GRADE 9
2005

COMMON TASK FOR ASSESSMENT (CTA)

NATURAL SCIENCES

LEARNER'S BOOK

SECTION A

Suggested Time : 5 hours

Marks : 120

A group of your school friends read the following headline: "*There is no life on Mars and Venus because the Martians and the Venusians destroyed the life-sustaining ability of their planets and wiped out their species*". Frightened by this headline, they ask you to join them as they decide to find out what it is about planet Earth that makes it life-sustaining. You all wish to know how feasible it is for ordinary humans to destroy the life-sustaining properties of Earth and hence exterminate (exterminate means 'completely destroy') our species. You decide to investigate what you need to do to ensure the Earth is never threatened by such a catastrophe (a catastrophe is a great disaster). You decide to make your findings known by designing a poster. To find the answers you seek, you carry out a series of activities.

The Tasks and Activities in this Common Task for Assessment (CTA)

- Section A consists of three tasks, each with activities that you need to complete to help you do Section B, the controlled individual activity.
- Section A should be done in your Natural Sciences workbook or in an ordinary exercise book specifically for Section A of the CTA or on paper as decided by your teacher.
- You will need 5 hours during class time plus some time at home to complete Section A.
- You will complete some activities in Section A on your own, some in groups and some as a class.
- Your teacher, yourself and your peers will assess the work (evidence) that you produce.
- This manual contains only Section A.
- The table that follows is a summary of the tasks and activities you will do in this Section A. Take special note of what you will be assessed on and the kinds of evidence you are expected to produce for each task's activities.

SECTION A – LEARNER SUMMARY

PAGE NO	TASK 1	TIME	MAXIMUM MARKS	SO	ASSESSED AGAINST:	EVIDENCE TO BE PRESENTED FOR ASSESSMENT	WHO ASSESSES?
4	**ACTIVITY 1** **Translating information –** **What do we know about the planets in our Solar system?**	20 minutes (class work) + 20 minutes (homework)	15 marks	SO1	• Type of graph • Choosing scale of y-axis • Plotting graph • Labelling graph • Appearance of graph	Six graphs are produced by the group – each member submits one graph.	TEACHER
6	**ACTIVITY 2** **Consolidating ideas –** **What makes planet Earth suitable for life?**	30 minutes (class work) + 20 minutes (homework)	10 marks	SO2	• Extent of ideas • Relevance of ideas • Structure of a Thinking Map • Use of space • Appearance of Thinking Map	An individual Thinking Map showing: What makes planet Earth suitable for life?	SELF
	TASK 2						
7	**ACTIVITY 3** **Acquiring knowledge –** **How can we represent the chemistry of life on planet Earth?**	50 minutes (class)	20 marks	SO2	• Writing chemical formulae • Drawing microscopic view diagrams • Balancing chemical equations • Writing balanced chemical equations	Individual written answers to question 3.1 Individual written answers to question 3.2	SELF

PAGE NO	TASK 2 (CONT)	TIME	MAXIMUM MARKS	SO	ASSESSED AGAINST:	EVIDENCE TO BE PRESENTED FOR ASSESSMENT	WHO ASSESSES
12	**ACTIVITY 4** **Debating an issue –** **What responsibilities do humans have to life on Earth?**	20 minutes (class) + 10 minutes (homework)	10 marks	SO5 SO8	• Making an ethical choice • Justifying an ethical choice	A statement making an ethical choice with a written paragraph to justify the position taken	TEACHER
14	**ACTIVITY 5** **Designing experiments –** **How can we test a condition necessary for life?**	40 minutes (class) + 30 minutes (homework)	15 marks	SO1 SO2	• Forming a hypothesis • Designing a fair test • Identifying variables • Controlling variables • Choosing measurement method	Individual written report on experimental design	TEACHER
	TASK 3						
15	**ACTIVITY 6** **Brainstorming ideas and calculating my footprint –** **What threatens life on Earth and what threats do you personally pose?**	40 minutes (class) + 10 minutes (homework)	15 marks	SO1 SO2	• Calculation of personal carbon footprint • Comparing data	Calculation of personal carbon footprint + answers to questions 7.1	PEER
18	**ACTIVITY 7** **Predicting impact –** **What can our country do to safeguard planet Earth?**	20 minutes (class) + 30 minutes (homework)	20 marks	SO4 SO5 SO9	• Identifying positive social impacts • Identifying negative social impacts • Identifying positive environmental impacts • Identifying negative environmental impacts	Table of impacts on people and the environment	TEACHER
20	**ACTIVITY 8** **Taking personal responsibility –** **What can YOU do to safeguard planet Earth?**	80 minutes (class)	15 marks	SO2 SO3 SO4	• Extent of ideas presented • Value of ideas presented • Organisation of ideas • Innovation in design • Visual impact of poster	Group poster	PEER

