



Energy Education
Intermediate Phase (Grade 4 - 6) (CAPS)
Educator Guide
Mathematics

Energy Education

Energy Education

The demand for electricity is growing. An alternative to building new power stations to supply the increase in demand for electricity is to use what we have more efficiently (i.e. without wasting), one of the ways is to change the way we use electricity. Eskom's Integrated Demand Management (IDM) Energy Education programme motivates people to change the way they use electricity. Eskom has taken the approach of integrating energy education within the school curriculum.

The energy education programme is being introduced in the Intermediate Phase so that learners can see energy-saving as integral to their lives and put into practice as they grow. The activities are simple and can be adapted by the educator. The activities are within the context of the Curriculum and Assessment Policy Statement (CAPS) of the Department of Education (DoE).

The subjects in the Intermediate Phase (Grades 4,5 and 6) are:

- Home Language
- First Additional Language
- Mathematics
- Life Skills
- Natural Science and Technology
- Social Science

Note: The Eskom guides are in English. The educator will need to translate them into the Home Language.

Educators need to consult the Department of Education's CAPS policy guides for details of the skills, content and assessment within the relevant phase and grade.

Mathematics (DoE, 2011)

One of the **Specific Aims** in teaching and learning Mathematics is to:

- Develop critical awareness of how much mathematical relationships are used in social, environmental, cultural and economic relations.

The **specific skills** in Mathematics include learning:

- To investigate, analyse, represent and interpret information
- To pose and solve problems
- To build an awareness of the important role Mathematics plays in real life situations including the personal development of the learner.

Data handling is one of the five content areas in Mathematics (Intermediate Phase).

The CAPS policy document (DoE, 2011, p16) shows the content for Data handling.

Content	General	Intermediate Phase focus
<p>Data handling</p>	<ul style="list-style-type: none"> • Data handling involves asking questions and finding answers in order to describe events in the social, technological and economic environment. • Through the study of Data handling, the learner develops the skills to collect, organise, represent, analyse, interpret and write a report on the data. 	<ul style="list-style-type: none"> • Learners should focus on all the skills that enable them to move from collecting data to reporting on the data. • Learners should be exposed to: <ul style="list-style-type: none"> - A variety of contexts for collecting and interpreting data. - A range of questions posed and answered relating to the data. • Learners should begin to analyse data critically through exposure to some factors that impact on data such as from who, when and where data is collected.

For the educator to take note:

- The energy-wise message is integral to all the activities.
- You may use the activities as they are.
- You can adapt or change the activities.
- You can use other resources where you see appropriate.
- Adapt the activities to suit the grade you teach.
- Adapt the activities according to the level of the learners (consider language or any other barriers).
- Share and discuss the activities with other educators in the same phase and grade.
- You can use activities from different grades but adapt to suit the level of your learners.
- You can design your own activities for the additional resources or activity sheets that have been provided. These may not be mentioned in the activities.
- Practice the energy-saving behaviour so you become an example of what is expected.
- Share your knowledge and practice on energy-wise education with everyone at school, at home and in the community.

Thank you for taking care of our earth

Data Handling (DoE, Mathematics, CAPS, 2011)

The activities which follow have reference to the following extracts from the Department of Education's (2011) CAPS policy document - Mathematics (Intermediate Phase Grades 4, 5 and 6). The activities which follow are related to the content area of Data Handling.

Grade 4 (Term 3)

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
Data handling	5.1 Collecting and organising data	Collecting data using tally marks and tables for recording	Teachers in this phase should ensure that different topics are chosen for data collection in each of the 3 grades The following are new in Term 3 of Grade 4 <ul style="list-style-type: none"> Learners read, analyse and summarise pie charts, where the information is presented in fractions only Learners read, analyse data represented in words i.e. short paragraphs - the data presented in words should be represented in other forms and then analysed 	7 hours
	5.2 Representing data	Draw a variety of graphs to display and interpret data including: <ul style="list-style-type: none"> Pictograph (one-to-one representation) Bar graph 	<p>Analysing graphs Analysis of graphs on environmental or socio-economic context and answer questions on graphs and questions to be provided by the teacher or textbook. Learners should work with at least:</p> <ul style="list-style-type: none"> 1 pie chart where information is given in common fractions and not percentages 1 bar graph <p>Suitable topics include</p> <ul style="list-style-type: none"> Quantities of material recycling companies in your town, province, country Quantities of recycling material collected by schools around the country Sources of lighting and heating in South Africa Kinds of toilets in South African homes Kinds of homes in South Africa <p>Data represented in words The data presented in words should be represented in other forms such as tally marks, table or pictographs and then analysed.</p>	

Data Handling

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
	5.3 Analysing, interpreting, and reporting on data	<p>Critically read and interpret data represented in:</p> <ul style="list-style-type: none"> • Words • Pictographs • Bar graphs • Pie charts <p>Analyse data by answering questions relating to data categories</p> <p>Summarise data verbally and in short written paragraphs</p>	<p>Complete data cycle including pictograph: context personal data This can be used as a Mathematics project for the year Learners work through whole data cycle to create an individual pictograph using contexts that relate to themselves, their classes, their school or their family. Suitable topics include favorite sports/movies/music/TV programmes/food or cool drink/colours, etc.</p> <p>Developing critical analysis skills Learners compare graphs on the same topic but where data has been collected from different groups of people, at different times, in different places or in different ways. Here learners will be able to discuss the differences between the graphs. The aim is for learners to become aware of factors that can have an impact on the data. Learners should do at least 1 example. Learners can summarise the findings of their comparison in a paragraph. Examples could include:</p> <ul style="list-style-type: none"> • Comparing data about cars that pass the school at different times or comparing data about cars that pass different venues (busy and quiet areas, poor and rich areas, etc.). • Comparing data collected at your school to national data from Census at schools e.g. favourite sports, subjects, transport to school, dwelling access to goods and services at home. • Comparing data collected from girls and boys e.g. favourite movies, favourite school projects. 	
<p>Assessment</p> <p>At this point learners should have been assessed on:</p> <ul style="list-style-type: none"> • Views • 2D-shapes • Data handling (recommended form of assessment: project) 				

