cleaning water]
3. https://www.nasa.gov/pdf/146846main_Cleaning_Water_Educator.pdf [Cleaning water]

8 A

Term 2, Week 8, Lesson A

Lesson Title: Municipal water

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Clean water
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe how municipalities clean water
- describe how this is done before we use it
- describe how this is done after we use it

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps		Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints		Use information in a new way	
Apply knowledge to new and unfamiliar contexts	✓	Critically evaluate scientific information		Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	
Identify assumptions		Categorise information			

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource Page 22: A settling tank	
Resource Page 23: A water treatment plant	
Resource Pages 24-27: How municipalities clean their water	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

Can you explain how to kill germs in water using bleach?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Add one teaspoon to 20 litres of water and leave the water to stand for two hours.

D ACCESSING INFORMATION

1. Write and draw the following on the chalkboard (always try to do this before the lesson starts):

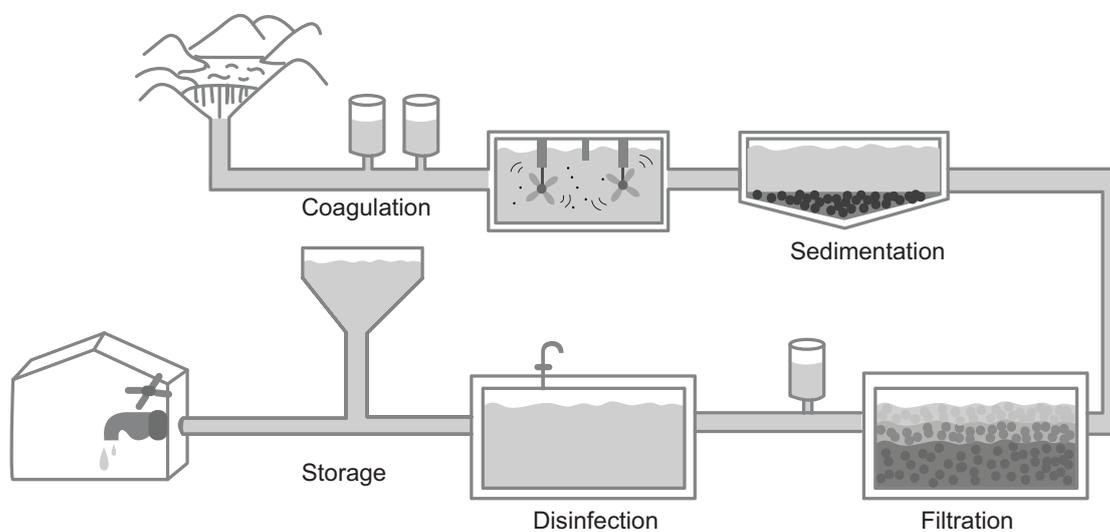
MUNICIPAL WATER: BEFORE IT IS USED

1. Water that comes out of a tap is supplied to residents and businesses by their local municipality.
2. Water is purified before and after it is used.
3. It is purified in water purification plants.
4. At the purification station, the first step is coagulation.
5. Here chemicals are added to make solid particles stick together.
6. Water then goes into a tank where it settles.
7. The **sediment** sinks to the bottom.
8. The water is then filtered through sand to remove dirt and other substances.
9. Chlorine, a chemical, is then added to get rid of germs.
10. This is known as **disinfection**.
11. Water is stored until it is needed.

TOPIC: Mixtures as water resources

MUNICIPAL WATER: AFTER IT IS USED

1. Waste water that is piped away from homes is called sewage.



How municipalities clean water

MUNICIPAL WATER: AFTER IT IS USED

1. Waste water that is piped away from homes is called sewage.
2. The pipes take the sewage to sewage treatment plants.
3. The same kinds of processes are used to clean the water: coagulation, settlement, filtration, disinfection.