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TASK 1

Bill Bryson in his book *A Short History of Nearly Everything* writes "It isn't easy being an organism. In the whole universe, as far as we yet know, there is only one place, an inconspicuous outpost of the Milky Way called Earth, that will sustain you …"

What is so special about our planet Earth that enables it to sustain life?

In Task 1 you will complete a series of activities in which you will learn more about planet Earth. You will compare Earth to other planets in our Solar system and establish some of the conditions for life.

ACTIVITY 1: What do we know about the planets in our Solar system?

Time: 20 minutes (class work) 20 minutes (homework) **Marks: 15**

Overview

During this activity you will draw a bar graph giving information about the different planets in our Solar system. This is a group activity. Each group member will draw a different graph. The graph drawn by each member will be assessed.

Evidence

You need to produce:

- one bar graph, in your workbook, displaying the set of information about the various planets allocated to you.

Activity

Look at the data in Table 1.

Table 1: Planetary Data compared to Earth (where Earth =1)

Planet	Distance from Sun	Year Length	Mass	Diameter	Density	Gravity
Mercury	0.39	0.24	0.06	0.38	0.98	0.3
Venus	0.72	0.61	0.82	0.95	0.95	0.9
Earth	1	1	1	1	1	1
Mars	1.52	1.88	0.11	0.53	0.71	0.4
Jupiter	5.20	11.86	318	11.27	0.24	2.6
Saturn	9.54	29.46	95	9.44	0.13	1.1
Uranus	19.2	84.02	15	4.10	0.22	0.9
Neptune	30.1	164.8	17	3.88	0.30	1.4
Pluto	39.4	248	0.002	0.17	0.24	0.05

- Work in groups of six. Each member of the group draws a different bar graph. Each bar graph should display one of the following sets of data for all nine planets taken from table 1.

    1. Distance from the Sun
    2. Year Length
    3. Mass
    4. Diameter
    5. Density
    6. Gravity

- Discuss the following in your group before you start:

    What sort of bar graph will you use?

    What scale will you use?

    What heading will you have?

    What labels will you include?

- Each graph will be assessed on:

	Type of graph	(3 marks)
	Choosing scale of y axis	(3 marks)
	Plotting graph	(3 marks)
	Labelling graph	(3 marks)
	Appearance of graph	(3 marks)

- Each group must hand in all six graphs to your teacher. Ensure that the name of the group member is on the graph he/she draws.

ASSESSMENT - Your teacher will assess the graphs according to the criteria listed in the 'Assessed Against:' column of the learner summary for this activity on page 2.

ACTIVITY 2: What makes planet Earth suitable for life?

Time: 30 minutes (class work) **Marks: 10**
20 minutes (homework)

Overview

During this activity you need to listen to your teacher and then brainstorm within your group in order to identify what makes planet Earth suitable for life.

Evidence

You need to produce:

- your group's list that answers the question – 'What makes planet Earth suitable for life?'
- a thinking map entitled 'What makes planet Earth suitable for life?' based on the list drawn up by your group.

Activity

- Listen to your teacher introduce some ideas about what makes Earth suitable.
- Working within your group, brainstorm a list of factors that you believe accounts for the fact that planet Earth is suitable for life.

Hints:

- Think carefully.
- What do you know about Earth compared to the other planets in our Solar system?
- Think about factors on which your life depends.
- Think of as many ideas as you can and write them down so that all the members of the group can see and discuss them. Keep an individual record of the list produced by the group.
- Listen to your teacher explain what a thinking map is.
- Individually, use your list to produce your own thinking map that answers the question, 'What makes planet Earth suitable for life?'
- Your thinking map will be assessed on:

Extent of ideas	(2 marks)
Relevance of ideas	(2 marks)
Structure of Thinking Map	(2 marks)
Use of space	(2 marks)
Appearance of Thinking Map	(2 marks)

ASSESSMENT - Your teacher will guide you through the self assessment of this activity.

