OXFORD

INTERVENTION GUIDE

Natural Sciences
Grade 8

SCHOOL Improvement

Packed with catch-up and assessment support!

- *Baseline assessments*
- *Intervention strategies*
- *Answers to assessments*

Oxford – your choice for success

Trusted by South African teachers

Contents

Types of assessment

This handbook focuses on three main types of assessment: baseline assessment; formal formative assessment and summative assessment.

Type of assessment	Description
Baseline assessment	Establishes whether learners meet the basic skills and knowledge level required. Helps the teacher plan for the year, and for each learner. Is administered at the beginning of the year and before a particular topic. Results are used as a guide for teaching and not for promotion purposes.
Formative assessment	Used to aid the learning process and not for promotion purposes. Usually informal, to provide the teacher and learner with a more frequent account of where the learner is at in their learning journey. Teachers can use this form of assessment to modify and adapt their own teaching.
Summative assessment	Carried out after completion of a topic or cluster of topics. Is an assessment of learning that has taken place. Recorded and used for promotion. This is usually formal assessment, making up the formal programme of assessment.

All assessment tasks that make up a formal Programme of Assessment for the year are regarded as formal assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All formal assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained.

The forms of assessment used should be appropriate for the learners' ages and developmental levels.

Learners must complete formal assessments each term. Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. This guide includes a number of intervention strategies that can be used to help learners that have performed poorly in the assessments. It is essential that intervention occurs at an early stage in order for it to be effective.

Programme of assessment

The formal assessment programme for Grade 8 Natural Sciences consists of five school-based assessments and two larger controlled tests. One is a mid-year test in Term 2 and the other is an end-of-year test in Term 4. Both of these are 90 marks. The school-based assessments include two smaller tests (only 60 marks), two practical investigations and a project. This programme of assessment is stipulated in the revised assessment plan for 2021.

Practical investigations make up 40% of the term mark and the test makes up the remaining 60%.

The content covered in Term 1 makes up 40% of the mid-year test, with the Term 2 content making up the remaining 60%. The end-of-year test comprises 60% Term 3 content and 40% content from Term 4.

Summary of the programme of assessment for Grade 8 Natural Sciences:

	Term 1	Term 2	Term 3	Term 4
Assessment task 1	Test (60 marks; 90 minutes)	Practical investigation (20 marks)	Test (60 marks; 90 minutes)	End-of-year test (90 marks; 120 minutes)
Assessment task 2	Practical investigation (20 marks)	Mid-year test (90 marks; 120 minutes)	Project (30 marks)	

In this guide you will find a baseline assessment that you can photocopy and give to learners in order to better assess their current skills and knowledge. You will also find all the assessments stipulated in the program of assessment like practical activities and tests. These can be copied and given to the learners and the marks used for their formal assessment. The memoranda for all assessments are available at the back of the guide. The guide also contains intervention strategies that can assist learners who performed below average in the baseline assessment, Term 1 and Term 3 assessments. These intervention strategies give practical guidelines on how to help the learners in order for them to improve their understanding.

Baseline assessment

1. Choose the correct answer for each of the questions below:

1.1 Which of the following mixtures is an example of a solution?

a. Salt and water
b. Sand and water
c. Oil and water
d. Sand and oil (2)

1.2 Which of the following is NOT a property of a metal?

a. It is a good conductor of heat.
b. It is an insulator.
c. It has a high boiling point.
d. It is malleable. (2)

1.3 What energy conversion takes place when a candle burns?

a. potential energy to chemical energy
b. potential energy to kinetic energy
c. potential energy to heat and light energy
d. kinetic energy to heat and light energy (2)

1.4 Distillation can be used to separate……

a. salt and water
b. oil and water
c. pigments
d. sand and water (2)

1.5 The rate at which the solute dissolves in the solvent depends on…

1. the temperature of the solvent
2. the size of the grains of the solute
3. whether the mixture is shaken or stirred.

a. 1, 2 and 3
b. 1 only
c. 1 and 2
d. 2 and 3 (2) **[10]**

2. Our oceans are often polluted with plastic wrappings and drinking straws.

2.1 State a method that could be used to separate the plastic from the water. (1)

2.2 Draw a labelled diagram showing the apparatus required to separate the plastic from the water. (4)

2.3 Suggest two possible solutions to reduce the amount of plastic that pollutes our sea. (2) **[7]**

3. Thembi wants to do an experiment to determine whether substances that she found in her kitchen are acidic, basic or neutral. She has a glass of orange juice, a glass of water and some drain cleaner.

3.1 Design an experiment to determine whether the substances are acidic, basic or neutral. Your experiment should include:
- Any additional chemicals needed
- Possible results that you could expect. (4)

3.2 Thembi knows that acids and bases are corrosive.

3.2.1 What is meant by the term *corrosive*? (1)

3.2.2 What precautions should she take when working with these substances? (1)

3.3 Thembi uses a table to record her results. Use your knowledge of acids and bases to draw up a table and predict the results she would get for each solution. (3)

3.4 List two other acids that can be found in the home. (2) **[11]**

4. Machines are never 100% efficient. Most machines waste energy. A hairdryer needs 700J of energy to function. 320J of this energy is wasted.

4.1 What form does the wasted energy take? (1)

4.2 Calculate the output energy. (2)

4.3 Determine the percentage efficiency of the hair dryer. (3) **[6]**

[Total marks: 50]

Intervention strategies

Natural Science can be a difficult subject for many learners. It requires learners to not only memorise the content, but also to apply their knowledge in various situations. It is essential that learners understand the content, rather than attempting to rote learn it. This baseline assessment assesses the skills and knowledge that the learners should have gained in Grade 7. Analyse your basement assessment results and use the data to identify why the learner performed poorly. Poor results can be attributed to a number of factors including:

- Barriers to learning
- Class size
- Reading comprehension (the ability to understand what they have read)
- Lack of understanding of the scientific method.

Barriers to learning

- Learners may face barriers to learning. It is essential that we as educators accommodate these learners to ensure that our classrooms remain inclusive.
- These learners may require and should be granted more time for:
  - completing tasks
  - acquiring thinking skills (own strategies)
  - assessment activities.
- Teachers need to adapt the number of activities to be completed without interfering with the learners gaining the required language skills.
- Ensure that weaker learners are paired with learners who are academically strong.

Class size

- Peer tutoring can be an effective intervention method when class size is an issue.
- Quieter learners tend to struggle in a large class as they tend not to ask questions and often fall behind.
- Dividing the class into smaller groups or pairs can help these learners as they will feel less intimidated.
- Ensure that the groups are made up of learners with varying ability so that the weaker learners are helped by the stronger ones.
- Peer assessment can also be used successfully during informal assessment and allows you the educator to gauge the learner's understanding in a less intimidating manner than a formal test or assignment.
- Assessing the individual learner's understanding can be difficult in a large class. The following strategies can be used:
  - **Thumbs up/thumbs down:** Check if learners have understood a concept by show of thumbs. Thumbs up indicate they got it, thumbs down shows they did not, thumbs sideways could show they are not sure.

- **Response boards:** These are small chalkboards or whiteboards where learners record their response to a question and when the teacher says "show your answers" they all hold up the board. This way you can quickly gauge how many are correct/incorrect.
- **Show fingers 1-2-3:** Ask learners to show fingers to show they understand activity instructions before working in a group. 1 = I do not understand, 2 = I sort of understand but I need some help, 3 = I completely understand. This can also be used post activities to see you met the activity objectives.

Reading comprehension

- Many learners struggle to understand what they have read. It is therefore important to make content comprehensible for all learners, particularly those who have English as a second or third language.
- Support learners by giving them pre-reading questions (to aid while reading) and post reading strategies to organise what they have learned.
- Pre-reading questions could include asking the learners *what they already know about the topic? What is the main idea in this paragraph? What real-life examples relate to this topic?* One strategy that can help these learners is teaching them to summarise the content into bullet points and make use of mind-maps.
- This forces the learners to rewrite the content in their own words.
- Write difficult terminology on the board and use simple words to explain what those terms mean.
- Diagrams can be very useful for explaining concepts in such a way that learners can visualise the situation.

Lack of understanding of the scientific method

- It is essential that learners have a good understanding of the scientific method.
- Practical work can be intimidating for many learners.
- Ensure that learners are given time to become familiar with the apparatus used.
- Allow learners to work in groups or pairs so that they are able to help each other.
- Revise the scientific method. Ensure that learners understand what is meant by the term hypothesis and conclusion.
- Explain to the learners that the conclusion must always be based on the evidence that they have collected.

