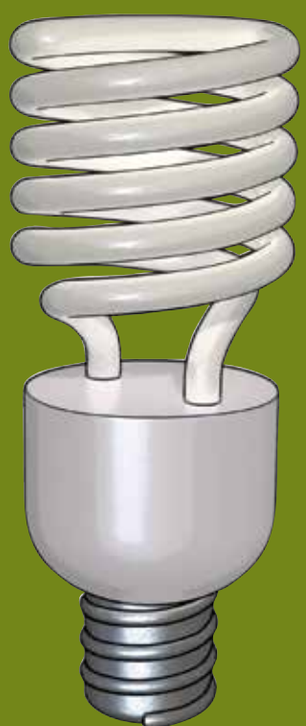
The value of our electricity

Intermediate Phase (Grade 6)

Learner activity sheet

Mathematics



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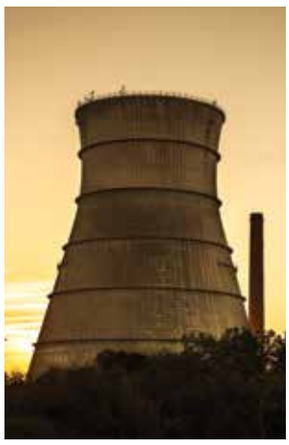


Energy Education

Dear Learner,

Electricity is produced from fuel such as coal, water, diesel and uranium which are limited resources. Building new power stations to increase the supply of electricity is costly, time consuming and is only one of the possible solutions towards producing more electricity. Increased use of electricity means we use up our limited natural resources and means we pollute more.

An immediate solution is to change the way in which we use electricity – that is using electricity wisely without wasting.

Eskom kindly asks you, the learner, to please put into practice different ways of using electricity wisely. You are going to learn a lot in energy education. Some of the things you will learn are:

- the changes in technology (use energy-saving lights instead of the traditional old lights),
- how to use technology more wisely (using the switch to switch off remote controlled appliances instead of the remote),
- other energy-wise saving tips,
- and how using energy wisely helps to care for our environment – our earth.

Do not worry, the energy education will be part of your school work. Be alert and become an example of how to use energy wisely. Share all that you learn with your friends, family and community. Remember to be energy-wise wherever you are – at home, at school and in other places.

Thank you for taking care of our earth.

Activity 1: Comparing the use of energy

Comparing light bulbs

Incandescents are the old type of bulb that homeowners used often in days gone by. Nowadays people are encouraged to use CFLs (energy savers). The older bulb uses most of its energy producing heat and a small amount producing light. This makes them much warmer and using them causes us to waste valuable, scarce electricity. Energy savers cost you more to buy initially, but they last much longer than the older bulb. This means that you will buy many more older lamps before the new ones have reached the end of their life span. Buyer more lamps more frequently wastes money. Buying fewer lamps that use less energy saves you money. Opening your curtains and using the natural light the sun provides us during the day, is of course the best way to save money on lighting costs.

Caution: Energy savers use mercury vapour whereas incandescents use a filament. When an energy saver has reached the end of its lifespan, most of the mercury vapour is used up. Even though the mercury vapour is used, it is still advised that spent (uses) energy savers are disposed of correctly. Wherever possible they should not be put in the normal rubbish but should be disposed of using the collection points offered by municipalities and retailers. If they cannot be handed in for collection at these points, as a last resort, they can be wrapped in newspaper and placed in a sealed bag and disposed of in the rubbish. Single energy savers in the rubbish do not cause anyone any harm, but if millions and millions of energy savers collect in landfill sites over many years, it could eventually cause ground water to be contaminated.

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

Picture A

Picture B

Picture A	Picture B
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.

2.1 What is the electricity account in picture A? _____

2.2 What is the electricity account in picture B? _____

2.3 Work out the difference in the electricity accounts?

_____

2.4 Give reasons why the amounts on the electricity account are different? _____

_____

_____

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. _____

_____

_____

_____

4. Give 2 differences between the energy-saving light (compact fluorescent light – CFL) and the old light bulb (incandescent light).