Data Handling

Grade 5 (Term 1)

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
Data handling	5.1 Collecting data and analysis	<ul style="list-style-type: none"> Collecting data using tally marks and tables to record Order data from smallest group to largest 	<p>What is different from Grade 4?</p> <p>The following is new in Grade 5</p> <ul style="list-style-type: none"> Ordering data sets Analysing data not only according to categories, but also taking into account content and source of data Analysing ungrouped numerical data sets to find the mode Pictographs which show a many-to-one correspondence Conclusion and predictions when analysing and summarising data <p>Teachers in this phase should ensure that different topics are chosen for data collection and analysis in each of the grades</p> <p>Complete data cycle including drawing bar graphs: context personal data</p> <p>The complete data cycle includes asking questions, collecting, organising, representing, analysing, interpreting and reporting on the data</p> <p>Work through data cycle to draw an individual bar graph using contexts that relate to themselves, their class, their school or their family</p> <p>Suitable topics include:</p> <ul style="list-style-type: none"> Favourite sports/movies/ TV programme/food or cool drinks/colours, etc. Models/make of cars passing the school grounds. 	10 hours
	5.2 Representing data	<p>Draw a variety of graphs to display and interpret data including:</p> <ul style="list-style-type: none"> Pictographs (many-to-one correspondence) Bar graphs 		

Data Handling

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
	5.3 Analysing, interpreting, and reporting on data	<p>Critically read and interpret data represented in:</p> <ul style="list-style-type: none"> • Words • Pictographs • Bar graphs • Pie charts <p>Analyse data by answering questions relating to:</p> <ul style="list-style-type: none"> • Data categories • Data sources and content <p>Summarise data verbally and in short written paragraphs that include:</p> <ul style="list-style-type: none"> • Drawing a conclusion on the data • Making predictions based on the data <p>Examine ungrouped numerical data to determine the most frequent score in the data sets (mode)</p>	<p>Analysing graphs</p> <p>Analysing graphs on environmental or socio-economic context by answering questions on graphs. Both graphs and questions to be provided by teacher or textbook. Learners should work with at least:</p> <ul style="list-style-type: none"> • 2 Pie charts where the information is given in fractions and not percentages • 1 Pictograph representing a many-to-one correspondence • 1 Bar graph <p>Suitable topics should include:</p> <ul style="list-style-type: none"> • Quantities of material recycled in the town, province, country • Quantities of recycling material collected by schools around the country • Sources of lighting and heating in south africa • Kinds of toilets in south africa • Kinds of homes in south africa 	

Data Handling

Grade 5 (Term 3)

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
Data handling	5.1 Collecting data and analysis	<ul style="list-style-type: none"> Collecting data using tally marks and tables for recording Order data from smallest group to the largest 	<p>What is different from Grade 4?</p> <p>The following is new in Grade 5</p> <ul style="list-style-type: none"> Ordering data sets Analysing data not only in categories, but also taking into account content and sources of data Analysing ungrouped numerical data sets to find the mode Pictographs which show a many-to-one correspondence Conclusion and predictions when analysing and summarising data <p>Teachers in this phase should ensure that different topics are chosen for data collection and analysis in each of the grades</p> <p>Complete data cycle including drawing bar graph: context personal data:</p> <p>The complete data cycle includes asking a question, collecting, organising, representing, analysing, interpreting and reporting on the data</p> <p>Work through data cycles to draw individual bar graphs using contexts that relate to themselves, their class, their school or their family</p> <p>Suitable topics include:</p> <ul style="list-style-type: none"> Favourite sports/movies/ TV programme/food or cool drinks/colours, etc. Model/make of cars passing by the school grounds 	9 Hours
	5.2 Representing data	<p>Draw a variety of graphs to display and interpret data including:</p> <ul style="list-style-type: none"> Pictographs (many-to-one correspondence) Bar graph 		

Data Handling

Content area	Topic	Concept and skills	Some clarification notes or teaching guidelines	Duration (in hours)
	5.3 Analysing, interpreting, and reporting on data	<p>Critically read and interpret data represented in:</p> <ul style="list-style-type: none"> • Words • Pictographs • Bar graphs • Pie charts <p>Analyse data by answering questions relating to:</p> <ul style="list-style-type: none"> • Data categories • Data sources and content <p>Summarise data verbally and in short written paragraphs that include:</p> <ul style="list-style-type: none"> • Drawing conclusions on the data • Making predictions based on the data <p>Examine ungrouped numerical data to determine the most frequently occurring scores in the data set (mode)</p>	<p>Analysing graphs Analysing graphs on environmental or socio-economic context by answering questions on graphs. Both graphs and questions to be provided by the teacher or textbook. Learners should work with at least:</p> <ul style="list-style-type: none"> • 2 Pie charts where the information is given in fractions, not percentages • 1 Pictograph representing a many-to-one correspondence • 1 Bar graph <p>Suitable topics should include:</p> <ul style="list-style-type: none"> • Quantities of material recycled in the town, province, country • Quantities of recycling material collected by schools around the country • Sources of lighting and heating in south africa • Kinds of toilets in south africa • Kinds of homes in south africa <p>Develop critical analysis skills Learners compare graphs on the same topic, but where the data has been collected from different groups of people at different times in different places or in different ways. Here learners will be able to discuss the difference between the graphs. The aim is also for learners to become aware of factors that can impact the data. Learners can summarise the findings of their comparison in a paragraph examples could include:</p> <ul style="list-style-type: none"> • Comparing data about cars that pass the school at different times • Comparing data about cars that pass different venues (busy and quiet areas, poor and rich areas) 	