Term 1 Assessment

1. Choose the correct answer for each of the questions below:
   1.1 Mushrooms and moulds are examples of:
   a. protista
   b. fungi
   c. bacteria
   d. viruses. (2)

   1.2 Which of the following animals is an example of a primary consumer?
   a. Seal
   b. Rabbit
   c. Jackal
   d. Shark (2)

   1.3 All of the earth's ecosystems combined is known as a……
   a. community
   b. population
   c. biosphere
   d. family. (2)

   1.4 Which row correctly identifies an omnivore and a herbivore? (2)

	Omnivore	Herbivore
A	Human	Lions
B	Lion	Giraffe
C	Giraffe	Lion
D	Human	Giraffe

   1.5 Animals that eat dead animals are known as…..
   a. predators
   b. herbivores
   c. scavengers
   d. omnivores. (2) **[10]**

2. Photosynthesis is the process whereby plants make food.
   2.1 Name the chemical that gives leaves their green colour. (2)
   2.2 Describe the role this chemical plays during photosynthesis. (2)
   2.3 Write a word equation for photosynthesis showing the substances that react and the products that form. (5)
   2.4 The sugar formed during photosynthesis is changed into starch, cellulose and other compounds. Why do plants need these chemicals? (2) **[10]**

3. Many learners confuse respiration with breathing.
Write a paragraph comparing the two. (3)

4. Scientists study ecology which is the interactions between organisms and their environment.

4.1 Does the photograph below show a population, a community or an ecosystem? Explain your answer. (3)

4.2 Define what is meant by the term *population*. (2)

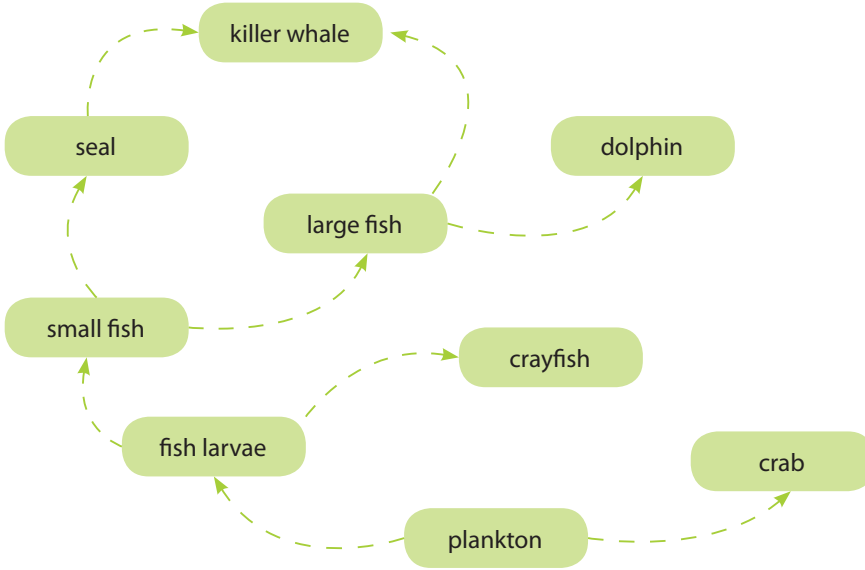
4.3 Ecosystems have biotic and abiotic components. List three abiotic components that can be found in an ecosystem. (3) **[8]**

5.1 Define the term *food chain*. (2)

5.2 Use the food web below to:

5.2.1 Draw a food chain with four links. (4)

5.2.2 Identify two primary consumers. (2) **[8]**



6. The great white shark has adapted to life as a predator.

6.1 Explain what is meant by the term *predator*. (2)

6.2 List four adaptations that make the great white shark an excellent predator. (4)

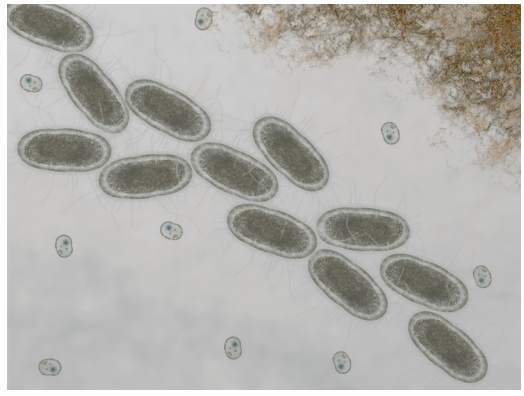
6.3 The great white shark forms part of a food chain. Draw a food chain with 4 links that the great white shark is part of. (4)

6.4 The great white shark is currently endangered. Why is it necessary to conserve these predators? (2) **[12]**

7. Microorganisms are very small living organisms. Bacteria are examples of microorganism.

7.1. Describe bacteria. (2)

7.2 The photograph below is a micrograph of bacteria. Use a ruler to determine the real size of each bacteria. (2)



7.3 What name is given to scientists who study bacteria? (1)

7.3.1 Tuberculosis is caused by bacteria. State three symptoms of this disease. (3)

7.3.2 This disease is contagious. What does this mean? (1) **[9]**

[Total marks: 60]

Practical activity 1: Investigating the effect that carbon dioxide has on the rate of photosynthesis

Photosynthesis is the process whereby plants make food by converting light energy into chemical energy using chlorophyll. This process requires carbon dioxide, water and light. In this experiment the carbon dioxide is provided by the bicarbonate of soda solution. The greater the amount of bicarbonate of soda dissolved in the solution, the more carbon dioxide present for photosynthesis to take place. In this practical activity we investigate how the amount of carbon dioxide present affects the speed (rate) at which photosynthesis takes place.

Materials required:

- Beakers or transparent cups big enough to hold 300 cm^3
- Single hole punch
- Bicarbonate of soda
- Stopwatch
- Spinach or ivy leaves
- 10 ml plastic syringe
- Light source light such as a reading lamp

Method:

1. Make a bicarbonate solution by dissolving 0.5 g of bicarbonate of soda in 250 cm^3 of water.
2. Use the punch to cut 10 disks out of a spinach or ivy leaf.
3. Remove the plunger from the syringe and place the leaf disks inside.
4. Replace the plunger and use the syringe to suck up 6-8 cm^3 of bicarbonate of soda solution into the syringe.
5. Hold the syringe upright and release any air in the syringe.
6. Place a finger over the tip of the syringe and gently pull back on the plunger creating a vacuum. Hold for a few seconds until all the leaf disks have sunk.
7. Empty the leaf disks from the syringe into the beaker containing the bicarbonate of soda solution. The leaf disks should sink to the bottom of the beaker.
8. Set up the light so that it shines above the beaker.
9. Use the stop watch to record the time it takes for five of the disks to float to the surface.

Now repeat the experiment four more times using different concentrations of sodium bicarbonate solutions. Use the table below to prepare the solutions:

Experiment	Mass of sodium bicarbonate in 250 cm^3 of water
1	0.5
2	1
3	1.5
4	2
5	2.5

Results:

- Record your results in a suitable table. (2)
- Use this table to plot a line graph. (5)

Questions:

1. Describe what happens during photosynthesis. (2)
2. Write a word equation for the reaction that takes place. (4)
3. State a possible hypothesis for this experiment. (2)
4. State the:
   - 4.1 Dependent variable
   - 4.2 Independent variable (2)
5. What conclusion can you draw from your results? (3)

[Total marks: 20]

Term 1 Intervention strategies

The assessments in Term 1 consist of a test and a practical activity. Intervention is required for learners who perform below average in these assessments. It is essential that intervention takes place timeously in order for it to be effective. There are a number of factors that could result in a learner achieving a poor result. These include:

- a poor understanding of the content
- a lack of metacognition
- inability to retain information
- lack of understanding of the scientific method
- inability to plot results on a line graph.

Poor understanding of the content

- Many learners find Natural Science a difficult subject largely due to the terminology used. A good way to introduce terminology is to create a glossary. New words and terms can be written at the back of the learners' books with the definition written next to it. Learners can then refer to the back of their book when they come across a word they do not understand.
- Select key words that learners did not understand in the assessments and display these along with the definitions in the classroom.
- In your lesson planning define both the content objectives/outcomes and the language objectives/outcomes for the specific lesson. For example, a language objective might be that learners need to understand the materials listed in a practical task. A scaffolding strategy might be to provide illustrations for these – such as pictures of a beaker, syringe and stopwatch.

A lack of metacognition

- It is essential that metacognition takes place during lessons. Metacognition is the ability to understand one's own thought processes. Learners retain information best when they can visualise situations.
- Visual aids and practical work can aid learners to understand the content.
    - Practical work can be done as a demonstration if resources are limited.
    - After completing practical tasks, give learners sentence starters to complete. For example:
        - I learned…
        - I wonder….
        - I still want to know….
        - I still don't understand…
        - I still have a question about…
    - Learners can review their responses to these questions in peer tutoring groups or you can review these and give learners specific feedback.

An inability to retain information

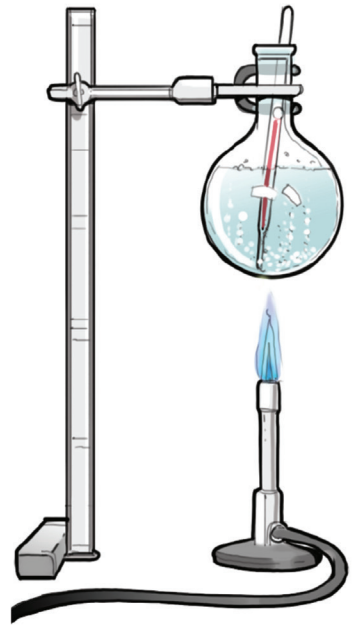
- Flash cards and mind-maps can be useful tools to help learners memorise facts.
- Term 1 covers a large amount of content and learners can be intimidated by the volume of work covered.
- Encourage learners to break the work down into more manageable sections. They can then create a mind-map for each sub-topic.
- Tables can also help learners summarise the work into more manageable sections.