2. Explain this to the learners as follows:
 - a. Municipalities need to have proper water purification methods to provide clean water to people.
 - b. Dirty water will go through four processes: coagulation, settlement, filtration and disinfection.
 - c. Show learners Resource Page 22: 'Settling tanks'.
 - d. These tanks enable water to settle so that the sediment sinks to the bottom.
 - e. Show learners Resource Page 23: 'A water treatment plant'.
 - f. The Resource Page shows what a water purification plant looks like.
 - g. Point out the settling tanks.
 - h. Show learners Resource Page 24: 'How municipalities clean water'.
 - i. Go through the process of the cleaning of water on the drawing.
 - j. Give learners Resource Pages 24- 27 to help learners to copy the drawing into their workbooks.
 - k. They will copy this drawing into their workbooks.
3. Give learners time to copy this information into their workbooks.

TOPIC: Mixtures as water resources

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What do you call the first step of the cleaning process in which chemicals are added to make solid particles stick together?
- b. What is the final step called when the chemical chlorine is added to kill germs in the water?

Answers to the checkpoint questions are as follows:

- a. The first step is called coagulation.
- b. The final step is called disinfection.

E CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

TASK: MEANINGS OF WORDS

1. Match the term from Column A with the correct meaning in Column B. Write the word and then its meaning.

	COLUMN A: WORD	COLUMN B: MEANING
1.	coagulation	pour off water slowly without disturbing the sediment
2.	settling	can dissolve
3.	decanting	particles cling together to make a visible solid
4.	sieving	large particles that settle in the bottom of a container
5.	filtering	separates large insoluble substances through a device with holes
6.	insoluble	leaving the water to stand for some time so that large particles of solids can sink to the bottom
7.	soluble	separates out small insoluble substances by pouring water through paper or a cloth
8.	sediment	cannot dissolve

2. Check your answers with a partner.

2. Explain this to the learners as follows:
 - a. For this task, learners must match the word in Column A with the meaning in Column B.
 - b. When they have completed this task in their workbooks, get them to check their answers with a partner.
 - c. When the class has completed the exercise, go through the answers with the learners.

TOPIC: Mixtures as water resources

3. Model answer:

TASK: MEANING OF WORDS

1.	coagulation:	particles cling together to make a visible solid
2.	settling:	leaving the water to stand for some time so that large particles of solids can sink to the bottom
3.	decanting:	pour off water slowly without disturbing the sediment
4.	sieving:	separates large insoluble substances through a device with holes
5.	filtering:	separates out small insoluble substances by pouring water through paper or a cloth
6.	insoluble:	cannot dissolve
7.	soluble:	can dissolve
8.	sediment:	large particles that settle in the bottom of a container

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What is 'sediment'?
- b. What is 'decanting'?

Answers to the checkpoint questions are as follows:

- a. Sediment results when large particles settle in the bottom of a container.
- b. Decanting takes place when the liquid is carefully poured off a mixture that has settled.

4. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Processes to purify water	90
Viva	Processes to purify water	94-97
Platinum	Processes to purify water	105
Solutions for All	Processes to purify water	174-175
Day-by-Day	Processes to purify water	108-109
Oxford	Processes to purify water	76-77
Spot On	Processes to purify water	-
Top Class	Processes to purify water	89-90
Sasol Inzalo Bk A	Processes to purify water	199-201

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://goo.gl/7K1PVg> [Exploring drinking water treatment]
2. <https://goo.gl/AEhn73> (4min 19sec) [Water and you]
3. <https://goo.gl/4HkjyS> (7min 47sec) [The sewage treatment process]
4. <https://goo.gl/uooqbe> (4min 55sec) [How does water get to your tap?]