Data Handling

Grade 6 (Term 1)

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
Data handling	5.1 Collecting data and analysis	Collect data <ul style="list-style-type: none"> Using tally marks and tables for recording Use simple questions (yes/no type response) Order data from smallest group to the largest	What is different from Grade 5? The following is new in Grade 6: <ul style="list-style-type: none"> Percentages - graphs can include data expressed in percentages, this after percentages have been converted in term 3 (this is important in pie charts, but bar graphs can also sometimes be presented in percentages) Collecting data using simple questionnaires Double bar graphs Median 	10 Hours
	5.2 Representing data	Draw a variety of graphs to display and interpret data including: <ul style="list-style-type: none"> Pictographs (many-to-one correspondence) Bar graph and double bar graph 	Complete data cycle including an individual bar graph: context environmental data The complete data cycle includes asking questions, collecting, organising, representing, analysing, interpreting and reporting on the data	
			Work through the whole data cycle to create an individual bar graph using the environmental data Suitable topics include: <ul style="list-style-type: none"> How much water is used per month by families of learners in the class Amount and kinds of litter on the school playground Amount and kind of recycling material collected by the school 	

Data Handling

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
	5.3 Analysing, interpreting, and reporting on data	<p>Critically read and interpret data represented in:</p> <ul style="list-style-type: none"> • Words • Pictographs • Bar graphs • Pie charts <p>Analyse data by answering questions relating to:</p> <ul style="list-style-type: none"> • Data categories, including data intervals • Data sources and context • Central tendencies - (mode and median) <p>Summarise data verbally and in short written paragraphs that include:</p> <ul style="list-style-type: none"> • Drawing conclusions on the data • Making predictions based on the data 	<p>Analysing graphs</p> <p>Analysing graphs on environmental or socio-economic contexts by answers based on graphs. Both graphs and questions to be provided by the teacher or textbook. Learners should work with at least:</p> <ul style="list-style-type: none"> • 2 Pie charts • 1 Pictograph with a many-to-one presentation <p>Suitable topics should include:</p> <ul style="list-style-type: none"> • Infant mortality rates per country in southern africa • Common causes of death of children in southern africa • Quantities of material recycled in the town, province and country • Quantities of recycling material collected by schools around the country • Amount of water stored in dams in your province 	

Data Handling

Grade 6 (Term 3)

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
Data handling	5.1 Collecting data and analysis	Collect data <ul style="list-style-type: none"> Use tally marks and tables to record Use simple questionnaires (yes/no type response). Order data from smallest group to largest 	What is different from Grade 5 The following is new in Grade 6: <ul style="list-style-type: none"> Graphs can include data expressed in percentages. This is important in pie charts but percentages can also be used in bar graphs or double bar graphs Collecting data using simple questionnaires Double bar graphs The median of data sets Complete data cycle including drawing a double bar graph: context personal data This is recommended as a mathematics project in Grade 6 The complete data cycle includes probing questions, collecting, organising, representing, analysing, interpreting and reporting on the data Learners work through the whole data cycle, to make individual double bar graphs using context that relate to themselves, their class, their school or their family Suitable topics include <ul style="list-style-type: none"> Favourite sports/movies/music/tv programme/food or cool drink/colours, etc. Include boys versus girls Height of learners in the class. Include boys versus girls Mass of learners in class. Include boys versus girls Shoe size of learners in class. Include boys versus girls 	9 Hours
	5.2 Representing data	Draw a variety of graphs to display and interpret data including: <ul style="list-style-type: none"> Pictograph (many-to-one representations) Bar graph and double bar graph 		

Data Handling

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
	5.3 Analysing, interpreting, and reporting on data	<p>Critically read and interpret data represented in:</p> <ul style="list-style-type: none"> • Words • Pictographs • Bar graphs • Double bar graphs • Pie charts <p>Analyse data by answering questions relating to:</p> <ul style="list-style-type: none"> • Data categories, including data intervals • Data sources and context • Central tendencies - (mode and median) <p>Summarise data verbally and in short written paragraphs that include:</p> <ul style="list-style-type: none"> • Drawing conclusions on the data • Making predictions based on the data <p>Examine ungrouped numerical data to determine:</p> <ul style="list-style-type: none"> • The most frequently occurring data set called the mode • The middlemost score in the data set called the median of the data set 	<p>Analysing ungrouped numerical data using a measure of central tendency Learners must find the mode and median of ungrouped numerical data sets Suitable topics include:</p> <ul style="list-style-type: none"> • Height of learners in class • Mass of learners in class • Shoe size of learners in class • Average time taken from home to school • Number of people staying in learners' homes in the class • Temperature for a month <p>Analysing graphs</p> <p>Analysing graphs on environmental or socio-economic context by answering questions on graphs. Both graphs and questions to be provided by the teacher or textbook. Learners should work with at least:</p> <ul style="list-style-type: none"> • 2 Pie charts • 1 Pictograph with a many-to-one representation 	

Data Handling

Content area	Topic	Concepts and skills	Some clarification notes or teaching guidelines	Duration (in hours)
			<p>Suitable topics should include:</p> <ul style="list-style-type: none"> • Population of the provinces of South Africa • Percentage of foreign tourists from different countries visiting South Africa • Percentage of pregnant women who are HIV positive in each province • Percentage of population with access to safe drinking water in African countries • Common cause of death in children in South Africa • Quantity of material recycled in your town, province and country • Amount of water stored in dams in your province • Comparison of rainfall in summer and in winter in your town • Percentage of girls and boys who smoke Grade 6 - 10 or 12 - 18 age group • Size of the rural and urban population per province in South Africa • Size of rural and urban population per country in Southern Africa <p>Developing critical analytical skills</p> <p>Learners compare graphs on the same topic but where data has been collected from different groups of people at different times, in different areas or in different ways. Here learners will be able to discuss the difference between the graphs. The aim is also for learners to become aware of factors that can impact data. Learners should do at least one example</p> <p>Learners can summarise the findings of their data in a paragraph for at least one example. Examples could include:</p> <ul style="list-style-type: none"> • Comparing data on cars that pass the school at different times or comparing data on cars that pass different venues (busy or quiet area, poor and rich areas, etc.) • Comparing national data from Statistics South Africa (StatsSA) to data collected at your school e.g. sources of heating, sources of lighting, sources of water • Comparing data collected over a month or over a year e.g. average rainfall figures of different towns for a month/ year. 	