Inability to plot results on a line graph

- Drawing graphs is an essential skill for learners. Give learners that struggle plenty of practice time in class. Learners can use the planet's temperatures listed in the table on page 165 of the *Oxford Successful Natural Science Grade 8* learner's book or the values in the table at the bottom of page 168 to draw a line graph. Discuss the points below with the learners to ensure that they understand what is required:
    - Learners must always use a sharp pencil when drawing graphs.
    - The axes must be labelled and the label must include the units for the quantity being plotted.
    - The dependent variable must be on the Y-axis and the independent variable on the X-axis.
    - An appropriate scale is one where the graph itself covers more than half the vertical and horizontal space provided.

Practical 2: Producing a heating curve

In this activity you will be required to produce a heating curve by melting ice over a Bunsen burner and recording the temperature as the ice changes phase. As the ice is heated the temperature recorded will change. You will be required to plot these temperature changes as a line graph.



Materials required:

- 300 cm^3 beaker
- Thermometer
- Bunsen burner
- Ice
- Graph paper

Method:

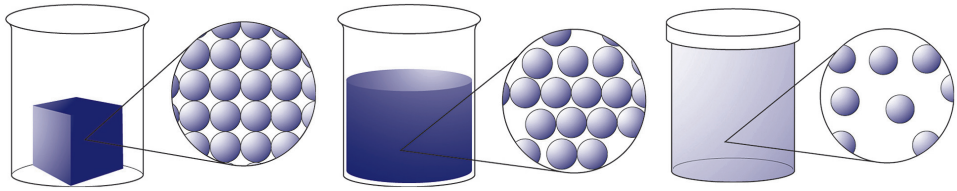
1. Set up the apparatus as seen in the diagram:
2. Record the temperature of the ice. Start heating the ice over the Bunsen burner. Be careful as the Bunsen burner will get very hot and can burn you.
3. Record the temperature every 2 minutes until boiling takes place.

Results:

- Record your results in a suitable table. (2)
- Plot your results as a line graph. (5)

Questions:

1. Define the term *boiling point*. (2)
2. State the boiling point for water. (1)
3. Use your knowledge of the kinetic theory of matter and the diagrams below to complete the table:



ice/solid water/liquid steam/gas

	Solid	Liquid	Gas
Spaces between particles			
Movement of particles			

[9]

4.1 What happens to the temperature of the substance at melting and boiling point? (1)

4.2 Explain why this happens. (3)

[Total marks: 20]

Mid-year examination

1. Choose the correct answer for each of the questions below:

   1.1 The smallest building block of matter is called the…
   a. atom
   b. element
   c. particle
   d. nucleus. (2)

   1.2 The charge on the nucleus of the atom is…
   a. positive
   b. negative
   c. neutral
   d. negative under certain conditions. (2)

   1.3 Which of the following statements regarding diffusion is true?
   1. Diffusion occurs faster in liquids than in gases.
   2. Diffusion occurs because of the particles' kinetic energy.
   3. Diffusion occurs in solids.

   a. 1 and 2
   b. 2 only
   c. 1 and 3
   d. 2 and 3 (2)

   1.4 A cube with side 5 cm long has a mass of 200 g.
   Which of the values below is the correct density of the cube?
   a. 1.6 $g.cm^{-3}$
   b. 4 $g.cm^{-3}$
   c. 1.1 $g.cm^{-3}$
   d. 2 $g.cm^{-3}$ (2)

   1.5 The element found in Group III, Period II is…
   a. boron
   b. aluminium
   c. lithium
   d. nitrogen. (2) **[10]**

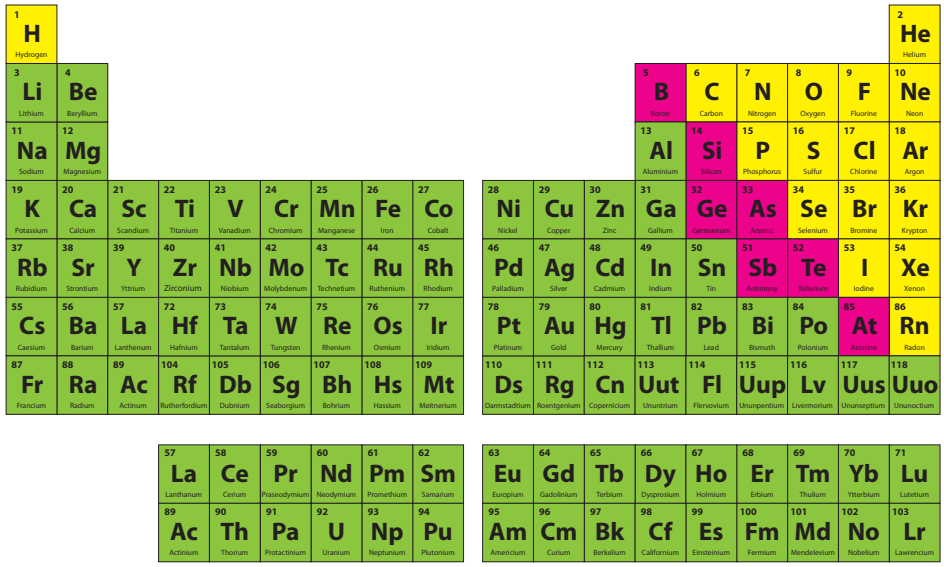
2. Elements are arranged in the Periodic table according to their proton number.

   2.1 Define an element. (2)
   2.2.1 Which element is represented by the symbol *Na*? (1)
   2.2.2 In which group and period of the Periodic Table is Na found? (2)
   2.2.3 How many protons does an atom of Na contain? (1)
   2.2.4 Is Na a metal or a non-metal? Explain your answer. (2)

   2.2 List three properties of a metal. (3) **[11]**

3. Use the Periodic Table below to answer the questions that follow:

PERIODIC TABLE OF THE ELEMENTS



3.1 Which element is found in Group 2, Period 3?
State its name and symbol. (2)

3.2 Is the element in Question 3.1 a metal or a non-metal?
Explain your answer. (2)

3.3 List three properties of this element. (3)

3.4 Elements are arranged according to their atomic number.
Define the atomic number of an element. (2)

3.5 The element with an atomic number of 14 is an example of a semi-metal.

3.5.1 State the name of this element. (1)

3.5.2 This element is a semi-conductor. Describe what this means. (2)

3.6 The table below shows the melting points of the first four metals in Group I.

Element	Melting point (°C)
Li	180
Na	98
K	63
Rb	39

3.6.1 Define the term *melting point*. (2)

3.6.2 Use the table to draw conclusions about the melting point of metals and their position on the Periodic Table. (2) **[16]**

4. All matter is made up of atoms.

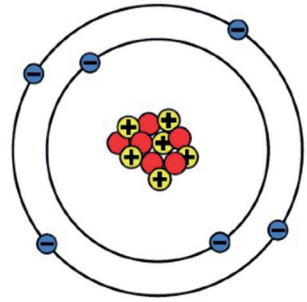
4.1 Use your knowledge of the atom to complete the table below:

Subatomic particle	Charge	Position in the atom
4.1.1	4.1.2	Spins around the nucleus
Proton	4.1.3	4.1.4
4.1.5	4.1.6	4.1.7

(7)

4.2 The overall charge on an atom is neutral. Explain why. (2)

4.3 The diagram to the right is an atom of an element in the periodic table:



4.3.1 Identify this element. (1)

4.3.2 Describe the position of this element on the Periodic Table. (2)

4.3.3 State the number of protons, electrons and neutrons in this atom. (3)

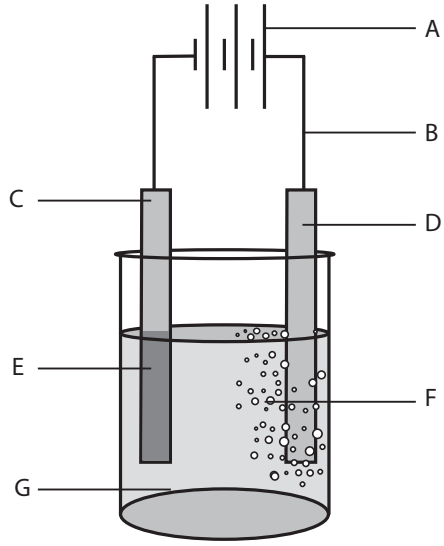
4.4 Explain the difference between an element and a compound. (3) **[15]**