8 B

Term 2, Week 8, Lesson B

Lesson Title: Investigate how to purify water

Time for lesson: 1 hour

A

POLICY AND OUTCOMES

Sub-Topic	Clean water
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- describe different ways to purify water
- investigate how to best purify water.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas	Recall facts	✓
Sketch design ideas		Draw simple 2D plans	Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge	Write summaries	✓
Describe concepts and processes, mechanisms and theories	✓	Develop flow charts, diagrams and mind maps	Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	Use information in a new way	✓
Apply knowledge to new and unfamiliar contexts		Critically evaluate scientific information	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants	Critically evaluate proposed solutions, products and processes	✓
Identify assumptions		Categorise information		

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Resource 28 – Resource 32: A homemade water filter	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

When do municipalities clean water?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Municipalities clean water before and after we use it.

D ACCESSING INFORMATION

1. Write the following on the chalkboard (always try to do this before the lesson starts):

INVESTIGATE HOW TO PURIFY WATER

1. Settling, decanting, filtering, boiling and adding chemicals are all ways of cleaning water.
2. Boiling and adding chemicals are the only ways to get rid of germs.

2. Explain this to the learners as follows:
 - a. Go through the different methods of cleaning water.
3. Give learners time to copy this information into their workbooks.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. Can you name five ways to clean water?
- b. Which two ways of cleaning water will kill germs?

Answers to the checkpoint questions are as follows:

- a. Settling, decanting, filtering, boiling and adding chemicals are all ways of cleaning water.
- b. Boiling and adding chemicals are the only ways to kill germs.

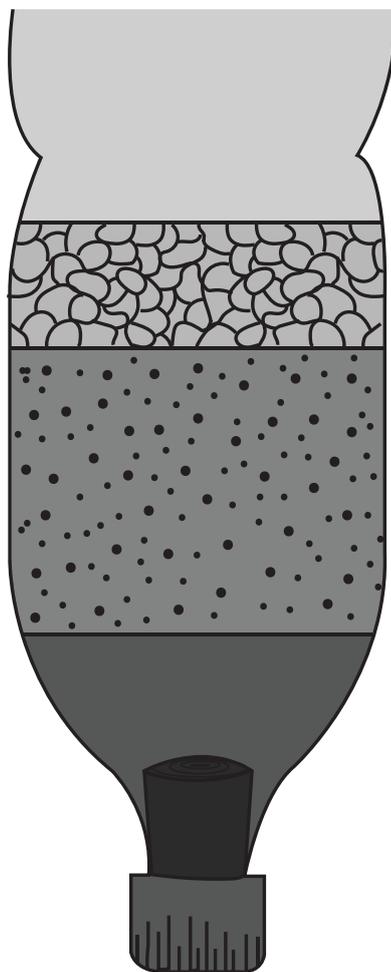
E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

TASK: MEANINGS OF WORDS

1. Water from rivers and other natural resources may often be muddy and dirty.
2. If the water supply to your tap has been affected by a tornado or other disaster, you might need to clean the water in some way.
3. When you have made a water filter, you should run water through it a few times to clean it.
4. Draw this diagram of a homemade water filter:



Top cut to allow water to be poured into filtration system

Gravel to filter out larger sediment

Sand to filter out fine impurities. Organisms and particles collect in the top layers of the sand, gradually forming a biological zone to filter out bacteria, viruses and parasites.

Activated carbon to remove contaminants and impurities, utilizing chemical absorption.

Cloth to hold back carbon and let purified water through

Removable cap

4. Answer these questions:
 - a. Why do you need to run water through the filter a few times before using it?
 - b. Do you think that this water filter would clean the water so that you could drink it?
 - c. Can you give a reason for your answer?

TOPIC: Mixtures as water resources

2. Explain this to the learners as follows:
 - a. There may be times when you might need to clean water.
 - b. There are many ways to clean water.
 - c. Not all ways make water drinkable.
 - d. Give learners Resource 28 to Resource 32.
 - e. Point to all the different layers of materials in the diagram of a homemade water filter.
 - f. The top layer is to catch large solid particles.
 - g. The bottom layers are to catch the smaller particles.
 - h. Go through the question with the learners.
 - i. It is important that they know that clean water is not always drinkable.
3. Give learners time to copy the diagram of a water filter and to answer question 4 in their workbooks.
4. Write the model answer on the chalkboard (always try to do this before the lesson starts)

MODEL ANSWER

4. a. You need to run water through it a few times to clean it.
4. b. No, it is not clean enough to drink.
4. c. The water may contain germs that would make people sick. The germs are not visible.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. What material would you put at the top of a homemade water filter?
- b. What material would you put at the bottom of a homemade water filter?