TASK 2

In Task 2 you will complete a series of activities in which you will learn more about the chemistry of planet Earth and how it contributes to Earth's ability to sustain life. You will debate the ethics of scientific experimentation with living organisms and then design an experiment to test a condition for life.

ACTIVITY 3: How can we represent the chemistry of life on Earth?

Time: 50 minutes (class work) Marks: 20

Overview

During this activity you will learn about the chemistry of life on Earth.

Evidence

During this activity, you need to produce:

- the answers to questions 3.1 and 3.2 in your workbooks.

Activity

Read the following:

Three Substances Important To Sustain Life

Oxygen
Oxygen is essential for life. Many substances burn in oxygen, transferring energy to the surroundings during the process. When fuels like petrol burn in a motor car engine, the energy transferred causes the car to move. We describe this chemical reaction as combustion. A similar reaction occurs in living organisms. Energy is transferred when food like glucose reacts with oxygen in the cells. This energy enables the organism to live. We describe the reaction as respiration.

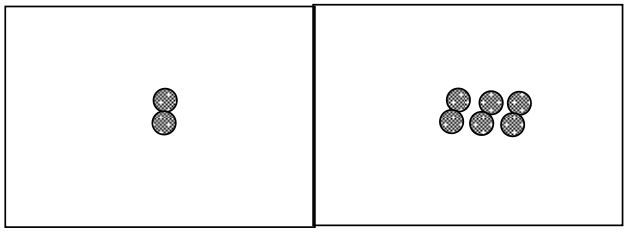
Water (based on 'Molecules at an Exhibition' by John Emsley)
Water is fascinating - It is one of the most investigated of all chemicals, but it is still one of the most puzzling. The water molecule, H_2O, appears simple. It consists of two hydrogen atoms attached to an oxygen atom in a V-shaped arrangement. Yet nothing is as complex as water in its behaviour. For example, H_2O should be a gas at room temperature (taken to be 25°C) like its sister molecule H_2S, hydrogen sulfide. Moreover, when it freezes at 0°C its solid form, ice, floats instead of sinking. Water expands when its temperature falls below 4°C and expands most of all when it turns into ice. It is this unique property of water that helps sustain life on Earth. Because water freezes from the top down, the ice 'blanket' that forms above the warmer water reduces the rate at which this water cools and creatures are able to live in the water. If the waters in which life started had frozen solid in winter, life would have been snuffed out straight away.

Carbon (from 'The Fifth Miracle' by Paul Davies)
Carbon is the truly vital element. It has a unique chemical property: carbon atoms can link together to form extended chain molecules of limitless variety and complexity. Proteins and DNA are two examples of these long chain molecules. If it weren't for carbon, life as we know it would be impossible. Probably any sort of life would be impossible.

Representing substances using diagrams and formulae
We have two ways of looking at matter in chemistry: macroscopically and microscopically. When we look at matter macroscopically, we look at what we see with our own eyes: its shape, colour, state and so on. When we look at it microscopically, we imagine that we can see the particles that make it up.

Using the following key, ▨ ≡ Oxygen atom ● ≡ Carbon atom ○ ≡ Hydrogen atom we can represent:

Example 1: One oxygen molecule Example 2: Three oxygen molecules



From these microscopic diagrams, we can write a chemical formula:

Example 1	Example 2:
O_2	$3O_2$

Whether we look at the diagram or the chemical formula, we can see how many atoms of each type there are in the molecule.
Complete microscopic diagrams for the following examples on your own:

Example 3 One water molecule	Example 4: Two water molecules

Write the formula for what is represented:

Example 3: Example 4:

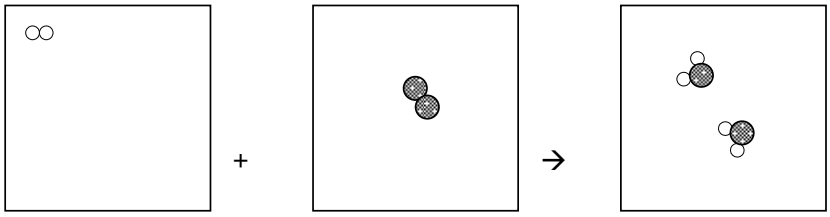
Check your responses with your teacher.