5. A compound can be broken down into its elements by electrolysis.

5.1 Define electrolysis. (2)

5.2 Copper chloride undergoes electrolysis to form copper and chlorine gas.

5.2.1 Label the diagram below showing the process:

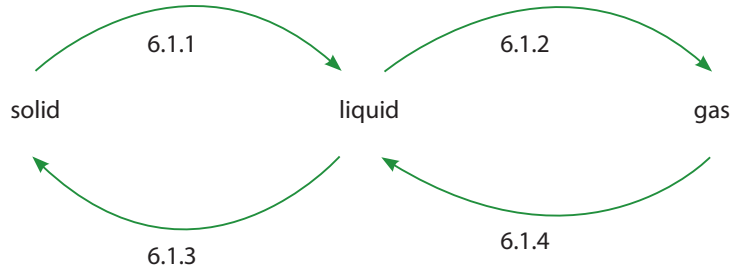


(7)

5.2.2 Describe the particles of chlorine gas including the spaces between particles and their movement. (2) **[11]**

6. A substance changes phase when it changes from a solid to a liquid to a gas.

6.1 Use your knowledge of phase changes to label the diagram below:



(4)

6.2 Do particles move closer together or further apart when they change from a solid to a gas? (1)

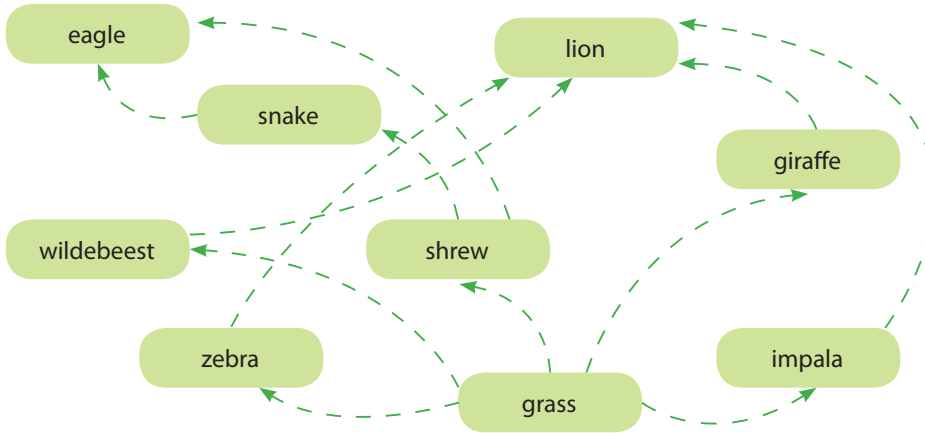
6.3 A cube of ice has a mass of 5 g and sides 2 cm long.

6.3.1 Define the term *density*. (2)

6.3.2 Calculate the density of the block of ice. (5)

6.3.3 Water has a density of 1 $g.cm^{-3}$. Will the ice float or sink on the water? Give a reason for your answer. (2) **[14]**

7. The diagram below shows a food web in the Savannah ecosystem.



7.1 Define a food web. (2)

7.2 Use the diagram to draw a food chain with four links. (4)

7.3 List three herbivores in this ecosystem. (3)

7.4 The balance can be disrupted by a number of factors. Write a paragraph discussing these factors. (4) **[13]**

[Total marks: 90]

Term 3 Assessment

Test

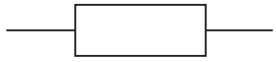
1. Choose the correct answer for each of the following questions:

   1.1 The light ray that passes out of a prism is known as…
   a. the emergent ray
   b. the incident ray
   c. the reflected ray
   d. the refracted ray. (2)

   1.2 The colour of light with the highest frequency is …
   a. yellow light
   b. red light
   c. violet light
   d. green light. (2)

   1.3 The smallest whole working part of a battery is known as a…
   a. resistor
   b. switch
   c. bulb
   d. cell. (2)

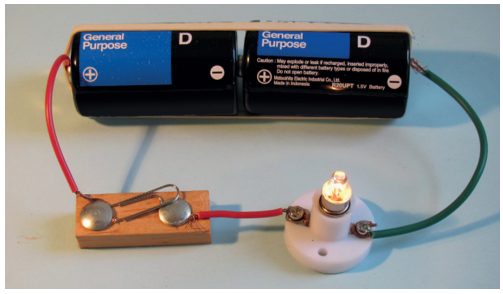
   1.4 The diagram below represents which component in an electrical circuit?

   a. Cell
   b. Resistor
   c. Bulb
   d. Switch (2)

   1.5 Which metal is used as the filament in light bulbs?
   a. Copper
   b. Nichrome
   c. Tungsten
   d. Magnesium (2) **[10]**

2. A light bulb forms part of an electric circuit as seen in the photograph below:



2.1 Draw a circuit diagram for this circuit. Make sure that you use the correct symbols for each of the components. (4)

2.2 Identify the type of energy stored in the battery. (1)

2.3 Current flows through the circuit. Define current. (2)

2.4 Describe the energy conversion that takes place in the bulb when the circuit is complete. (3)

2.5 Most of the light bulbs we use are incandescent light bulbs which contain a filament. Explain the functioning of the filament. (3)

2.6 Circuits can become overheated.

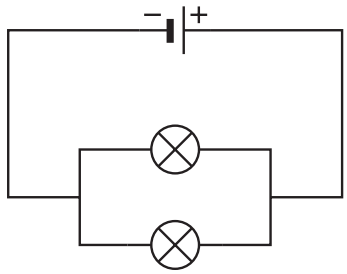
2.6.1 Why are overheated circuits dangerous? (1)

The photograph below shows a device that can be used to prevent circuits from overheating.

2.6.2 Name this device. (1)

2.6.3 Explain how this device prevents overheating. (3) **[18]**

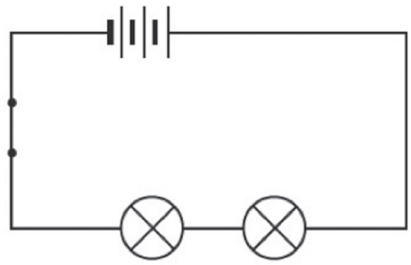
3. The circuit diagram below shows an electric circuit.



3.1 Is this a parallel or series circuit? Explain your answer. (2)

3.2 One of the bulbs is disconnected. How will this affect the brightness of the remaining bulbs? (1)

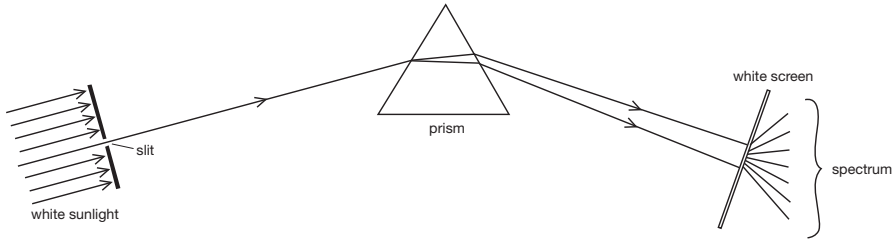
3.3 The circuit is now replaced with the one below:



3.3.1 An additional bulb is added to the circuit. How will this affect the brightness of the bulbs? Explain your answer. (2)

3.3.2 One of the bulbs is disconnected. What will you observe? (1) **[6]**

4. White light shines through a prism as seen in the diagram below:



4.1 List the colours of the visible light spectrum in the correct order. (7)

4.2 What name is given to the spreading out of white light? (1)

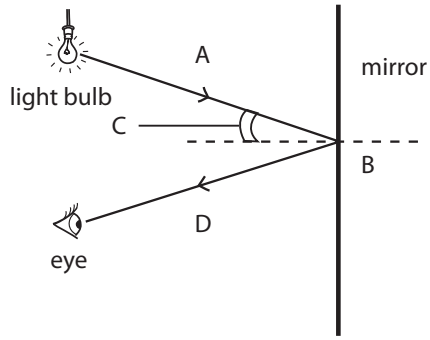
4.3 Sara says that, "Red light has the highest frequency and the longest wavelength." Is she correct? Explain your answer. (3)