Mathematics

Activity 1: Comparing energy use



- This activity is for Grades 4, 5 and 6.
- Give each learner an A4 worksheet of the 2 ladies.
- Picture A is on the left and picture B is on the right.
- Tell the learners that they need to find the difference between picture A and picture B on their own. [Individual activity].
- Learners need to number each corresponding difference in each picture e.g. 1, 2, 3...
- Give the learners about 5 minutes to do the activity.
- Use prestik or a magnet to place the A2 poster of the 2 ladies on the board.
- Tell the learners to give you the differences between the pictures. They should put up their hands if they wish to answer. They have to come to the board and point out the differences on the poster.
- Have a discussion on the two pictures as the learners give the differences e.g. when the learners say that the lady in picture A is happy and the lady in picture B is sad, follow-up with: *Why do you think the lady in picture A is happy?* [She is using energy wisely; she is using energy-saving lights; she has a low account].
- After the discussion give each learner a worksheet. Tell them to answer the questions individually in their books. Questions 1, 2, 3 and 4 can be done in one lesson and the rest of the questions in another lesson.



A



B

Activity 1: Comparing energy use



1. Write down the differences between pictures A and B.

Picture A	Picture B
1. Uses energy-saving lights	1. Uses old light bulbs
2. The bin is empty	2. The bin is full
3. The lady is smiling	3. The lady is sad
4. The lady's hair is black	4. The lady's hair is grey/white
5. The account is low	5. The account is high
6. The temperature is low	6. The temperature is high
7. Has a window - natural light	7. No window
8. The light is off	8. The light is on at 8.00am

2.
 - 2.1 How much is the electricity account in picture A? [R254]
 - 2.2 How much is the electricity account in picture B? [R723]
 - 2.3 Work out the difference between the electricity accounts. [R723 - R254 = R469].
 - 2.4 Give reasons why the amounts on the electricity accounts are different? [The lady in picture A: is using energy-saving lights - her account is lower; she is practising being energy-wise by using natural light (window); the lights are off at 8.00am].
3. Do you think the lady in picture B is doing the right thing by leaving the lights on until 8.00am? Give reasons for your answer. [Listen to the learners views; you could add that she is not using energy-saving habits].
4. Give 2 differences between the energy-saving light (compact fluorescent light - CFL) and the old light bulb (incandescent light)? [CFL - gives off less heat/lasts longer; old light bulb - gives off more heat/does not last as long as a CFL].

Activity 2: The cost of using energy-saving lights or old light bulbs.



- This activity is for Grades 4, 5 and 6.
- This activity is a follow-up to Activity 1.
- Use the pictures of the ladies.
- Make certain that you go over pictographs and graphs before giving the learners the tasks on graphs.
- Give the learners the worksheets to answer the questions on their own.

Did you know?



Bar graphs and Histograms

- There is a difference in the way bar graphs and histograms are drawn.
- Bar graphs usually show categorical data - e.g. energy use of a fridge, television, geyser. Bar graphs are used to compare variables.
- Histograms usually show continuous data - data that represents measured quantities e.g R100, R200, R300... Histograms are used to show distribution of variables.
- The bars in bar graphs are usually separated. In histograms the bars are adjacent (next) to each other. Sometimes bar graphs may have no space between the bars. Histograms are never drawn with spaces between the bars - the bars are next to each other.



Pictographs

- A pictograph is a way of showing information using pictures or images. This is a simple way of introducing learners to presenting information in tables and graphs later on.

Activity 2: The cost of using energy-saving lights or old light bulbs.

1. Study pictures A and B.



A



B

1.1 If the lady's electricity account in picture A is R5 using 1 energy-saving light for the month, complete table 1 to show her electricity account if she uses:

	Number of energy-saving lights used for the month	Electricity Account
1.	1 energy-saving light (CFL)	R5
2.	2 energy-saving lights (CFLs)	R10
3.	3 energy-saving lights (CFLs)	R15
4.	4 energy-saving lights (CFLs)	R20
5.	5 energy-saving lights (CFLs)	R25
6.	6 energy-saving lights (CFLs)	R30

Table 1. Energy-saving lights







1.2 If the lady's electricity account in picture B is R10 using 1 old light bulb for the month, complete table 2 to show her electricity account if she uses:

	Number of old light bulbs used for the month	Electricity Account
1.	1 old light bulb	R10
2.	2 old light bulbs	R20
3.	3 old light bulbs	R30
4.	4 old light bulbs	R40
5.	5 old light bulbs	R50
6.	6 old light bulbs	R60

Table 2. Old light bulbs

Activity 2: The cost of using energy-saving lights or old light bulbs.

2.1 Draw a pictograph to show the information in table 1. One picture should represent one unit of money in the pictograph.