Answers to the checkpoint questions are as follows:

- a. Answers may vary: small stones, gravel.
- b. Answers may vary: a cloth, cotton wool.

5. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Processes to purify water	91-93
Viva	Processes to purify water	98-99
Platinum	Processes to purify water	106
Solutions for All	Processes to purify water	175-176
Day-by-Day	Processes to purify water	109-110
Oxford	Processes to purify water	78
Spot On	Processes to purify water	47-48
Top Class	Processes to purify water	88
Sasol Inzalo Bk A	Processes to purify water	194

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <https://www.wikihow.com/Make-a-Water-Filter> [Make a water filter]
2. <http://www.instructables.com/id/Simple-Water-Filter-out-of-a-Waterbottle/> [Simple water filter]

8 C

Term 2, Week 8, Lesson C

Lesson Title: Design, make and evaluate a simple system

Time for lesson: 1½ hours

A

POLICY AND OUTCOMES

Sub-Topic	Clean water
CAPS Page Number	55

Lesson Objectives

By the end of the lesson, learners will be able to:

- write a design brief and specifications
- make a water filtering system
- evaluate the water filter system.

Specific Aims	1. DOING SCIENCE	✓
	2. KNOWING THE SUBJECT CONTENT & MAKING CONNECTIONS	✓
	3. UNDERSTANDING THE USES OF SCIENCES & INDIGENOUS KNOWLEDGE	

SCIENCE PROCESS SKILLS

Access information	✓	Select key ideas		Recall facts	✓
Sketch design ideas		Draw simple 2D plans		Write design briefs	
Build a conceptual framework	✓	Organise to reorganise knowledge		Write summaries	✓
Describe concepts and processes, mechanisms and theories		Develop flow charts, diagrams and mind maps		Recognise patterns and trends	
Understand the impact of technology and science		Write specifications and constraints	✓	Use information in a new way	✓
Apply knowledge to new and unfamiliar contexts		Critically evaluate scientific information	✓	Analyse information and data	
Recognise relationships between existing knowledge and new ideas	✓	Use knowledge to design solutions to problems, needs and wants		Critically evaluate proposed solutions, products and processes	✓
Identify assumptions		Categorise information			

TOPIC: Mixtures as water resources

B POSSIBLE RESOURCES

For this lesson, you will need:

IDEAL RESOURCES	IMPROVISED RESOURCES
Coarse sand, fine sand, cotton wool, dirty water, a pair of scissors, a bucket, a 2 litre plastic bottle	

C CLASSROOM MANAGEMENT

1. Make sure that you are ready and prepared.
2. Write the following question onto the chalkboard before the lesson starts:

What material would you put at the bottom of a water filter?

3. Learners should enter the classroom and answer the question in their workbooks.
4. Discuss the answer with the learners.
5. Write the model answer onto the chalkboard.

Answers may vary: A clean cloth or cotton wool may be used.

D ACCESSING INFORMATION

1. Write the following on the chalkboard (always try to do this before the lesson starts):

PROBLEM

A tornado has hit the water treatment plant and there is no available drinking water. Design a water filter system to provide drinking water for your home.

DESIGN BRIEF, SPECIFICATIONS AND CONSTRAINTS

1. Write a design brief for this problem by completing the sentence below:
Design and make a _____ (what it is you are designing and making) for _____ (who this is for) as _____ (state the problem here).
2. Write a list of specifications and constraints. Specifications tell you what your product will look like and should do. Constraints are things that control what you do by keeping you within limits. Write specifications in point form by answering these questions:
 - a. What must the water filter be able to do?
 - b. What will you use for the filter?
 - c. What recyclable materials could you use?
 - d. How will you collect the water that has been filtered?