4.4 Light is reflected off the flat surface of a mirror.

4.4.1 What type of reflection takes place? (1)

4.4.2 List four properties of the reflected image. (4)

4.4.3 Label the diagram below:



(4) **[20]**

5. Glasses use lenses to help bend and focus the light.

5.1 What name is given to the bending of light? (1)

5.2 Is glass transparent or opaque? Explain your answer. (2)

5.3 Draw a ray diagram showing the bending of light through a convex lens. Include the following labels:

- Focal point
- Incident rays
- Refracted rays

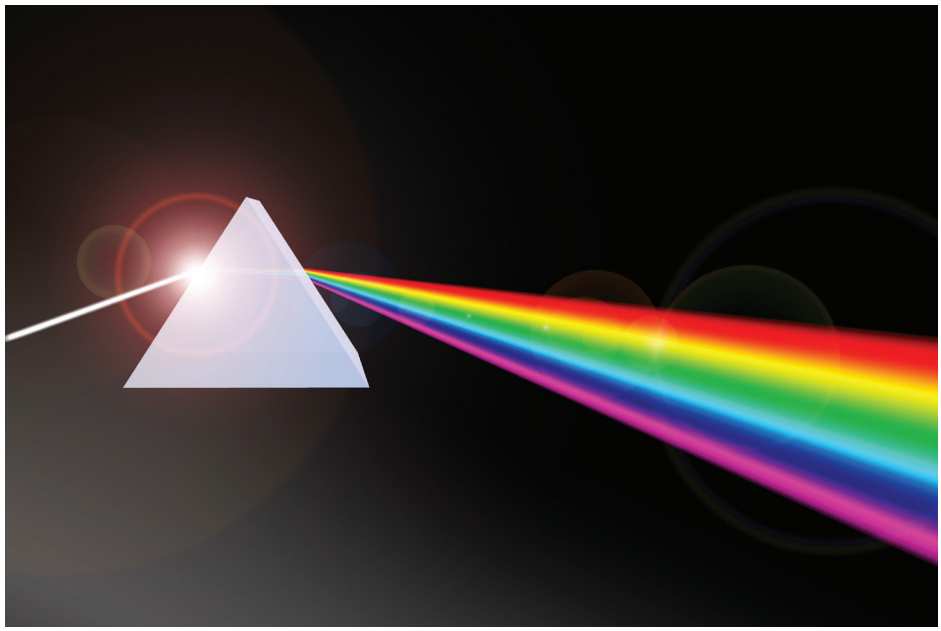
(3) **[6]**

[Total marks: 60]

Project: The electromagnetic spectrum

In this project learners will research the electromagnetic spectrum and present their research to the class in the form of an oral presentation. The electromagnetic spectrum is made up of the full range of electromagnetic waves, visible light being only one of them. The electromagnetic spectrum includes:

- radio waves
- microwaves
- infrared light
- visible light
- ultraviolet light
- x-rays
- gamma rays.



The learners' presentation should include:

1. their wavelength and frequency
2. their properties
3. their applications.

The learners' presentation will be marked according to the following rubric:

Criteria	1	2	3–4	5
Voice projection	Mumbles, difficult to understand.	Speaks clearly but too softly to hear. Monotone.	Speaks clearly, but does not maintain eye contact with the audience. Tone is varied.	Speaks clearly and engages the class.
Language	Limited vocabulary.	Uses an extensive vocabulary, but uses the words incorrectly.	Speaks well with an appropriate use of words.	Words used are correct and scientific vocabulary is used.
Science content and literacy	No analysis of science topic. No explanation. No science-specific connection.	Poor explanation. Inaccurate science connection. Misinterprets the science.	Adequate explanation. Science connection present but could be developed further.	Concept fully and properly explained. Insight present. Science-specific connection made. Content is accurate, comprehensive and well supported.
Topic	No attempt was made to cover all aspects of the topic.	Some information is missing.	Most aspects of the electromagnetic spectrum were discussed.	All aspects of the electromagnetic spectrum were discussed.
Creativity	No creativity shown.	Attempt at creativity, only one resource used.	Audience is engaged with the use of pictures or posters.	Shows creativity in presentation of content. Multiple resources are used.

[Total marks: 30]

Term 3 Intervention strategies

Term 3 assessments consist of a test and a project. The Term 3 assessments require students to not only understand new concepts, but also apply that knowledge in the form of analysing data. Learners that have performed poorly are likely to have struggled with one of the following:

- Conceptualising new content
- Understanding terminology
- Poor presentation skills.

Conceptualising new content

- Electricity is a difficult concept for learners to visualise.
- The more "real-life" examples used the easier it will be for the learners to conceptualise the topic. Use batteries and light bulbs to demonstrate a complete circuit and what would happen to the flow of current if there was a break in the circuit.
- Rearrange the connecting wires so that learners can see what is meant by a parallel and series circuit.
- Light is also best explained through practical demonstrations. Use a laser beam and a mirror to demonstrate the reflection and refraction of light.
- Use objects found in the classroom to explain the difference between transparent, opaque and translucent objects.

Understanding terminology

- Topic 1 and 2 introduce terminology that may be unfamiliar to some learners.
- One strategy that can help these learners is teaching them to summarise the content into bullet points and make use of mind-maps.
- This forces the learners to rewrite the content in their own words.
- Write difficult terminology on the board and use simple words to explain what those terms mean.
- Refer to the board whenever these words are used in the lesson.

Poor presentation skills

- Many learners struggle to speak in front of the class.
- This will improve with practice. The more opportunities learners are given the better they will become at speaking in front of their peers.
- Encourage these learners to answer questions in class and take part in class discussions by using one of the following strategies: Use the think-pair-share method. (Posing a question and allowing an individual think time followed by discussion with a partner and then sharing with others. This encourages shyer learners to communicate their ideas as it is less threatening to do this in a partnership and then foursome.)
- Tell-check-say (learner tells answer to a buddy, together they check if it is correct by looking in the textbook then the learner says the answer out loud to the class or writes it down).

- Target basic and then more advanced questions to specific learners based on their readiness to answer them. A good strategy is to first ask the question to the whole class. This ensures that everyone thinks about it. Next use a learner's name or better yet add the name **after** posing the question: "Sam, what name is given to the bending of light??" (the other learners likely think, "this is good – SAM has to answer it"). If you ask the question, wait 2 seconds and then add Sam's name ("What is the name given to the bending of light? Sam, what do you think?"), all the learners in the class will think about the question, even though only one learner, Sam, gives the answer.
- Keywords on cards can be used to help the learner remember their presentation. Eye contact is essential so emphasise to learners that they should not read their presentation.
- Diagrams and colour can help make a poster more interesting.
- Some learners find power points useful when presenting their work.

Term 4 Assessment

End-of-year examination

1. Choose the correct answer for each of the following questions:

   1.1 The light sensitive layer of cells at the back of the eye is known as the…
   a. cornea
   b. pupil
   c. retina
   d. optic nerve. (2)

   1.2 Which metal is used in the elements of stoves, heaters and toasters?
   a. Tungsten
   b. Copper
   c. Nichrome
   d. Zinc (2)

   1.3 Which planet has rings consisting of lumps of ice and rocks?
   a. Mars
   b. Jupiter
   c. Saturn
   d. Earth (2)

   1.4 The star closest to earth is…
   a. Alpha Centauri
   b. Beta Centauri
   c. Southern Cross
   d. Proxima Centauri (2)

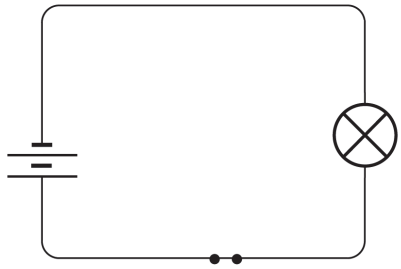
   1.5 The world's largest radio telescope is known as…
   a. SKA
   b. SALT
   c. Hubble
   d. KAT-7 (2) **[10]**

2. 

   2.1 Define *static electricity.* (2)

   2.2 A positively charged balloon sticks to the surface of a wall as seen in the photograph.
   2.2.1 Has the balloon lost or gained electrons? (1)
   2.2.2 What is the charge on the surface of the wall? Explain your answer. (2)
   2.2.3 Name the force that causes electrons to move from one object to another. (1) **[6]**

3. The diagram below shows an electrical circuit:



3.1 Which component is represented by the symbol below?

 (2)

3.2 An additional light bulb is added in parallel.

3.2.1 What is meant by a parallel circuit? (2)

3.2.2 Redraw the circuit diagram, but include the second bulb in parallel. (2)

3.2.3 Describe how adding the second bulb affects the brightness of the original bulb. Explain your answer. (2)

3.3 The light bulbs in the circuit diagram are replaced by LEDs.

3.3.1 What is an LED? (2)

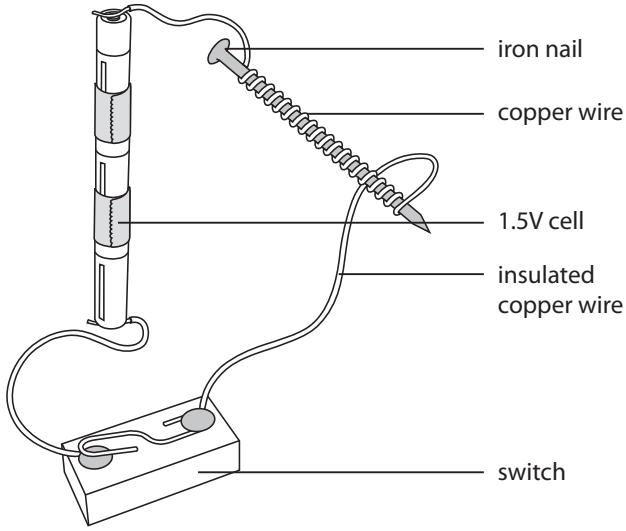
3.3.2 List two advantages of using LEDs instead of normal bulbs. (2) **[12]**

4. Match the terms in Column A with the description in Column B:

Column A	Column B
Resistor	A thin wire used to prevent circuits from overheating
Fuse	A component in an electric circuit that converts electrical energy into useful energy
Output device	A component that converts electrical energy into movement energy
Motor	A component that slows down the flow of current

[4]

5. Sam wants to investigate whether the number of 1.5 V cells used affects the strength of an electromagnet. He builds an electromagnet using materials he has at home.