Representing chemical reactions using equations

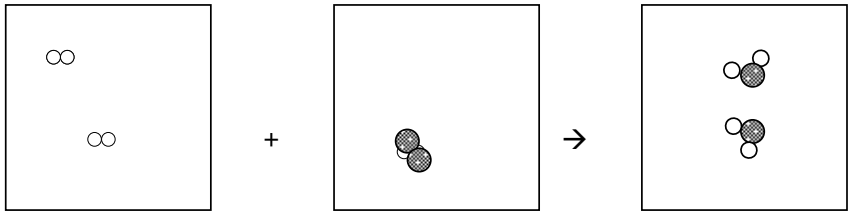
We use chemical formulae in chemical equations to represent a chemical change (chemical reaction).

For example: hydrogen (H_2) burns (reacts with oxygen – O_2) to form water (H_2O).

We can represent this chemical change microscopically:



You can clearly see that we have a problem in the above diagrams.
The number of atoms of each type in the reactant molecules (shown in the boxes before the arrow) must be the same as the number of atoms of each type in the product molecules (shown in the box after the arrow). This is because a chemical change involves a rearranging of the bonds between reactant atoms. There is no change in the number of reactant atoms – atoms are conserved. To correct this we must add molecules to balance the number of atoms of each type on the left and right side of the arrow.

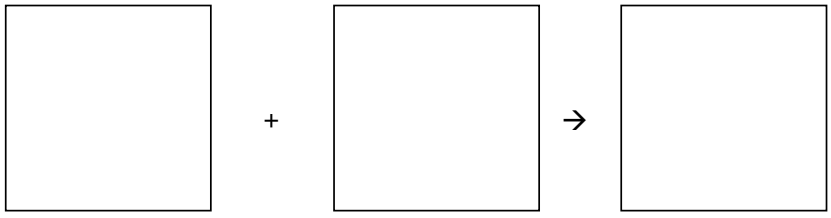


Now we can represent this chemical change using formulae to write a balanced chemical equation:

$$2H_2 \quad + \quad O_2 \quad \rightarrow \quad 2H_2O$$

Complete the following on your own:

Draw microscopic diagrams to represent the carbon (C) burning (reacting with oxygen) to form carbon dioxide (CO_2).



Use formulae to write a balanced chemical equation for the reaction:
Check your responses with your teacher.

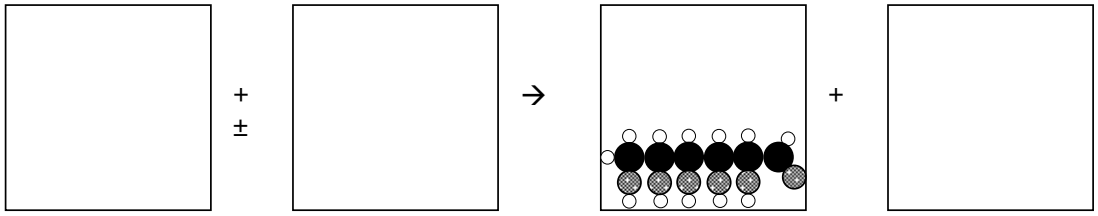
Here is another example: energy from the Sun is harnessed by the chlorophyll pigment in green leaves of plants and is used to convert carbon dioxide from the air and water from the soil into carbohydrates like glucose.

The process is called photosynthesis and this is the reaction equation:

$$CO_2 + H_2O \xrightarrow{\text{sunlight}} C_6H_{12}O_6 + O_2$$

The reactants are carbon dioxide and water and the products are glucose and oxygen. Remember in any chemical reaction, atoms are conserved. This means that the number of each kind of atom present in the reactant molecules is the same as the number of each kind of atom present in the product molecules.

Complete microscopic diagrams to represent this chemical change:



Check your responses with your teacher.

A reverse reaction occurs when we use up carbohydrates in our bodies. This is the process of respiration. We use the oxygen that we breathe in from the atmosphere to react with foods like glucose to form carbon dioxide and water. This carbon dioxide we breathe out into the atmosphere.