A

B

Energy-saving light (compact fluorescent light – CFL)	Old light bulb (incandescent light)
1.	1.
2.	2.

Activity 2: The cost of using energy saving or old lights

1. Study the TWO light bulbs and answer the following questions.

Picture A

Picture 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 2,3,4,5 or 6 energy-saving lights?

The light bulb in picture A was on for the same amount of hours as in picture B?

Number of energy-saving lights used for the month	Electricity account
1 energy-saving light (CFL)	R5
2 energy-saving lights (CFLs)	
3 energy-saving lights (CFLs)	
4 energy-saving lights (CFLs)	
5 energy-saving lights (CFLs)	
6 energy-saving lights (CFLs)	

Table 1. Cost of using energy-saving light bulbs

1.2 If the lady's electricity account in picture B is R10 using 1 old bulb for the month, complete table 2 to show her electricity account if she uses 2,3,4,5 or 6 old light bulb lights?

The light bulb in picture A was on for the same amount of hours as in picture B?

Number of old lights used for the month	Electricity account
1 old bulb	R10
2 old bulbs	
3 old bulbs	
4 old bulbs	
5 old bulbs	
6 old bulbs	

Table 2. Cost of using old light bulbs

1.3 What is the total cost, in rands, of the energy efficient bulbs in table 1?

1.4 What is the total cost, in rands, of the energy wasting bulbs in table 2?

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

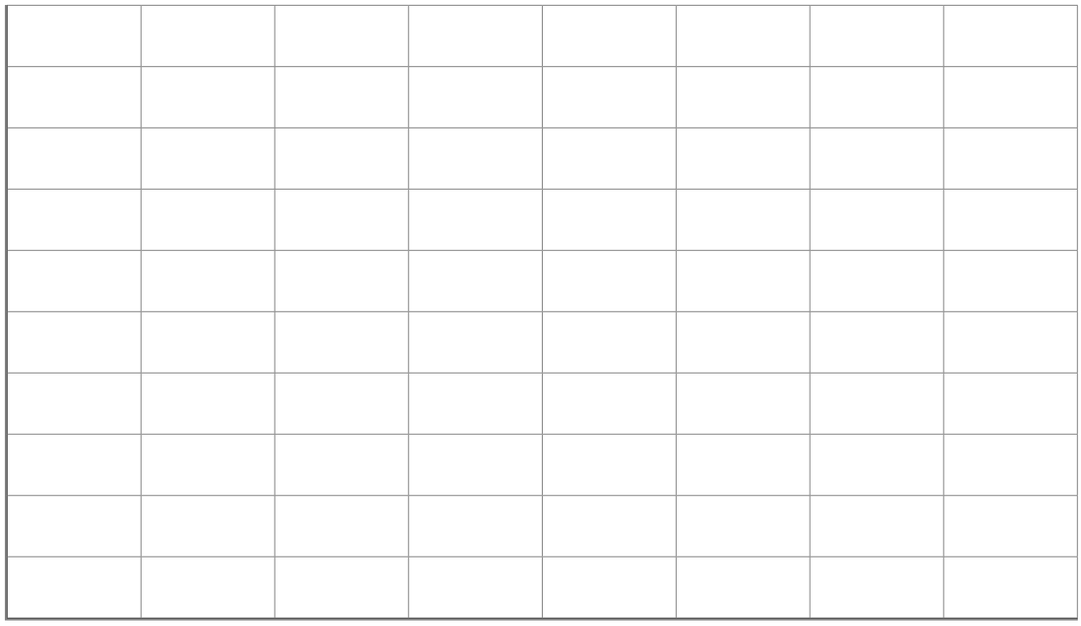
Number of energy saving lights						
Cost						

Cost of using energy-saving lights. One unit (5) = 

2.2 Draw a bar graph to show the information in the table 1. Label your graph. [Y axis – cost in rand/X axis – number of energy saving lights]