He then uses the magnets to lift a number of paper clips. He adds another cell and repeats the experiment, recording the total number of paper clips it can pick up. He continues to add cells until he has five batteries connected in series.

5.1 State three uses for an electromagnet. (3)

5.2 An electromagnet is a temporary magnet.
What does this mean? (1)

5.3 State a possible hypothesis for his experiment. (2)

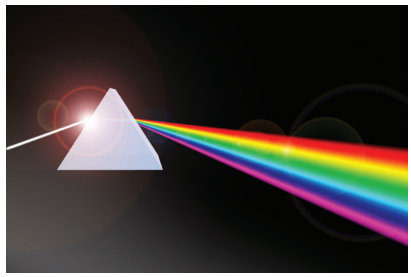
5.4 He records the following results in a table. Complete the table by calculating the total voltage of all the cells. (3)

Number of cells	Total voltage	Total number of paper clips lifted
1	1.5V	4
2	3.0V	7
3	5.4.1	12
4	5.4.2	16
5	5.4.3	18

5.5 Plot a line graph showing the number of paper clips lifted against the total voltage of the cells. (5)

5.6 What conclusion can we draw from his experiment? (2) **[16]**

6. White light is passed through a prism as seen in the photograph below:



6.1 What name is given to this phenomenon? (1)

6.2 Use the diagram to answer the following questions:

6.2.1 Which colour of light is diffracted the most, red or violet? (1)

6.2.2 Which colour of light has the longest wavelength, red or violet? (1)

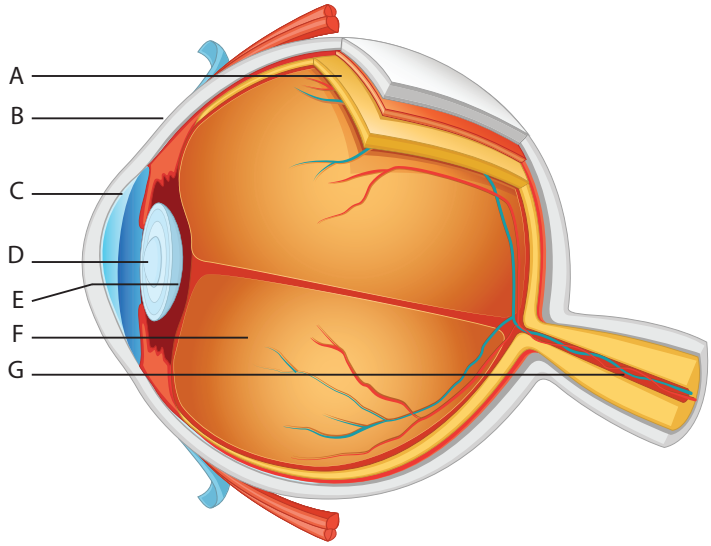
6.3 Light passes through a rectangular perspex block and undergoes refraction.

6.3.1 What is meant by the term *refraction*? (2)

6.3.2 Draw a ray diagram showing the refraction of light as it enters the block. Include the following labels in your diagram:

- Incident ray
- Normal
- Angle of refraction
- Angle of incidence
- Refracted ray
- Emergent ray. (6)

6.4 When light shines on an object, some of that light is reflected off the object and enters our eyes. That is how we see. Label the diagram below showing the different parts of the eye.

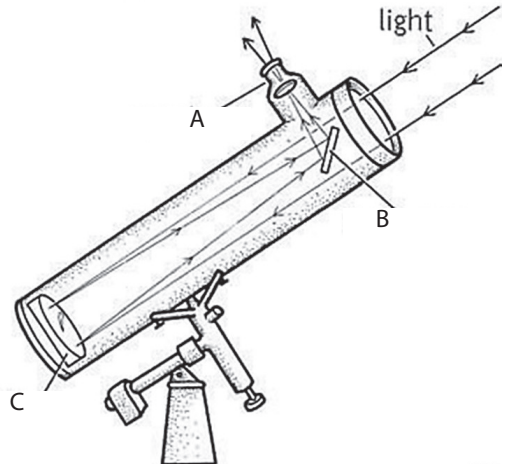


(7) **[18]**

7. The sun is the only body in our solar system that can produce its own energy.
   7.1 Is the sun an example of a luminous or non-luminous object? (1)
   7.2 Describe how the sun produces its own energy. Include an equation in your answer. (4)
   7.3 A number of planets orbit the sun. The planet to the right is the fourth planet from the sun and is found in between Earth and Jupiter.

      7.3.1 Identify this planet. (1)
      7.3.2 This planet is often called the red planet. Which element causes this red colour? (1)
      7.3.3 Is this planet suitable for humans? Give a reason for your answer. (2)
   7.4 Discuss why the earth is the perfect planet to support life. (4)
   7.5 Explain how planets differ from stars. (1) **[14]**

8. The earth together with our sun live in the Milky Way galaxy.
   8.1 What is a galaxy? (2)
   8.2 Describe the shape of the Milky Way. (1)
   8.3 The stars are so far away from us on earth that we need a telescope to see them.
      8.3.1 State the two types of telescopes. (2)
      8.3.2 Describe the factors that you should take into account when planning where to build a telescope. (2)
      8.3.3 Label the diagram of a reflecting telescope. (3) **[10]**

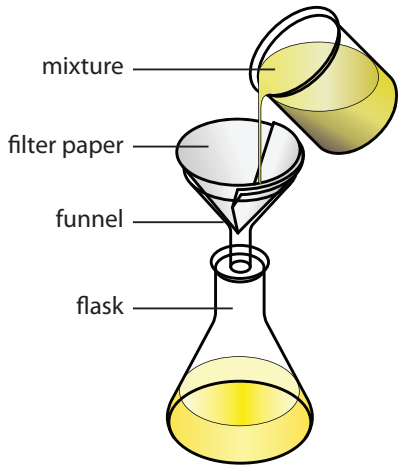


[Total marks: 90]

Baseline assessment answers

1.1 a. ✓✓ (2)
1.2 b. ✓✓ (2)
1.3 c. ✓✓ (2)
1.4 a. ✓✓ (2)
1.5 a. ✓✓ (2) **[10]**

2.1 filtration ✓ (1)
2.2



(4)

2.3 Recycling
Using biodegradable straws (any reasonable answer) (2) **[7]**

3.1 She would need red litmus paper and blue litmus paper. ✓ (4)

	Acidic substance	Basic substance	Neutral substance
Red litmus paper	Stays red	Turns blue	Stays red
Blue litmus paper	Turns red	Stays blue	Stays blue
	✓	✓	✓

3.2.1 It eats away at other materials. ✓ (1)
3.2.2 She could wear gloves, avoid getting it her eyes, wash her hands after working with them. ✓ (1)

3.3 Logical table used (4)

	Orange juice	Drain cleaner	Water
Red litmus paper	Stays red	Turns blue	Stays red
Blue litmus paper	Turns red	Stays blue	Stays blue
	✓	✓	✓

3.4 milk ✓ vinegar ✓ lemon juice (any reasonable example) (2) **[11]**

4.1 Sound energy ✓ (1)

4.2 output energy = 700 – 320 = 380✓J✓ (2)

4.3 Percentage efficiency = output energy/total energy x 100 ✓
% efficiency = 380/700 x 100 ✓ = 54.29% ✓ (3) **[6]**

[Total marks: 50]

Term 1 Assessment answers

Test 1

1.1 b. ✓✓ (2)
1.2 b. ✓✓ (2)
1.3 c. ✓✓ (2)
1.4 d. ✓✓ (2)
1.5 c. ✓✓ (2) **[10]**

2.1 Chlorophyll ✓ (1)
2.2 It absorbs light energy from the sun ✓ and converts it into a form plants can use. ✓ [2]
2.3 carbon dioxide ✓ + water ✓ + light energy ✓ → glucose ✓ + oxygen ✓ (5)
2.4 Starch is needed for growth ✓ and reproduction ✓ (2) **[10]**

3. Breathing is when you inhale oxygen ✓ and exhale carbon dioxide. ✓
Respiration is the process of releasing energy from food. ✓ **[3]**

4.1 Ecosystem ✓ It shows a community ✓ and its habitat. ✓ (3)
4.2 A group of organisms ✓ all of the same kind or species. ✓ (2)
4.3 Temperature ✓
Sunlight ✓
Rainfall ✓
Wind
Soil (any three) (3) **[8]**

5.1 The flow of energy ✓ from one organism feeding on another. ✓ (2)
5.2.1 Plankton✓ → fish larvae ✓ → small fish ✓ → seal ✓ (any suitable example) (4)
5.2.2 Fish larvae ✓ and crab ✓ (2) **[8]**