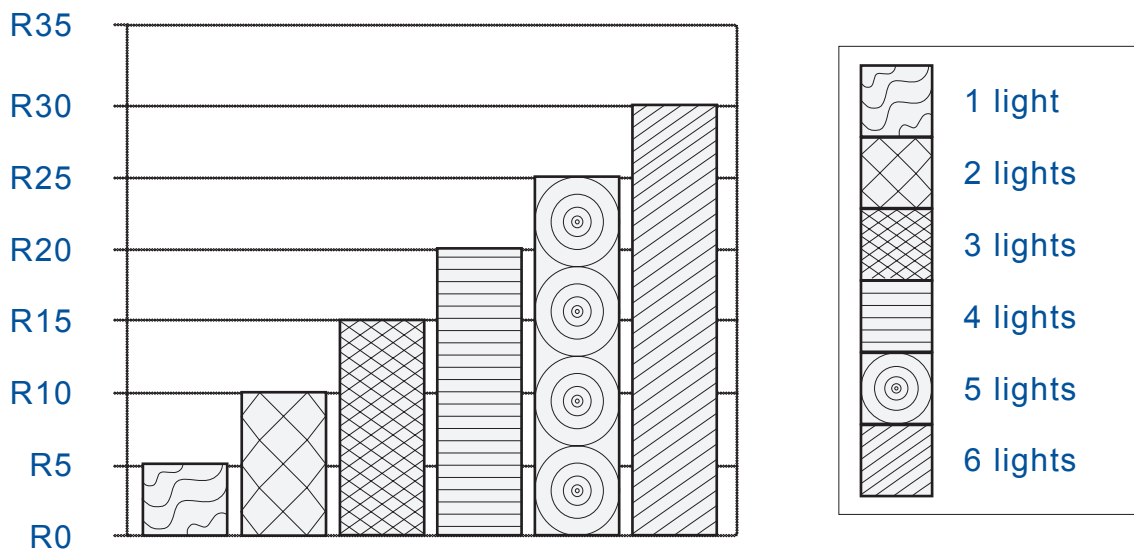
Number of energy-saving lights	1. 	2. 	3. 	4. 	5. 	6. 
Cost	●	● ●	● ● ●	● ● ● ● ●	● ● ● ● ● ● ●	● ● ● ● ● ● ● ● ● ●
	R5	R10	R15	R20	R25	R30

Cost of using energy-saving lights. One unit = ● R5



*Grade 4: can draw two separate pictographs - one for the number of energy-saving lights and the other for costs.

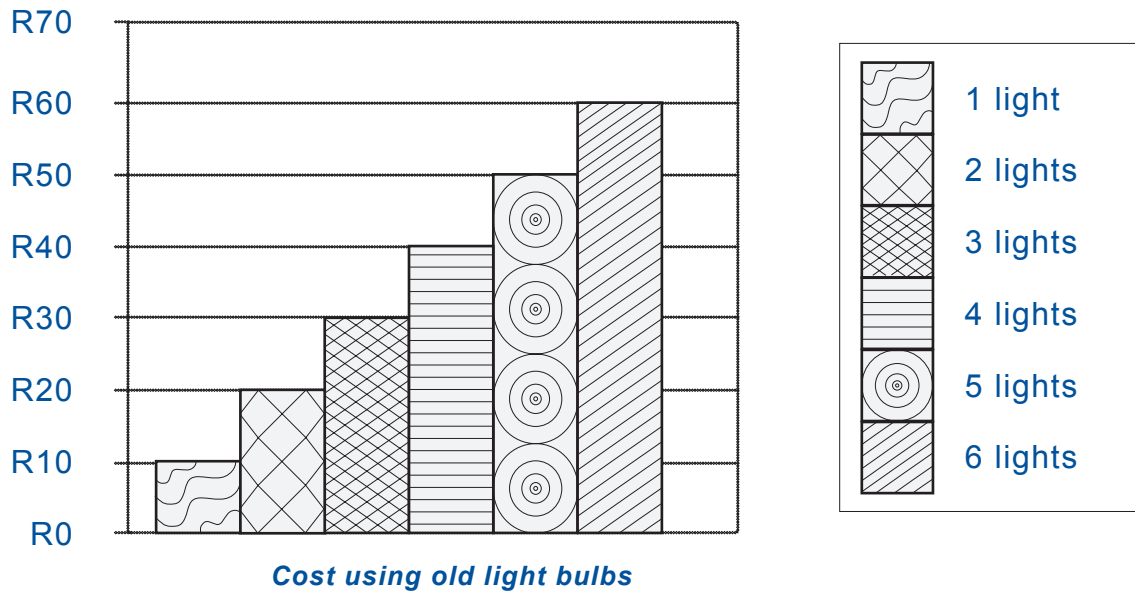
2.2 Draw a bar graph to show the information in table 1. Label your graph.



Cost using energy-saving lights
Graph showing the cost of using energy-saving lights

Activity 2: The cost of using energy-saving lights or old light bulbs.

3. Complete table 2 using the information from the graph to show the cost of using old light bulbs.



	Number of old light bulbs used for the month	Electricity account
1.	1 old light bulb	R10
2.	2 old light bulbs	R20
3.	3 old light bulbs	R30
4.	4 old light bulbs	R40
5.	5 old light bulbs	R50
6.	6 old light bulbs	R60

Table 2. Old light bulbs



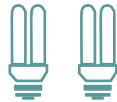

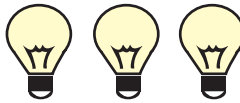
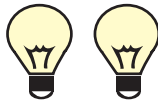

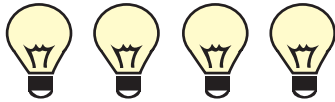

4. What 2 things can you say about the cost of electricity from the information in table 1 and table 2? [Using old light bulbs costs more; the more lights you use the more you pay].
5. Even if you have energy-saving lights, how can you use them in a way that will help to use energy wisely (also keeping the electricity account low)? [Switch off what you are not using; switch off when there is enough natural light; use lower watt value lights where possible; use one bulb in a room where possible or the lowest number if the rooms are big].