TOPIC: Mixtures as water resources

DESIGN

- a. Draw a design for a water filter system.
 - b. Label your drawing.
 - c. Make a list of tools and materials you will need.
 - d. Materials available are: coarse sand, fine sand, cotton wool, and dirty water.
 - e. Tools available are: a pair of scissors and a bucket.
 - f. Learners must bring two plastic bottles and anything else that could be of use.
2. Explain this to the learners as follows:
- a. All designers use design briefs, specifications and constraints.
 - b. Once the learners have drawn a design, they must list a list of tools and materials to be used.
 - c. They must list these in their workbooks before they start designing.
3. Give learners time to write down their design brief, specifications, constraints, list of tools and materials. They must then draw their design in their workbooks.
4. A model answer (answers will vary):

DESIGN BRIEF

Design and make a water filter system for my family as no clean water is being supplied by the water treatment plant.

SPECIFICATIONS AND CONSTRAINTS

- a. The water filter must be able to clean water by removing all the insoluble substances.
- b. I will use leaves, gravel, sand, and a cloth in a plastic bottle to make a water filter.
- c. I can use a plastic bottle and a clean dish cloth.
- d. I will put another plastic bottle underneath the filter to catch the water.

Checkpoint 1

Ask the learners the following questions to check their understanding at this point:

- a. What is a design brief?
- b. What are constraints?

Answers to the checkpoint questions are as follows:

- a. A design brief is a sentence explaining what it is that you need to design and make, and who it is for.
- b. Constraint are things that control what you do by keeping you within limits.

E

CONCEPTUAL DEVELOPMENT

1. Write the following on the chalkboard (always try to do this before the lesson starts):

MAKE A WATER FILTER

1. Gather all the tools and materials according to your list.
2. Work safely: do not run or hold the pair of scissors downwards. Make sure you focus when you cut plastic bottles.
3. Make your water filter.
4. Run water through your water filter to clean it before you use it.

EVALUATE YOUR WATER FILTER

1. Run two cups of dirty water through your water filter into the second plastic bottle.
2. Write down what you observe in your workbook.
3. If you could change your design in any way, what would you do? Write your changes down in your workbook.

2. Explain this to the learners as follows:
 - a. Learners must gather all the tools and materials and start making their water filter according to their design.
 - b. When they are ready, they must check their filter.
 - c. Learners must then test and evaluate their water filter.
3. Give learners time to make and evaluate their water filter.
4. A model answer:

EVALUATION

1. The water was clear so the water filter had cleaned the dirty water.
2. I would add more cotton wool at the end of the filter to get rid of the smaller particles.

Checkpoint 2

Ask the learners the following questions to check their understanding at this point:

- a. Can you give two safety rules when making a product?
- b. Why do we evaluate the products we make?

Answers to the checkpoint questions are as follows:

- a. No running, and holding your pair of scissors down are two safety rules.
- b. We evaluate the products so that we can keep improving the design.

5. Ask the learners if they have any questions and provide answers and explanations.

TOPIC: Mixtures as water resources

F REFERENCE POINTS FOR FURTHER DEVELOPMENT

If you need additional information or activities on this topic, you can find these in your textbook on the following pages:

NAME OF TEXTBOOK	TOPIC	PAGE NUMBER
Study & Master	Processes to purify water	93
Viva	Processes to purify water	98-102
Platinum	Processes to purify water	108-109
Solutions for All	Processes to purify water	175-184
Day-by-Day	Processes to purify water	110-111
Oxford	Processes to purify water	77-78
Spot On	Processes to purify water	47-49
Top Class	Processes to purify water	88-89
Sasol Inzalo Bk A	Processes to purify water	194-198

G ADDITIONAL ACTIVITIES/ READING

In addition, further reading, listening or viewing activities related to this sub-topic are available through the following web links:

1. <http://filterbutler.com/blog/make-homemade-water-filter/> [How to make your own homemade water filter]
2. <https://goo.gl/sVBYD5> (3min 45sec) [How to make a water filter from a plastic bottle]

NATURAL
SCIENCES
&
TECHNOLOGY
ASSESSMENT
GRADE 6 TERM 2



In this section of the booklet, you will find your science assessments for this term.