6.1 An animal that hunts other animals for food. ✓✓ (2)
6.2 Sharp teeth ✓
Can detect movement as an electromagnetic field ✓
Streamlined body ✓
Sharp teeth ✓
Powerful tail to help it swim fast ✓ (maximum 4 marks) (4)
6.3 fish larvae ✓ → small fish ✓ → seal ✓ → great white shark ✓ (4)
6.4 The seal population would grow too big ✓ disrupting the ecosystem. ✓ (2) **[12]**

7.1 Bacteria are microorganisms ✓ made up of only one cell. ✓ (2)

7.2 2 ✓ micrometres ✓ (2)

7.3 microbiologist ✓ (1)

7.4.1 coughing ✓
weight loss ✓
coughing up blood ✓ (3)

7.4.2 It can spread from one person to another. ✓ (1) **[9]**

[Total marks: 60]

Practical 1

Table

- logical layout ✓
- heading includes units ✓ (2)

Graph

- points plotted correctly ✓✓✓ (results will vary from learner to learner)
- axes labelled including units ✓
- an appropriate scale was used ✓ (5)

Questions

1. The plant converts light energy from the sun ✓ into food (glucose). ✓ (2)
2. Carbon dioxide + light energy + water ✓✓ → glucose + oxygen ✓✓ (4)
3. The greater the amount of carbon dioxide available, the faster the rate of photosynthesis. ✓✓ (or reverse argument). (2)
4. 4.1 The rate of photosynthesis ✓ (1)

   4.2 The amount of carbon dioxide available. ✓ (1)
5. As the amount of carbon dioxide increases ✓ the time it takes for half the leaf disks to floats decreases. ✓ This means that the more carbon dioxide present, the faster the rate of photosynthesis. ✓ (Answer must confirm results.) (3)

[Total marks: 20]

Term 2 Assessment answers

Practical 2

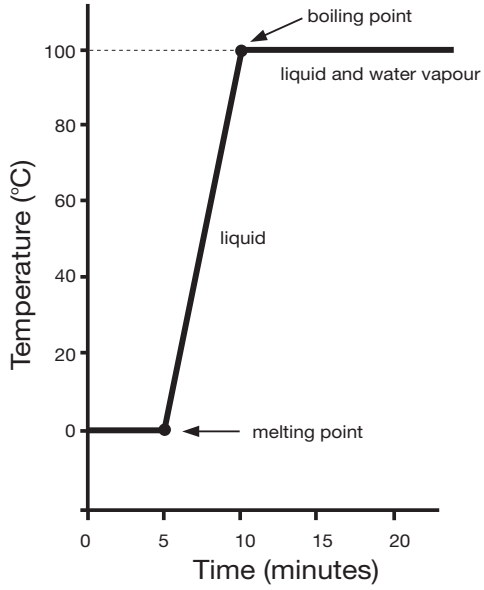
Table

- logical layout ✓
- heading includes units ✓ (2)

Graph

- points plotted correctly ✓✓✓ (results will vary from learner to learner)
- axes labelled including units ✓
- an appropriate scale was used ✓

Graph should look similar to the one below:



(5)

Questions

1. The temperature ✓ at which a liquid turns into a gas. ✓ (2)
2. 100° C ✓ (result must be taken from the graph) (1)
3.

	Solid	Liquid	Gas
Spaces between particles	Very small spaces between particles✓	Small spaces between particles ✓	Large spaces between particles✓
Movement of particles	Particles vibrate✓	Particles able to move around each other✓	Particles move fast and in all directions✓

(6)

4.1 Stays constant ✓ (1)

4.2 Temperature is a measure of the energy of a substance. ✓
As the substance heats up, it gains energy ✓ but the energy is used to move the particles further apart. ✓ (3)

[Total marks: 20]

Mid-year examination

1.1 a. ✓✓ (2)
1.2 a. ✓✓ (2)
1.3 b. ✓✓ (2)
1.4 a. ✓✓ (2)
1.5 a. ✓✓ (2) **[10]**

2.1 A pure substance ✓ that cannot be broken down into simpler substances. ✓ (2)
2.2.1 Sodium ✓ (1)
2.2.2 Group 1, ✓ Period 2 ✓ (2)
2.2.3 11 protons ✓ (1)
2.2.4 It is a metal ✓ It is on the left hand side of the Periodic Table. ✓ (2)
2.3 High melting and boiling point ✓
Malleable ✓
Ductile ✓ (3) **[11]**

3.1 Magnesium ✓ Mg ✓ (2)
3.2 Metal ✓ It is found on the left hand side of the Periodic Table. ✓ (2)
3.3 High melting and boiling point ✓
Malleable ✓
Good conductor of heat and electricity ✓ (3)
3.4 It is the number of protons ✓ in one atom of the element. ✓ (2)
3.5.1 Silicon ✓ (1)
3.5.2 A semi-conductor only conducts electricity when heated. ✓✓ (2)
3.6.1 It is the temperature ✓ at which a solid turns into a liquid. ✓ (2)
3.6.2 The melting point decreases ✓ as you move down the group. ✓ (2) **[16]**

4.1.1 electron ✓
4.1.2 negative ✓
4.1.3 positive ✓
4.1.4 in the nucleus ✓
4.1.5 neutron ✓
4.1.6 neutral ✓
4.1.7 in the nucleus ✓ (7)

4.2 The number of positively charged protons ✓ equals the number of negatively charged electrons. ✓ (2)

4.3.1 Carbon ✓ (1)

4.3.2 Group IV ✓ Period II ✓ (2)

4.3.3 Protons = 6 ✓
Electrons = 6 ✓
Neutrons = 6 ✓ (3)

4.4 An element is a pure substance that consists of only one type of atom. ✓ Compounds consist of two different elements ✓ chemically bonded together. ✓ (3) **[18]**

5.1 The process of breaking down ✓ a liquid compound by using electricity. ✓ (2)

5.2.1 A – battery ✓
B – copper wire ✓
C – electrode ✓
D – electrode ✓
E – copper metal ✓
F – chlorine gas ✓
G – copper chloride solution ✓ (7)

5.2.2 The particles have large spaces between them ✓ and move quickly. ✓ (2) **[11]**

6.1.1 melting ✓
6.1.2 boiling ✓
6.1.3 freezing ✓
6.1.4 condensation ✓ (4)

6.2 further apart ✓ (1)

6.3.1 The amount of mass ✓ in a particular volume. ✓ (2)

6.3.2 Volume = 2 x 2 x 2 = 8 cm^3 ✓
Density = mass/volume ✓
Density = 5/8 ✓ = 0.63 ✓ g $.cm^{-3}$ ✓ (5)

6.3.3 It will float ✓ It is less dense. ✓ (2) **[14]**

7.1 A food web is interlinked ✓ food chains. ✓ (2)

7.2 grass ✓ → shrew ✓ → snake ✓ → eagle✓ (4)

7.3 Zebra
Shrew
Giraffe
Impala
Wildebees (any three) (3)

7.4 Natural factors ✓ – floods/drought/extreme changes in climate✓
Human factors ✓ – poaching/pollution ✓ (4) **[13]**

[Total marks: 90]

Term 3 Assessment answers

Project

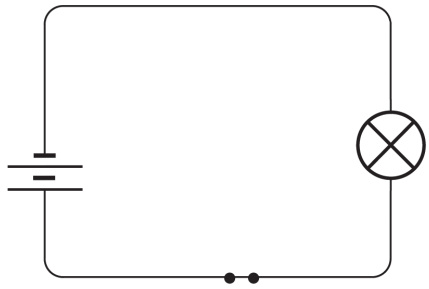
In this project learners are required to present their findings to their peers in the form of an oral presentation and a poster.

The presentation is marked according to the rubric provided. Learners may work in pairs and research can be done using the internet or books from the school library.