Example template for Table 2. Cost of using energy-saving lights

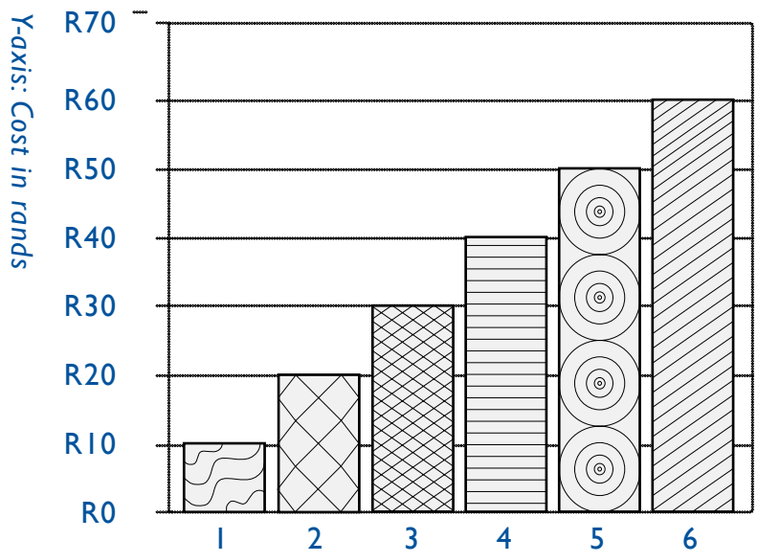
Y-axis: Cost in rands



X-axis: Number of energy-saving light bulbs

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

Cost of using old light bulbs



Number of old lights used for the month	Electricity Account
1 old bulb	
2 old bulbs	
3 old bulbs	
4 old bulbs	
5 old bulbs	
6 old bulbs	

Table 2. Cost of using old light bulbs

4. What conclusions can you make about the cost of electricity from the information in tables 1 and 3? _____

_____

5. Even if you have energy saving lights, how can you use them in a way that will help to use energy wisely? _____

_____

6. If 10 households used 5 energy savers each, and each light bulb uses 11 watts per light bulb, what is the total amount of electricity used by all the households for lighting? _____

_____

7. In one year, 10 households disposed of 4 old light bulbs and 2 energy savers each. All the energy savers were disposed of using the retailer take back collection points thereby disposing of them safely. The old light bulbs were disposed of by recycling as they have glass that can be used again. How many light bulbs were disposed of using the retailer collection points in that year?

_____

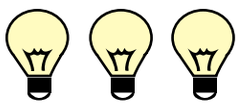
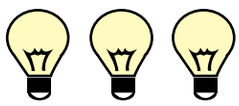
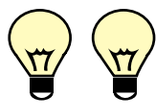
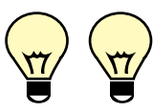
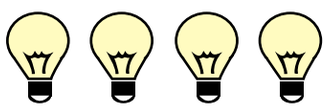
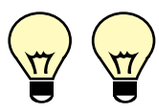
_____

_____

_____

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

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. The old light bulbs are 60W and the energy-saving lights are 15W.

Bedroom 1 	Bedroom 2 	Passage 
Kitchen 	Lounge 	Toilet 
Bathroom 	Outside 	Garage 

1.1 How many old light bulbs (incandescent light bulbs) are there altogether in Sipho's house? _____

1.2 How many energy-saving light bulbs (compact fluorescent light bulbs) are there altogether in Sipho's house? _____

_____

2. Use tally marks to complete the following tally table for the number of old light bulbs and the number of energy-saving light bulbs.