Complete the following and hand in to your teacher for assessment:

Use the following key: ⊗ ≡ Oxygen atom ● ≡ Carbon atom ○ ≡ Hydrogen atom

3.1 Write a chemical formula to represent each of the following:

a) (1 mark)

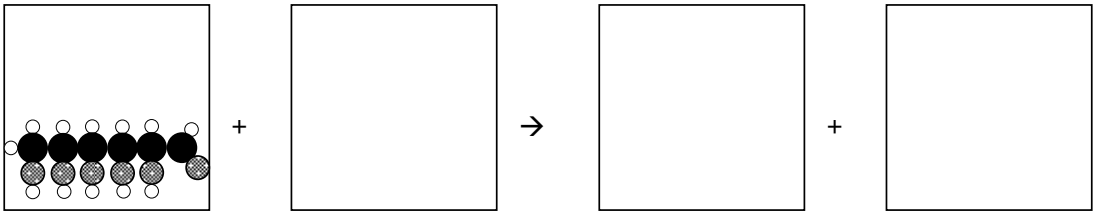
b)  (1 mark)

c)  (2 marks)

d)  (2 marks)

e)  (2 marks)

3.2 a) Complete microscopic view diagrams in the squares below to show the chemical change that occurs during **respiration**:



(6 marks)

b) Working from the microscopic view diagrams you have drawn for the process of respiration, write a balanced chemical equation to represent this chemical change (6 marks)

ASSESSMENT- Your teacher will guide you through the self-assessment of this activity.

ACTIVITY 4: What responsibilities do humans have for life on Earth?

Time: 20 minutes (class work) Marks: 10
10 minutes (homework)

Overview

In Activity 5 you must design a scientific experiment involving living organisms. Activity 4 requires that you reflect on the ethical issues involved in experimenting using animals before you design your experiment.

Evidence

During this activity you need to produce:

- two checklists of opinions for 4.1;
- a statement giving your position with regard to the experiment involving animals described, with a written paragraph giving reasons why you have taken this position in 4.2.

Article I. Activity

Experimenting on living organisms, particularly animals, is common in scientific research. Read through the following scenario adapted from the website *onlineethics.org*:

John is a university student whose major project requires that he explore the workings of the central nervous system. Impressed with his ideas, his advisor proposes that he works with John and that they apply for funding in order to perform experiments on an animal to find the information John needs. John is worried as he knows that performing these experiments requires a fully functioning animal with a working nervous system - in other words, the animal must be awake and conscious.

John also knows what such an experiment might be like. He knows that the experimental procedure would begin with giving the animal an anaesthetic (an anaesthetic is a drug that makes the animal lose consciousness), not for the animal's benefit, but for experimental convenience: it is much easier to handle animals initially if they are temporarily unconscious. He also knows that the cheapest and most effective anaesthetic is carbon dioxide, which works simply by cutting off the animal's oxygen supply. The animal would struggle violently when placed in the gas chambers, until the oxygen content in the tissues drops below the level necessary to be conscious. After rendering the animal unconscious, John would have to perform gross surgery, working quickly to restrain the animal and remove its limbs preventing further struggle that might result in nerve damage during the finer surgery to come.

The finer surgery would take about an hour and a half. Although the animal need not be conscious during this period, exposure to carbon dioxide for such a long period would either kill the animal or cause irreversible brain damage, both unacceptable outcomes for the experiment. Therefore, it would have to be allowed to regain consciousness during the finer surgery.

By the time the animal awakes, its legs would be gone. The animal would likely explore the stumps that remain with its mouth and start to shake a little after exploring the wound sites, probably from shock. After the finer surgery and with its head braced, the animal would be subjected to painful procedures in order to explore the relationship between nerve cell activity and animal behaviour. The final phase of the experiment could last another eight hours if the animal survives that long. All of these procedures would be performed without pain killers in a fully conscious animal.

John's advisor believes that his experiment is worthwile. John can collect important information that can be used to help humans suffering from neurological damage and diseases that affect the nervous system. The sacrifice of a single animal's life could save many thousands of humans lives.

4.1 Complete the following checklists:

a) *The Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* has published the following guiding questions for experiments involving animals. Answer these questions in your group about John's experiment by ticking the relevant column.

	YES	NO
Could the aim of this experiment be achieved without using animals?		
Would the animals be adversely impacted on by this experiment?		
Will arrangements be made to minimise or avoid any adverse impact on the animals in this experiment?		
Will the animal's wellbeing be regularly assessed during the experiment?		
Do the potential benefits of the experiment outweigh the impact on the animal's welfare?		

b) The same Australian document asks: *Has the most appropriate species been selected for the experiment?*
Which animal species do you think would be ethical to use for John's experiment?

	YES	NO
grasshopper		
frog		
mouse		
dog		
chimpanzee		

4.2 a) Should John agree to do this experiment? (1 mark)

b) Write a paragraph to support your view and giving reasons for your choice in 4.2(a). (9 marks)

ASSESSMENT – Your teacher will assess this activity using the criteria listed in the 'Assessed Against:' column of the learner summary for this activity on page 2.