There are two assessments included:

1. A Practical Activity

The activity completed is drawn from one of the lessons in the lesson plans. The rubric attached in this pack will assist you with assessing the task completed by the learners. The task to be assessed with the rubric is identified in the rubric.

2. A Final Examination

The final examination included will need to be copied onto the chalkboard for learners to complete. There is also a memorandum included to assist you with marking the learners completed examination scripts.

All of the assessments are aligned to CAPS requirements and the marks allocated for each assessment are as stipulated in CAPS.

GRADE 6 ASSESSMENT - RUBRIC

GRADE 6

TERM 2

CAPS ASSESSMENT 3

TOTAL MARKS: 15

RUBRIC FOR PRACITCAL TASK

LESSONS 8B-8C

CRITERIA	EXCELLENT 5 MARKS	VERY GOOD 3 – 4 MARKS	ACHIEVED 2 MARKS	NOT ACHIEVED 0 - 1 MARK
<p>INVESTIGATE (Lesson 8B)</p> <ul style="list-style-type: none"> - draws and labels diagram of a water filter - answers correctly the questions about the purpose of a water filter (Question 4a) - evaluates the water filter with reasons (Question 4a, 4b) 				
<p>DESIGN AND MAKE (Lesson 8C)</p> <ul style="list-style-type: none"> - correctly writes design brief, specifications and constraints - draws and labels a neat sketch of a water filter system - lists all tools and materials needed - makes the water filter system observing safety rules - cleans workspace 				
<p>EVALUATE (Lesson 8C)</p> <ul style="list-style-type: none"> - tests water filter system correctly - writes down observations - makes suggestions on how to improve water filter system 				

	Learner's Marks	Possible Marks
Investigate		5
Design and Make		5
Evaluate		5
Total:		15

Grade 6
Term 2: Test
Marks: 50

QUESTION PAPER

NOTES TO THE TEACHER

- The mid-year examination will assess content and skills from Term 1 and Term 2. This examination is for 50 marks. The mid-year examination counts for 25% of the final year mark.

Prepare for the examination by doing the following:

- a. Write the following heading for the examination on the chalkboard: Natural Sciences and Technology.
- b. Write the examination questions on the chalkboard before the learners enter the classroom.
- c. Make sure that there is a piece of paper for each learner.
- d. Make sure that each learner has a pen, pencil and ruler.
- e. Learners must enter the classroom in silence.
- f. Tell the learners to write their names and the date at the top of the paper.
- g. Tell the learners when they must start.
- h. Learners are allowed an hour for the examination.
- i. Tell learners when the time is up.
- j. Collect all the papers.
- k. Dismiss the learners.

GRADE 6 ASSESSMENT - TEST

Grade 6 Mid-Year Examination

Time: 60 minutes

Marks: 50

LIFE AND LIVING; PROCESSING

PHOTOSYNTHESIS [7 MARKS]

1. Complete the following sentences from the list of possible words. Rewrite the sentence and underline the chosen words.

water, iodine, oxygen, sunlight, producers, carbon dioxide, starch

- Plants need three things to make food: _____, _____ and _____.
- Plants release (give off) a gas called _____.
- Plants make glucose sugar and change it into _____.
- To carry out a test to see if there is starch on a food, we use a chemical called _____.
- Plants make their own food so they are called _____.