Activity 3: Survey – The use of lights at Sipho’s house



- This activity is for Grades 4, 5 and 6.
- This activity is based on a survey of the floor plan of the house.
- Explain to the learners that a survey involves gathering or collecting information to understand what is happening in a particular situation.
- Make certain that you go over pictographs and graphs before giving the learners the task.
- Discuss the floor plan with learners for them to understand the given information.
- Give the learners worksheets and tell them to answer question one on their own.

A survey was done at Sipho’s house. The following is a floor plan of Sipho’s house showing the number, kind of lights and the watt value of the lights. He switches all the lights on everyday at 6.00pm and switches them off at 7.00pm. The old light bulbs are 60W and the energy-saving lights are 15W.

<p>Bedroom 1</p> 	<p>Bedroom 2</p> 	<p>Passage</p> 
<p>Kitchen</p> 	<p>Lounge</p> 	<p>Toilet</p> 
<p>Bathroom</p> 	<p>Outside</p> 	<p>Garage</p> 

Activity 3: Survey – The use of lights at Siphó’s house

1. How many old light bulbs (incandescent lights) and how many energy-saving lights (compact fluorescent lights) does Siphó use in his house? [Old lights - 18; energy-saving lights - 6].
2. Draw a tally table for the number of old light bulbs and the number of energy-saving lights.

Old light bulbs		18
Energy-saving lights		6

3. Set 1: Altogether how many energy-saving lights (compact fluorescent lights) are used in the bedrooms and passage? [6]
4. Set 2: Altogether how many old light bulbs (incandescent lights) are used in the garage, lounge and kitchen? [8]

Draw a pictograph of Set 1 and Set 2.

Set 1 - Energy-saving lights								
Set 2 - Old light bulbs								



*Grade 4 can draw Set 1 and Set 2 as separate pictographs.

Activity 3: Survey – The use of lights at Sipho’s house

6. Calculate the total watt value of the old light bulbs (incandescent lights) in the house? [18 x 60 = 1080 watts] or the learners can add the wattage per room and then get the total.
7. Calculate the total watt value of the energy-saving lights (compact fluorescent lights) in the house? [6 x 15 = 90 watts] or the learners can add the wattage per room and then get the total.
8. Which lights use more energy? [The old light bulbs].
9. Sipho found that his electricity account is very high. Give Sipho some advice on how he can bring down his electricity account. [Change all the lights to energy-saving lights; do not switch all the lights on at night; switch the lights off as soon as there is enough natural light in the morning; he can use sensor lights in the garage/outside - these lights only come on when there is movement; outside he can use lights powered by solar energy].

Activity 4: Survey of lights used by learners



- This activity is for Grades 4, 5 and 6.
- This activity involves getting information from the class.
- Explain to the learners that a survey involves gathering or collecting information to understand what is happening in a particular situation.
- Do the first part of the activity as a class i.e. filling in information on the table.
- Read each question and ask the learners to put their hands up (straight) if it applies to them.
- Count the number of hands that have been put up.
- Ask all the learners to record the information in the table.
- Tell the learners to answer the questions on their own.
- The figures given in the table are only examples - you will need to get the actual information from the learners in your class.



Find out how many learners (in your class) use the old light bulbs and how many learners use energy-saving lights at home. Complete the table to record all the necessary information about electricity and about your findings.

Survey		
Grade:	5	Date: 23 September 2013
1.	Number of learners in class	40
2.	Number of learners who have electricity at home	25
3.	Number of learners who do not have electricity at home	15
4.	Number of learners only using old light bulbs at home	10
5.	Number of learners only using the energy-saving lights at home	8
6.	Number of learners who use both old light bulbs and energy-saving lights at home	7

Activity 4: Survey of lights used by learners

1. How do you know that all the learners in the class took part in the survey?

[The answers to 2 and 3 = 40; the answers to 4, 5, and 6 = 25].

2. Draw a tally table for numbers 4, 5 and 6 in the survey.

Learners using old light bulbs	/// ///	10
Learners using energy-saving lights	/// ///	8
Learners using energy-saving lights and old light bulbs	/// //	7

3. Which group of learners is using the most electricity? [Learners - old light bulbs].

4. Which group of learners is using the least electricity? [Learners - energy-saving lights].

5. Why do you think that your answers to 3 and 4 may not be totally correct? [It depends on whether they are practising energy-wise behaviour when using the lights - learners with energy-saving lights could have a higher energy use if they're keeping the lights on for longer periods of time].

Activity 5: Using energy wisely - The Television (TV)




- This activity is for Grades 4, 5 and 6.
- Explain to the learners that a survey involves gathering or collecting information to understand what is happening in a particular situation.
- You need to get the information from the class.
- Give each learner a worksheet with the table.
- Do the first part of the activity as a class i.e. filling in the information on the table.
- Read each question and ask the learners to put their hands up (straight) if it applies to them.
- Count the number of hands that have been put up.
- Ask all the learners to record the information on the table.
- Tell the learners to answer the questions on their own.
- The figures given in the table are only examples - you will need to get the actual information from the learners in your class.

Activity 5: Using energy wisely - The television (TV)



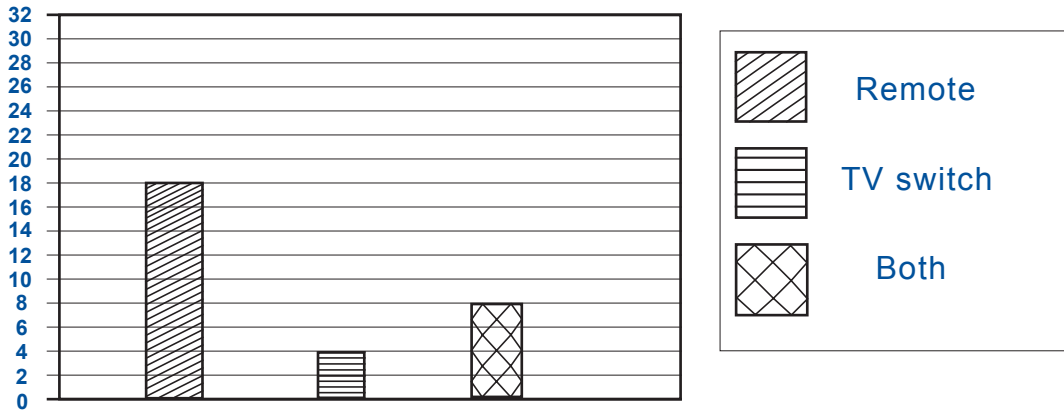
1. Gather the following information from your class by completing the survey below.