Old lights		
Energy saving lights		

3. Altogether how many energy saving lights (compact fluorescent lights) are used in the bedrooms and passage?

4. Altogether how many old lights (incandescent bulbs) are used in the garage, lounge and kitchen?

5. Draw the pictograph showing the totally marks on the previous page

Energy saving lights								
Old lights								
Set of lights								

6. There are 2 lights in the passage and 2 lights in the toilet.

6.1 Calculate the watt value of the lights in the passage.

6.2 Calculate the watt value of the lights in the toilet.

6.3 Which lights use more energy? _____

6.4 Calculate the total watt value of the old light bulbs (incandescent lights) in the house _____

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. Sipho found that his electricity account is very high. Give Sipho some advice on how he can bring down his electricity account.

9. If 200 households used 9 old light bulbs of 60 watts each, and all these bulbs were replaced with energy saving bulbs that used 11 watts each, what would the total saving in electricity be?

Activity 4: Using energy wisely – The television

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

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

2. Why is it important to find out how many learners do not have televisions at home? _____

_____

3. Sometimes not having a television is an advantage.
List some of the advantages of not having a television.

_____

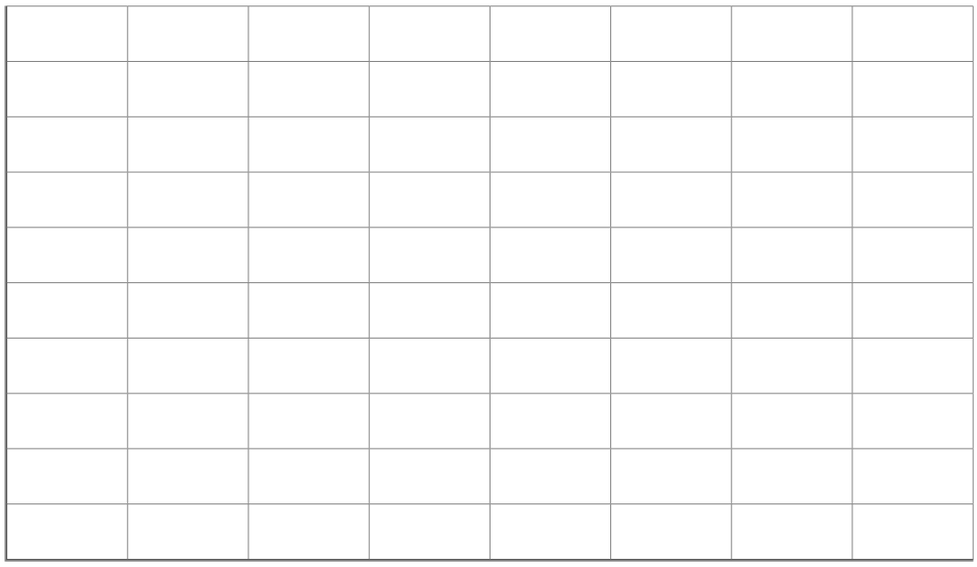
_____

_____

4. Draw a bar graph to show the information for questions 4, 5 and 6 of the survey questionaire. [Show the number of learners Y-axis and method used to switch Tv off X-axis]

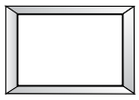
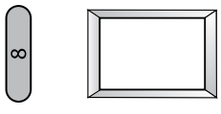
Number of learners who switched the TV on and off

Y



X

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

Remote 		
TV switch 		
Remote & TV switch 		
TV on and off – remote or switch or both		

6. What can you say about the way learners switch the TV on and off? _____

_____

7. What is the most energy efficiency way of switching the tv of?

_____

_____

8. Write down the ***golden rule*** for the use of electricity.

_____

_____

_____

9. Look at the percentage column where you have filled in the information you have gathered.

9.1 What is the highest percentage recorded? _____

9.2 What was this percentage for? _____

_____

9.3 What was the lowest percentage recorded? _____

_____

9.4 What was it for? _____

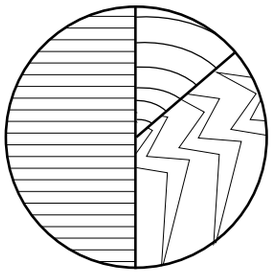
_____

Activity 5: What appliance uses the most electricity at home?