Test 2

1.1 a. ✓✓ (2)
1.2 c. ✓✓ (2)
1.3 d. ✓✓ (2)
1.4 b. ✓✓ (2)
1.5 c. ✓✓ (2) **[10]**

2.1



(4)

2.2 Potential energy ✓ (1)
2.3 The movement ✓ of charge in an electric circuit. ✓ (2)
2.4 electrical energy ✓ → heat ✓ and light energy ✓ (3)
2.5 It is a resistor. ✓ It slows the current down. ✓ This causes the electrical energy to be converted into light energy as the filament gets hot. ✓ (3)
2.6.1 Can lead to fires. ✓ (1)
2.6.2 Fuse ✓ (1)
2.6.3 It consists of a thin wire with a low melting point. ✓ When the current gets too big, it melts ✓ and the circuit breaks. ✓ (3) **[18]**

3.1 Parallel ✓ A circuit with more than one path across which the current can flow. ✓ (2)

3.2 No effect ✓ (1)

3.3.1 The bulbs will get dimmer. ✓ The current flowing through the circuit gets smaller.✓ (2)

3.3.2 None of the bulbs will light up. (1) **[6]**

4.1 Red ✓
Orange ✓
Yellow ✓
Green ✓
Blue ✓
Indigo ✓
Violet ✓ (7)

4.2 Dispersion ✓ (1)

4.3 No ✓ the red light has the lowest frequency ✓ and the longest wavelength. ✓ (3)

4.4.1 Regular reflection ✓ (1)

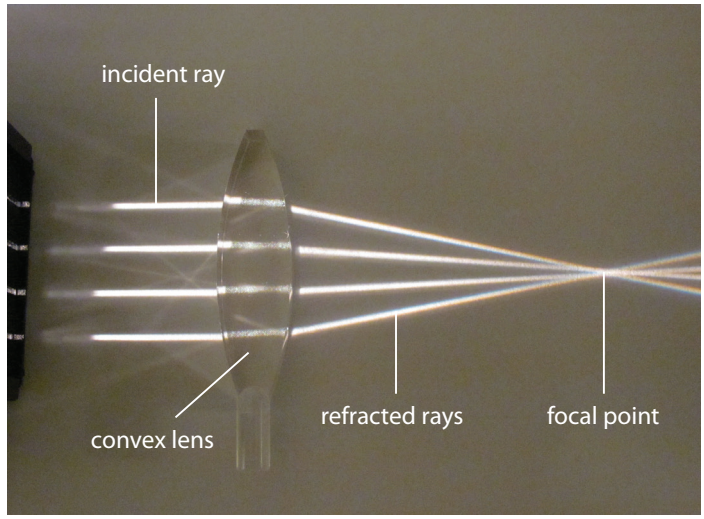
4.4.2 Same size ✓
Same shape ✓
The image is the same distance from the mirror as the object. ✓
The image is laterally inverted. ✓ (4)

4.4.3 A – Incident ray ✓
B – Normal ✓
C – Angle of incidence ✓
D – Reflected ray ✓ (4) **[20]**

5.1 Refraction ✓ (1)

5.2 Transparent ✓ It allows light to pass through it. ✓ (2)

5.3



(3) **[6]**

[Total marks: 60]

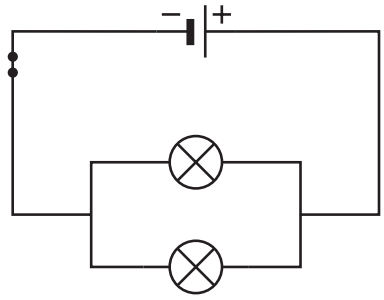
Term 4 Assessment answers

End-of-year examination

1.1 c. ✓✓ (2)
1.2 c. ✓✓ (2)
1.3 c. ✓✓ (2)
1.4 a. ✓✓ (2)
1.5 a. ✓✓ (2) **[10]**

2.1 The build-up of electric charge on an object. ✓✓ (2)
2.2.1 Lost electrons ✓ (1)
2.2.2 Negative, ✓ oppositely charged objects attract. ✓ (2)
2.2.3 Friction ✓ (1) **[6]**

3.1 Closed ✓ switch ✓ (2)
3.2.1 A circuit with more than one ✓ path along which current can flow. ✓ (2)
3.2.2



(2)
3.2.3 No effect. ✓ Each bulb has the same amount of current flowing through it as if it was on its own. ✓ (2)
3.3.1 Light emitting ✓ diode ✓ (2)
3.3.2 Uses less energy ✓ and lasts longer. ✓ (2) **[12]**

4.

Column A	Column B
Fuse	A thin wire used to prevent circuits from overheating
Output device	A component in an electric circuit that converts electrical energy into useful energy
Motor	A component that converts electrical energy into movement energy
Resistor	A component that slows down the flow of current

[4]

5.1 Electric bells, ✓ motors, ✓ dynamos, ✓ loudspeakers (max 3) (3)

5.2 You can turn it on and off. ✓ (1)

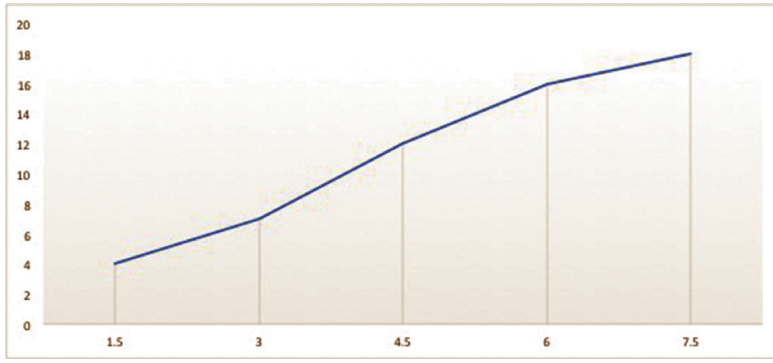
5.3. The greater the number of cells, the stronger the electromagnet. ✓✓ (2)

5.4.1 4.5V ✓

5.4.2 6V ✓

5.4.3 7.5V ✓ (3)

5.5 Correctly plotting the points ✓✓✓
Labelling the axes ✓
A suitable scale used ✓ (5)



5.6 The more cells added, the stronger the electromagnet. ✓✓ (2) **[16]**

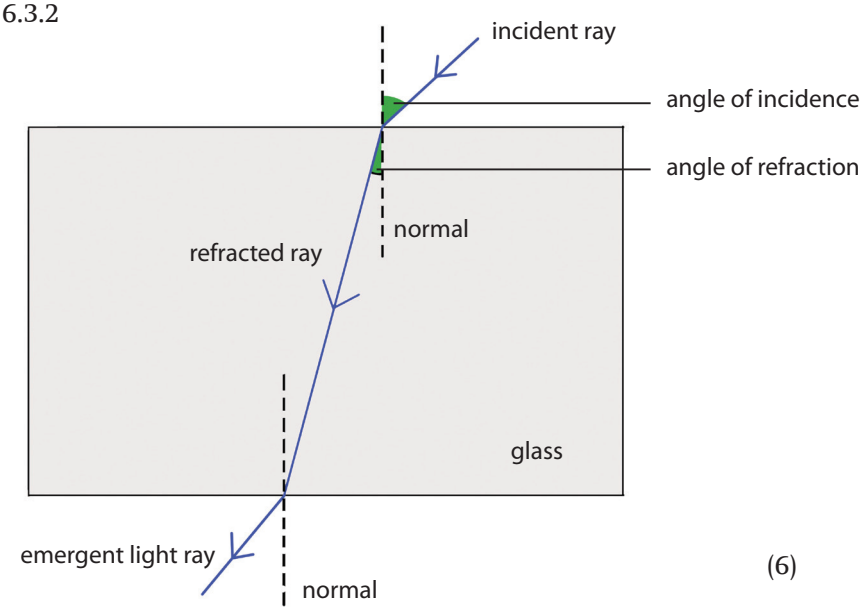
6.1 Dispersion ✓ (1)

6.2.1 Violet ✓ (1)

6.2.2 Red ✓ (1)

6.3.1 The bending of light ✓ when it enters a different medium. ✓ (2)

6.3.2



(6)

6.4 A – retina
E – lens
B – cornea
F – jelly
C – iris
G – optic nerve
D – pupil (7) **[18]**

7.1 luminous ✓ (1)

7.2 Nuclear reaction. ✓ Pressure causes two hydrogen atoms to fuse ✓ and form helium and energy. ✓ H + H → He + energy ✓ (4)

7.3.1 Mars ✓ (1)

7.3.2 Iron ✓ (1)

7.3.3 No, ✓ the atmosphere is mostly carbon dioxide. ✓ (2)

7.4 Sufficient oxygen in atmosphere
Temperature is not too hot or too cold
Rocky surface with plants for food
Planet contains lots of liquid water (4)

7.5 Planets unlike stars do not produce their own energy. ✓ (1) **[14]**

8.1 Millions of stars, gas and dust ✓ held together by gravity. ✓ (2)

8.2 Spiral ✓ (1)

8.3.1 Optical telescopes ✓ and radio telescopes ✓ (2)

8.3.2 Build where the air is clear of dust ✓ and away from cities and towns. ✓ (2)

8.3.3 A – eye piece ✓
B – flat mirror ✓
C – objective mirror ✓ (3) **[10]**

[Total marks: 90]

Notes

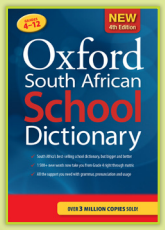
Notes

INTERVENTION GUIDE

Natural Sciences
Grade 8

For best results, use this guide with your *Oxford Successful Natural Sciences* Grade 8 Learner's Book and Teacher's Guide.

PLUS:



PHOTOCOPY OR DOWNLOAD IN A FLASH!

Visit freeresources.oxford.co.za to download this guide!

CONTACT US:
021 596 2300
083 798 4588
OxfordSASchools
@OxfordSASchools

Oxford – your choice for success
Trusted by South African teachers

THE MANDELA RHODES FOUNDATION

PROM190765798
SOUTH AFRICA

OXFORD UNIVERSITY PRESS

www.oxford.co.za