ACTIVITY 5: How can we test a condition necessary for life?

Time: **40 minutes (class work)** **Marks: 15**
30 minutes (homework)

Overview

During this activity you will choose a testable condition for life (like air, water, light or food). You will test this condition for life on a living organism of your choice. You will look at what is needed to design a fair test and then design such a test for your chosen condition for life.

Evidence

During this activity, you need to produce:
- an individual written report detailing your experimental design;
- a completed checklist against which your design will be evaluated.

a. Activity

- Your teacher will discuss fair tests with you.
- Choose one condition to test as a condition for life. Design an experiment, a fair test, to test this condition.
- Write a brief but clear report describing your experimental design.
- Complete the following checklist to help you in preparing your report detailing your experimental design:

	Done	Not Done
Condition for life is identified		
Living organism identified		
Investigative question is formulated		
Hypothesis is formulated		
Experimental method is described		
What will be measured is identified		
How it will be measured is described		
Independent variable is identified		
Dependent variable is identified		
Controlled variables are identified		

- Your report will be assessed on:

Forming a hypothesis	(3 marks)
Designing a fair test	(3 marks)
Identifying variables	(3 marks)
Controlling variables	(3 marks)
Choosing measurement method	(3 marks)

ASSESSMENT – Your teacher will assess this activity using the criteria listed in the 'Assessed Against:' column of the learners summary for this activity on page 3.

TASK 3

In Task 3 you will complete a series of activities in which you will look at the threats to life on Earth, particularly those posed by you personally. You will consider what actions can be taken to safeguard the planet on a national scale and on a personal scale. You will make your findings known by designing a poster.

ACTIVITY 6: What threatens life on Earth and what threats do you personally pose?

Time: 40 minutes (class work) Marks: 15
10 minutes (homework)

Overview

Before you do this activity you need to find some details of your home energy consumption. During this activity, you will discuss what threatens life on Earth. You will look at the way in which your activities threaten planet Earth's ability to sustain life. You will work out your carbon footprint.

Evidence

During this activity, you will have to produce the following evidence:

- Your calculated carbon footprint.
- Answers to questions 6.1.

Article II. Activity

- Your teacher will engage you in a class discussion of the threats to Earth's ability to sustain life. He/she will collect these ideas on the board or overhead projector.

  Which of these threats do your activities actually contribute to?

- The impact that you have on the planet is called your ecological footprint. A big impact causing lots of damage is referred to as a 'heavy footprint', while a small impact causing little damage is referred to as a 'light footprint'. What sort of footprint do you have? Your ecological footprint can be divided up into more specific impacts, for example, your energy footprint. Let's measure your carbon footprint – the impact you are having on the atmosphere by adding CO_2 to it, through your activities. The amount of CO_2 in the atmosphere is a direct cause of global warming.

- You need to find out the following information from home:

  How many members are in your household?

  How many cars are in your household?

  How many litres of fuel are used in each car per month?

  What type of fuel does each car use (diesel or petrol)?

  How many kilowatts of electricity are used in your home per month?

  How much of other household fuels is used per month, e.g. paraffin, candle wax, propane, liquid gas, kerosene or coal?

- Use the following steps to calculate your carbon footprint:

A. **Motor vehicle 1**:

number of litres of fuel x Emission Factor of the fuel

= number of kilograms of CO_2 emitted per month

No. of litres fuel	Emission Factor	No. of kilograms CO_2
	x 2,68 (diesel)	
	x 2,35 (petrol)	

B. **Motor vehicle 2**:

number of litres of fuel x Emission Factor of the fuel

= number of kilograms of CO_2 emitted per month

No. of litres fuel	Emission Factor	No. of kilograms CO_2
	x 2,68 (diesel)	
	x 2,35 (petrol)	

C. **Household Electricity Consumption:**

number of kilowatt hours consumed per month x Emission Factor for South Africa = number of kilograms of CO_2 emitted per month

No. of kwh	Emission Factor	No. of kilograms CO_2
	x 0,845	

Other Household Fuel Consumptions:

Fuel	Monthly Consumption	Emission Factor	No. of kilograms CO_2
Paraffin	Litres	x 2,7	
Candle wax	kilograms	x 3,1	
Propane	Litres	x 1,4	
Liquid gas	Litres	x 1,8	
Kerosene	Litres	x 2,6	
Coal	kilograms	x 2,5	