Survey: Television (TV)			
Date of survey: 23 November 2013			
Survey Conducted by: Jabu Mpshe			
Grade: 6			
Total number of learners in class: 40			
No.	Item	Number	Percentage
1.	How many learners are there in class?	40	
2.	How many learners have a television (TV) at home?	30	
3.	How many learners do not have a television (TV) at home?	10	
4.	How many learners switch the television (TV) on and off using the remote control?	18	
5.	How many learners switch the television (TV) on and off using the switch on the television (TV)?	4	
6.	How many learners switch the television (TV) on and off sometimes using the switch on the television (TV) and sometimes with the remote?	8	

2. Why is it important to find out how many learners do not have televisions (TVs) at home? [The survey is about televisions - learners who do not have a television may put their hands up and this will give incorrect information].
3. Sometimes not having a television (TV) is an advantage. List some of the advantages of not having a television (TV). [Nothing to distract you from doing your homework; more time to play outside; more time to spend talking to family; do not see any violence; do not waste time watching television; saves on energy bill; more time to do other things].

Activity 5: Using energy wisely - The television (TV)


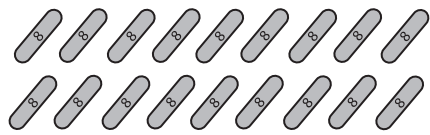
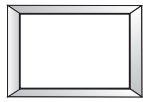
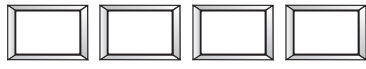
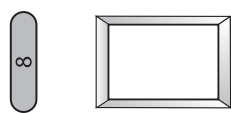
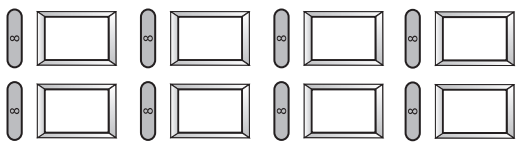
4. Draw a bar graph to show the information from questions 4, 5 and 6 of the survey. Label your graph.



Switching the TV on and off

Graph showing how learners switch the TV on and off

5. Complete the pictograph to show the information for questions 4, 5 and 6.

<p>Remote</p> 		18
<p>TV switch</p> 		4
<p>Remote & TV switch</p> 		8
<p>TV on and off – remote, switch or both</p>		

Activity 5: Using energy wisely - The television (TV)



*Grade 4: can draw 3 separate pictographs (TV - remote control; TV - switch; TV - both).

6. What can you say about the way learners switch the television (TV) on and off?
[Most learners use the remote control to switch the TV on and off].
7. What do you think is the correct way to switch the television (TV) on and off?
[Switch the TV off using the switch on the TV; when you switch off using the remote control the light is on - it means that the TV is not completely switched off - energy is being wasted].
8. Write down the **Golden Rule** for the use of electricity?

Switch it off if you are not using it.

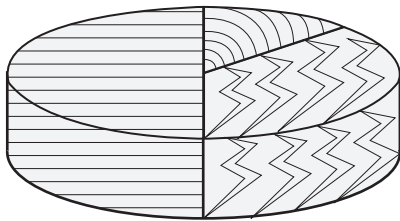
Activity 6: Which appliance uses the most electricity at home?



- This activity is for Grades 4, 5 and 6.
- Make certain that you go over pictographs and graphs before giving the learners the tasks on graphs.
- Give the learners the worksheets to answer the questions on their own.

Read the information in the pie chart and answer the questions. The pie chart shows the amount of energy used by 3 appliances.

Keep in mind that as long as energy is flowing through or a light is on you are using electricity and have to pay for it. **You pay for the electricity you use.**



1. Which 3 appliances are shown on the pie chart? [Standby - remote control TV; fridge; geyser].
2. Which appliance do you think uses the most amount of energy in a house? [Geyser].
3. Which appliance uses the second most amount of energy in a house? [Fridge].
4. Which appliance uses the third most amount of energy in a house? [All appliances on standby like a remote control TV - switched off with a remote].

Activity 6: Which appliance uses the most electricity at home?

5. Complete the table for the geyser which shows the fraction of energy used by the different appliances.

Appliance	Time left on for the day	Energy used	Cost
Fridge	24 hours	2/6	R16
TV on standby (switched off with the remote control)	24 hours	1/6	R8
Geyser	24 hours	3/6	R24

5.1 Which appliance do you think uses the most amount of energy in the house? Explain why you have chosen that appliance. [Geyser - on for 24 hours, continuously heats water - pay the most].

5.2 Which appliance uses the second most amount of energy in a house? Explain why you have chosen that appliance. [Fridge - on for 24 hours, pay the second most].

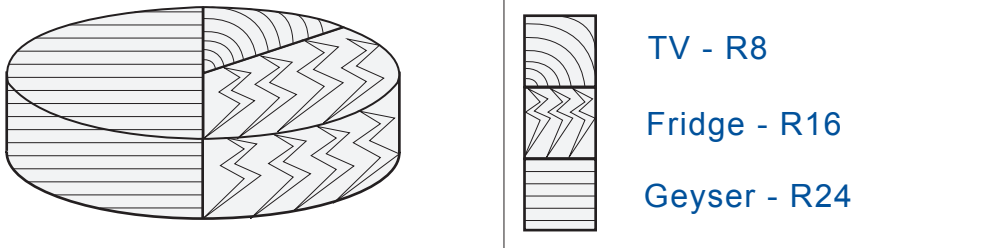
5.3 Which appliance uses the third most amount of energy in the house? Explain why you have chosen this appliance. [All appliances on standby like a remote control TV - switch off by remote - pay third most].

