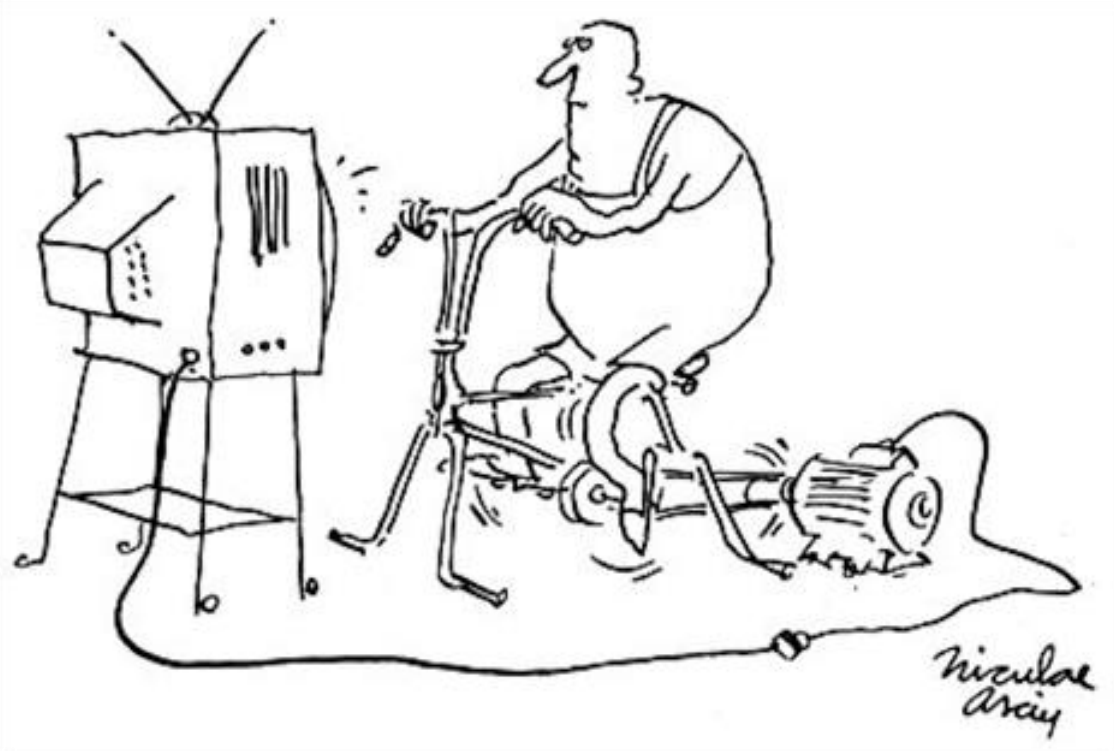
SALTUS GRAMMAR SCHOOL

S9 Science



Topic 9I - Electricity

Name: ……

Class: …… **Date:**……

Summary

This unit takes a look at the Electricity within the context of cost, the environment, renewable and non-renewable fuels. The emphasis is of course on a sustainable lifestyle – we try to include as much as possible to the situation here in Bermuda.

Topic	Objectives
Voltage and Energy	• List the components in a circuit • Explain how changing the voltage affects the current in a circuit
Power and Energy	• Explain what the power rating of an appliance shows • Explain how we can reduce our energy bills
Generating Electricity	• Describe how electricity is generated. • Consider the advantages and disadvantages of different ways of generating electricity. • Explain why efficiency is important
Fossil Fuels	• Know that energy resources are required for everyday life • Understand the formation and extraction of fossil fuels • Know that fossil fuels are non-renewable and polluting, leading to acid rain and global warming
Using Less Energy	• Understand that we can reduce the impact of global warming by using less energy • Understand that we can save money by using less energy • Know a variety of methods of reducing energy consumption
Other Energy Resources	• Recall a variety of alternative energy resources • Explain the difference between non-renewable and renewable energy resources • Explain some of the advantages and disadvantages of various energy resources

Updated: Feb 2020

A: Voltage and Energy

Objectives:

- List the components in a circuit
- Explain how changing the voltage affects the current in a circuit

9I:1 - Voltage and Current

Tick one box to answer questions **1** to **3**.