(4 marks)

To work out your carbon footprint, add the number of kilograms of carbon dioxide produced by your family each month, i.e. motor vehicle 1 + motor vehicle 2 + household electricity + other household fuels. (2 marks)

Divide your total by the number of people (consumers) in your household or family. (2 marks)

This answer is an estimate of the average number of kilograms of carbon dioxide that you are responsible for pumping into the atmosphere each month. (2 marks)

- Get together in your group and compare your carbon footprints. Answer the questions which follow:

6.1 a) Who has the heaviest carbon footprint in your group?
b) What is that person's carbon dioxide emission per month?
c) Who has the lightest carbon footprint in your group?
d) What is that person's carbon dioxide emission per month?
e) Which is the bigger portion of your carbon footprint: transportation or energy use? (5 marks)

ASSESSMENT – Your teacher will guide the class through the peer assessment of this activity.

ACTIVITY 7: What can our country do to safeguard planet Earth?

Time: 20 minutes (class work) **Marks: 20**
30 minutes (homework)

Overview

- During this activity you will consider some ideas that could be implemented by our government and the impact these could have on the people and the environment of South Africa.

Evidence

During this activity you will produce the following:

- a table of identified impacts on people and the environment.

Article III. Activity

- Imagine that our South African Department of Energy Affairs proposes the following plans to save our planet by reducing our national carbon footprint:

  Plan 1: Install a solar panel system to generate 10% of our electricity

  Plan 2: Increase the price of electricity to curb consumption

  Plan 3: Place a levy on the price of motor vehicles with high fuel consumption

  Plan 4: Put a daily limit on the numbers of cars travelling into major cities

- Discuss in your group whether implementing each plan will be more positive or more negative for people; and whether implementing each plan will be more positive or more negative for the environment. In order to do this, you must identify the possible positive and negative impacts on people and on the environment that each plan could have.

- Copy the table and complete it by writing in the positive and negative impacts and then ticking whether you think the plan will be more positive or negative for the people and the environment. This must be done on your own.

Plan	Positive Impact on People	Negative Impact on People	Positive Impact on Environment	Negative Impact on Environment	
Plan 1					(4 marks)
More positive? More Negative?					(2 x ½ mark)

Plan 2					(4 marks)
More positive? More Negative?					(2 x ½ mark)
Plan 3					(4 marks)
More positive? More Negative?					(2 x ½ mark)
Plan 4					(4 marks)
More positive? More Negative?					(2 x ½ mark)

ASSESSMENT – Your teacher will assess this activity according to the criteria listed in the 'Assessed Against:' column of the learner summary for this activity on page 3.

ACTIVITY 8: What can YOU do to safeguard planet Earth?

Time: 80 minutes (class work) Marks: 15

Overview

- During this activity you will identify what you and your peers can do to save the planet by reducing your own personal carbon footprints.

Evidence

During this activity you will produce the following:

- a poster design to educate your peers as to what they can do to reduce their carbon footprint.

Activity

- In your group, make a list of all the things that you and your peers can do in your own environment to reduce your personal carbon footprints. Organise your list into related categories. Plan and create a poster to educate the other groups as to the difference that they can make. Everyone in the group must contribute to the poster.

  Your poster will be assessed on the following:

  - the number of ideas presented
  - the value of the ideas presented
  - the organisation of the ideas
  - the visual impact of the poster

	0 marks	1 mark	2 marks	3 marks
Number of ideas	No ideas presented	0 – 5 ideas presented	6 – 10 ideas presented	More than 10 ideas presented
Value of ideas	No ideas presented	Ideas are inappropriate and/or irrelevant	Ideas are appropriate and relevant but a key idea is missing	Ideas are appropriate and relevant and all key ideas are included
Organisation of ideas	No ideas presented	Organisation is unclear and confusing	Organisation is clear but too simple	Organisation is clear, detailed and interesting
Innovation of design	No poster created	Little innovation of design is evident	Some innovation of design is evident	Design is innovative and inspiring
Visual impact	No poster created	Poster is dull and lacks visual impact	Poster is visually pleasing but not eye-catching	Poster is visually exciting and eye-catching

ASSESSMENT – Your teacher will guide your peers to assess your group's poster according to the rubric above and guide you through the peer assessment component of this activity.