NUTRIENTS IN FOOD [5 MARKS]

- How do proteins help our bodies?
- Maize meal is an example of which food group?
- Which of the following is an example of the food group of fats and oils: margarine, apple, bread, jam, meat?
- In what type of foods do you find vitamins and minerals?

NUTRITION [4 MARKS]

Choose the correct word for to complete each sentence. You need to write down the word only.

balanced diet, additives, kilojoules, kilograms, highly processed, preservatives

- _____ are added to food to make them look better, to make them last longer and to make them easier to cook and eat.
- A _____ is choosing the right amounts of food from the four different food groups every day.
- Fast food is _____ and is not healthy to eat.
- Energy, which is shown on food labels, is measured in _____.

FOOD PROCESSING [4 MARKS]

- What is the reason for drying fruit?
- Give one advantage of processed food?
- Name two ways in which potatoes can be cooked to make them edible.

ECOSYSTEMS AND FOOD WEBS [5 MARKS]

- What are the four non-living things in an ecosystem?
- In what ecosystem does a whale live?
- Why can few plants live in a desert ecosystem?
- What type of animal (herbivore, omnivore or carnivore) is at the top of a food web?

GRADE 6 ASSESSMENT - TEST

MATTER AND MATERIALS; PROCESSING

SOLIDS, LIQUIDS AND GASES [2 MARKS]

Choose your answers from the following words:

solids, liquids, gases

17. What type of particles are packed close together in a regular pattern with very little space between them?
18. In which state do particles move the most?

MIXTURES [3 MARKS]

19. What is a mixture?
20. Explain what happens when oil and water are mixed.
21. Which method of separation would be best for a mixture of chalk and water?

SOLUTIONS AS SPECIAL MIXTURES [8 MARKS]

22. Is the following statement True or False: 'A teaspoon of salt is dissolved in a glass of water is known as a solution'?
23. In the example in Q22, is the salt called a solvent or the solute?
24. In the example in Q22, which process would you use to separate the salt from the water?
25. What do we call the process of forming crystals from evaporation?
26. Name two separation methods that do not work for a solution.
27. If more and more of a solute is mixed into a solution, and the solute starts to settle at the bottom of the container, is this a saturated or unsaturated solution?
28. What word is used to describe solids, like sand and oil, that do not dissolve in water?

DISSOLVING [2 MARKS]

29. In what temperature of water does salt dissolve the fastest: hot, warm or cold?
30. As well as temperature, what else will make salt or sugar dissolve faster in water?

MIXTURES AND WATER RESOURCES [5]

31. What is water pollution?
32. What insoluble substance, from ships, does not wash off sea birds' feathers?
33. Name one soluble substance that pollutes or water.
34. What is a wetland?
35. Name one method of separating that wetlands use to remove substances from the water.

PROCESSES TO PURIFY WATER [5]

36. What chemical is added to water to kill germs?
37. Name two methods which separate solid particles from liquid?
38. Which two ways of cleaning water will kill germs?

GRADE 6 ASSESSMENT - MEMORANDUM

Grade 6 Mid-Year Examination

Time: 60 minutes

Marks: 50

LIFE AND LIVING; PROCESSING

PHOTOSYNTHESIS [7 MARKS]

1. Complete the following sentences from the list of possible words. Rewrite the sentence and underline the chosen words.

water, iodine, oxygen, sunlight, producers, carbon dioxide, starch

- Plants need three things to make food: water, sunlight and carbon dioxide.
- Plants release (give off) a gas called oxygen.
- Plants make glucose sugar and change it into starch.
- To carry out a test to see if there is starch on a food, we use a chemical called iodine.
- Plants make their own food so they are called producers.