5.4 Although the television (TV) is switched off, why is there still a cost or payment? [When you switch off using a remote control the light is on - it means that the TV is not completely switched off - energy is still being used].

5.5 What is the energy-wise way to switch off the television (TV)? [Switch off using the switch on the TV].

Activity 6: Which appliance uses the most electricity at home?

5.6 Draw a pie chart to show the amount paid for the electricity used by each appliance - television (TV), geyser and fridge. Label your pie chart.



Pie Chart: Amount paid for the use of appliances

5.7 Complete the pictograph to show the amount paid for each appliance. One picture should represent one unit of money on the pictograph.

TV						R8
Fridge						R16
Geyser						R24
Cost of using appliances ● R2						



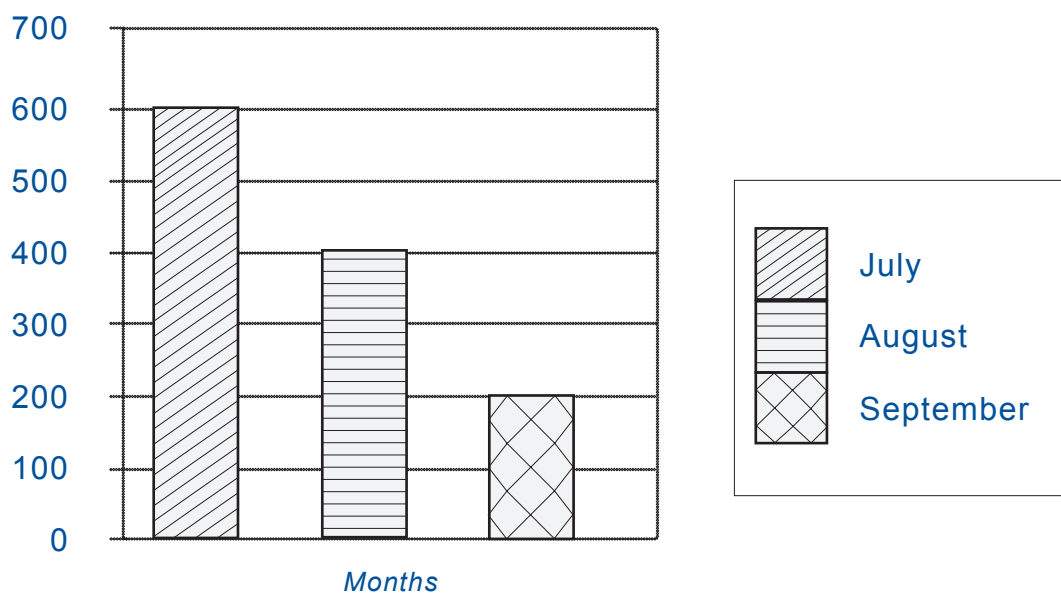
*Grade 4: can draw 3 separate pictographs: (TV; fridge; geyser).

Activity 7: Electricity accounts - You pay for the electricity you use.



- This activity is for Grades 5 and 6.
- Make certain that you go over pictographs and graphs before giving the learners tasks on graphs.
- Give the learners the worksheets to answer the questions on their own.

The following bar graph shows the electricity account for a family of 5 living in a three-bedroom house in South Africa. They use heaters in winter and their air-conditioners are on in summer.

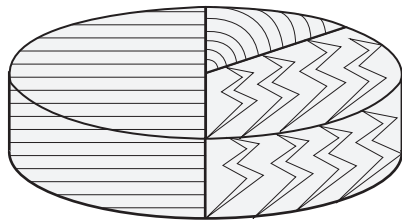


1. Complete the table below using the information from the graph.

Month	<i>July</i>	<i>August</i>	<i>September</i>	Total
Account	R600	R400	R200	R1200

Activity 7: Electricity accounts - You pay for the electricity you use.

2. Draw a pie chart to show the electricity account for July, August and September.
Label your pie chart.



Pie chart: Electricity account for 3 months

- 2.1 In which month was the most electricity used? Why do you think this was the case? [Remember when the seasons start and end in South Africa]. [July. It is winter and the heaters are used - heaters use up a lot of electricity].
- 2.2 Explain why the electricity account in October is likely to be far less than July? [The weather warms up - heaters are not necessarily used].
- 2.3 Why do you think that the electricity account for January can be as high as in August? [It is summer and the air-conditioner is probably on all day].

Activity 7: Electricity accounts - You pay for the electricity you use.

2.4 Write down ways in which the electricity account can be brought down in July and January by reading the the information below, by applying what you have learnt about energy-saving lights and energy-saving tips.

Technology that uses electricity to make us feel warm in winter or cool in summer can use a lot of energy.

Winter:

- Using blankets, warm clothes and eating food while it is fairly warm can save energy in winter.
- Make certain that windows are closed tightly and any space under the doors is covered.
- Open the curtains as soon as the sun rises to warm up the house. This prevents cold air from coming into the house and warm air from leaving the house.

Summer:

- Use light clothes and drink lots of water.
- Open the curtains much later or keep the curtains closed to filter the sunlight keeping the house cooler for much longer.
- Switch off the lights as soon as there is enough light. In summer the sun rises early.
- When using an air-conditioner make sure that windows are closed tightly and any space under the doors is covered. This prevents the cool air from leaving the house.
- Also remember quite often the temperature drops in the evenings - so you can turn off the air-conditioner for a while.

[July - all that applies for winter; January - all that applies for summer].