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**.

Energy used by tv, fridge and geyser



Standby - remote control television (TV)

Fridge

Geyser

Of the appliances in the home, the geyser uses the most electricity, second is the fridge and third is a tv in stand by mode (this means the tv was switched off with a remote control).

1. Which 3 appliances are shown in the pie chart?

_____

2. Which appliance do you think takes up the most amount of energy in a house? _____

_____

3. Which appliance takes up the second most amount of energy in a house? _____

_____

4. Which appliance takes up the third most amount of energy in a house? _____

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

5. The table shows the fraction of energy used by the different appliances.

5.1 Complete the fraction energy used by the geyser.

Appliance	Time left on for the day	Energy used	Cost
Fridge	24 hours	$\frac{2}{6}$	R16
Television (TV) on standby (switched off with the remote control)	24 hours	$\frac{1}{6}$	R8
Geyser	24 hours		R24

5.2 Which appliance do you think uses the most amount of energy in a house? Explain why you have chosen that appliance. _____

_____

_____

5.3 Which appliance uses the second most amount of energy in a house? Explain why you have chosen that appliance.

_____

_____

5.4 Which appliance uses the third most energy in a house? Explain why you have chosen that appliance. _____

_____

_____

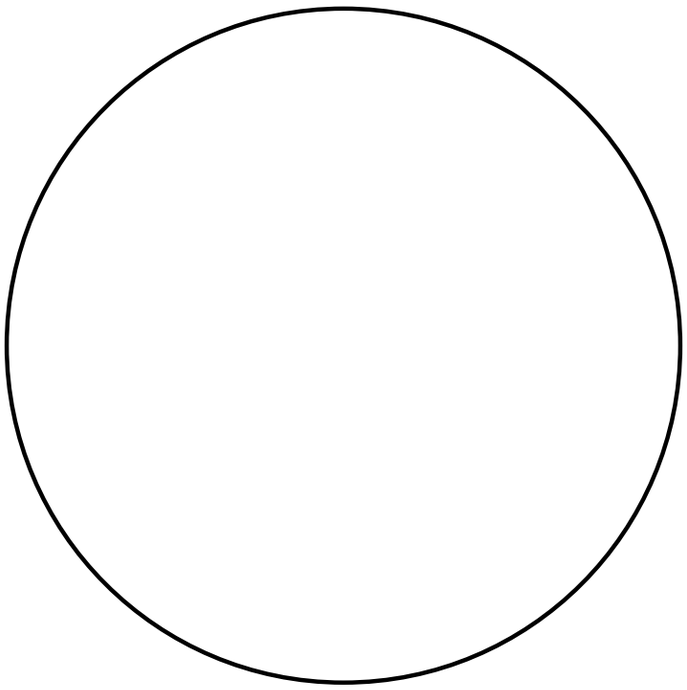
5.5 Although the television (TV) is switched off, why is there still a cost? _____