NUTRIENTS IN FOOD [5 MARKS]

- How do proteins help our bodies? *They repair and grow our body.*
- Maize meal is an example of which food group? *Carbohydrates.*
- Which of the following is an example of the food group of fats and oils: margarine, apple, bread, jam, meat? *Margarine*
- In what type of foods do you find vitamins and minerals? *Vegetables and fruits.*

NUTRITION [4 MARKS]

Choose the correct word for to complete each sentence. You need to write down the word only.

balanced diet, additives, kilojoules, kilograms, highly processed, preservatives

- Additives are added to food to make them look better, to make them last longer and to make them easier to cook and eat.
- A balanced diet is choosing the right amounts of food from the four different food groups every day.
- Fast food is highly processed and is not healthy to eat.
- Energy, which is shown on food labels, is measured in kilojoules.

FOOD PROCESSING [4 MARKS]

- What is the reason for drying fruit? *To make it last longer.*
- Give one advantage of processed food? *Any of the following: longer shelf-life, makes it more edible, adds nutritional value.*
- Name two ways in which potatoes can be cooked to make them edible. *Any two of boiled, fried, baked, roasted, steamed.*

GRADE 6 ASSESSMENT - MEMORANDUM

ECOSYSTEMS AND FOOD WEBS [5 MARKS]

13. What are the four non-living things in an ecosystem? *Air, water, soil, sunlight*
14. In what ecosystem does a whale live? *Sea ecosystem.*
15. Why can few plants live in a desert ecosystem? *There is very little water for plants and animals to survive.*
16. What type of animal (herbivore, omnivore or carnivore) is at the top of a food web? *Carnivore.*

MATTER AND MATERIALS; PROCESSING

SOLIDS, LIQUIDS AND GASES [2 MARKS]

Choose your answers from the following words:

solids, liquids, gases

17. What type of particles are packed close together in a regular pattern with very little space between them? *Solids.*
18. In which state do particles move the most? *Gas state.*

MIXTURES [3 MARKS]

19. What is a mixture? *A mixture is two or more substances that have been mixed together.*
20. Explain what happens when oil and water are mixed. *Oil and water do not mix so they form separate layers.*
21. Which method of separation would be best for a mixture of chalk and water? *Filtering would be the best method to separate chalk and water.*

SOLUTIONS AS SPECIAL MIXTURES [8 MARKS]

22. Is the following statement True or False: 'A teaspoon of salt is dissolved in a glass of water is known as a solution'? *True*
23. In the example in Q22, is the salt called a solvent or the solute? *Salt is a solute.*
24. In the example in Q22, which process would you use to separate the salt from the water?
Evaporation or boiling will separate the salt from the water (give one of these examples).
25. What do we call the process of forming crystals from evaporation? *This is called crystallisation.*
26. Name two separation methods that do not work for a solution. *Any two of the following: hand sorting, sieving, filtering, settling, decanting.*
27. If more and more of a solute is mixed into a solution, and the solute starts to settle at the bottom of the container, is this a saturated or unsaturated solution? *Saturated solution.*
28. What word is used to describe solids, like sand and oil, that do not dissolve in water? *Insoluble.*

DISSOLVING [2 MARKS]

29. In what temperature of water does salt dissolve the fastest: hot, warm or cold? *Hot.*
30. As well as temperature, what else will make salt or sugar dissolve faster in water? *Stirring.*

GRADE 6 ASSESSMENT - MEMORANDUM

MIXTURES AND WATER RESOURCES [5]

31. What is water pollution? *Water pollution is when water is made dirty.*
32. What insoluble substance, from ships, does not wash off sea birds' feathers? *Oil.*
33. Name one soluble substance that pollutes or water. *Any of the following: insecticides, washing powder, dishwashing liquid, fertilizers.*
34. What is a wetland? *A wetland is a flat piece of land covered in water for most of the year.*
35. Name one method of separating that wetlands use to remove substances from the water. *Either of the following: filtering or settling.*

PROCESSES TO PURIFY WATER [5]

36. What chemical is added to water to kill germs? *Chlorine is added to water to kill germs.*
37. Name two methods which separate solid particles from liquid? *Either two of: sieving, filtering, settling and decanting.*
38. Which two ways of cleaning water will kill germs? *Boiling and adding chemicals (chlorine)*