_____

5.6 What is the energy-wise way to switch the television (TV) off?

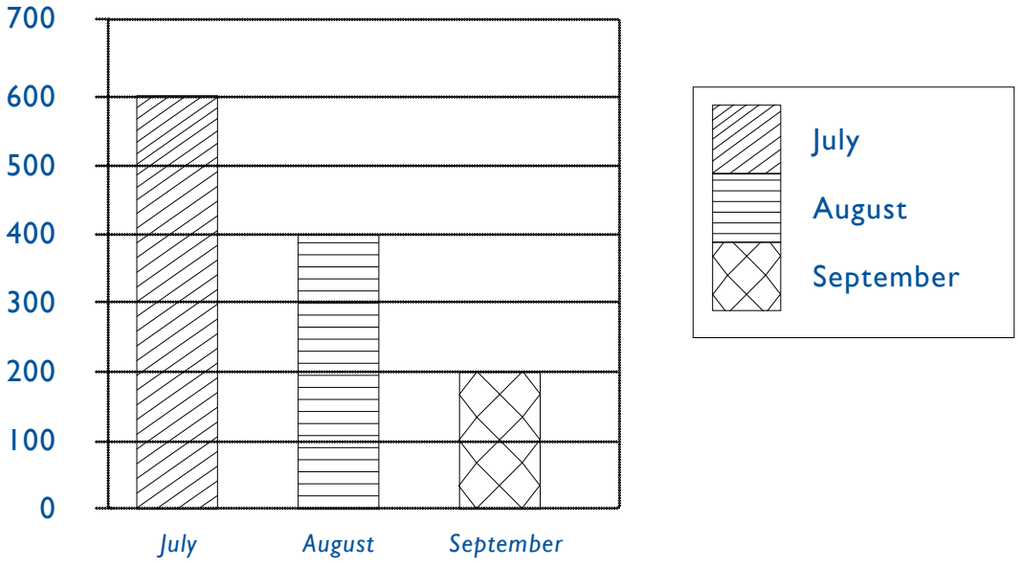
_____

5.7 Draw a pie chart to show the cost for the electricity used by each appliance in one day.
Label your pie chart.



Activity 6: Electricity accounts – you pay for the electricity you use

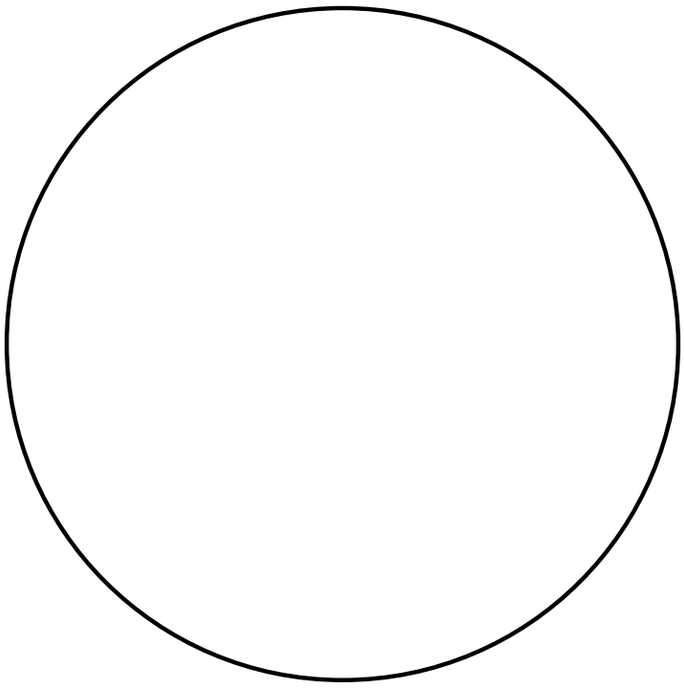
The following bar graph shows the electricity account for a family of 5 living in a three bedroom house in South Africa. They use heaters in winter and their air conditioners are on in summer.



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

Month	July	August	September	Total
Account				

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 amount of electricity used? Why do you think this was the case? [Remember when the seasons start and finish in South Africa]. _____

_____

_____

2.2 Explain why the electricity account in October is likely to be far less than July? _____

_____

2.3 Why do you think that the electricity account for January can be as high as for August? _____

_____

2.4 Write down ways in which the electricity account can be brought down in July and January by reading 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. There are other ways to keep warm or cool.

Winter:

- Use blankets and warm clothes.
- Eat food while it is fairly warm.
- Make certain that windows are closed tightly and any spaces under the door are covered. This prevents cold air from coming into the house and warm air from leaving the house.
- Open the curtains as soon as the sun rises to warm up 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 certain that windows are closed tightly and any spaces under the door is covered. This prevents the cool air from leaving the house.
- Also remember the temperature usually drops in the evenings – so you can turn off the air conditioner for a while.

Notes:

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For more information on the schools programme, please visit www.eskom.co.za/idm.