1 What does a cell push around a circuit?

☐ atoms ☐ electrons ☐ components

2 What do light bulbs do in a circuit?

☐ transfer energy as light

☐ transfer energy as sound

☐ use up the current

3 The voltage of a cell is a way of measuring:

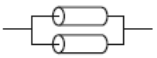
☐ how much current the cell gives to the circuit

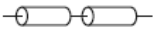
☐ the size of the cell

☐ how much energy the cell gives to the current.

Tick two boxes to answer questions **4** and **5**.

4 You can increase the size of the current by:

☐ using more cells, like this 

☐ using more cells, like this 

☐ using cells with a higher voltage

☐ using smaller cells.

5 If you increase the voltage of the cells in a circuit:

☐ the current gets bigger

☐ the current gets smaller

☐ more energy is transferred by the circuit

☐ more current is used up by the circuit.

6 Look at the drawing of the central heating model.

a Draw lines to match up the parts.

This part of the model…	…represents this part of a circuit.
boiler and pump	wires
pipes	light bulb
radiator	cell

b You turn up the boiler so the water is hotter. This represents putting a cell with a higher voltage in the circuit because:

☐ the hotter water transfers more energy to the radiator

☐ the hotter water flows more slowly

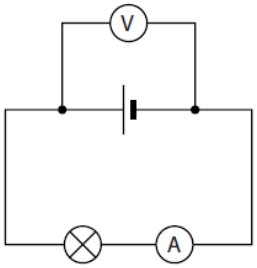
☐ the hotter water flows faster.

9I:2 – LAB Measuring the Current in a Circuit

Aim: How does the amount of current in a circuit depend on the voltage provided by the battery?

Apparatus

- cells or power pack
- bulb
- ammeter
- voltmeter
- connecting wires



Method

A Set up the circuit as shown in the diagram. Ask your teacher to check it.

B Switch on and read the voltmeter and ammeter. Write the voltage and the current in a results table.

C Increase the voltage by adding another cell or by changing the setting on the power pack.

D Read the current and voltage again.

E Repeat steps **C** and **D** until you have five different sets of readings.

Results (2):

Voltage (V)	Current (A)

Graph, draw either by hand or on your laptop – glue below (5):

Conclusion

How does the voltage affect the current? Describe in as much detail as possible. (3)

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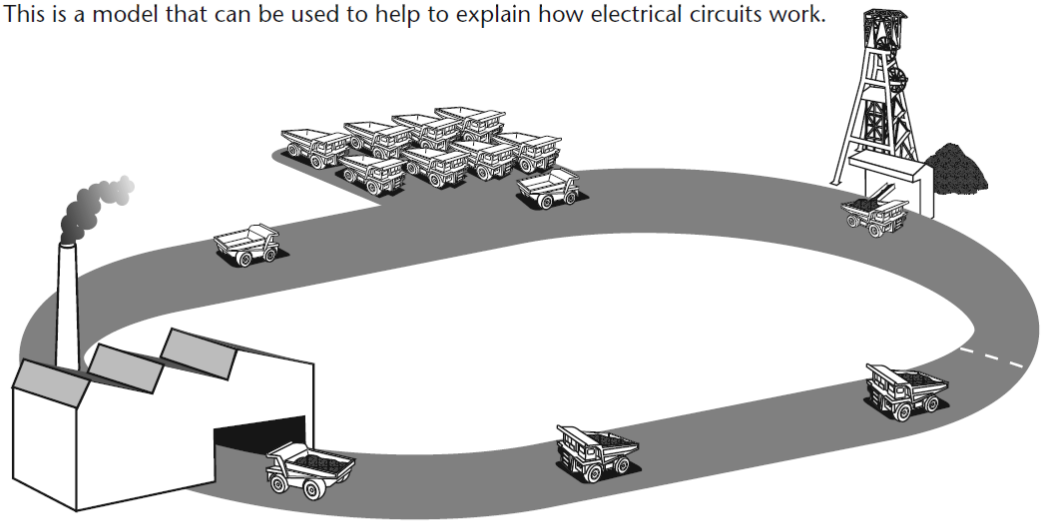
9I:3 - A Model Circuit

This is a model that can be used to help to explain how electrical circuits work.



Model A.

1. Which part of the model represents:

   a) the electrons that move around a circuit? ..... (1)

   b) the light bulb that transfers energy? ..... (1)

   c) the cell that supplies the energy to the current? ..... (1)

2. A cell pushes the electrons around the circuit as well as giving them energy. Do you think this model represents this action of the cell? Explain your answer. (2)

.....

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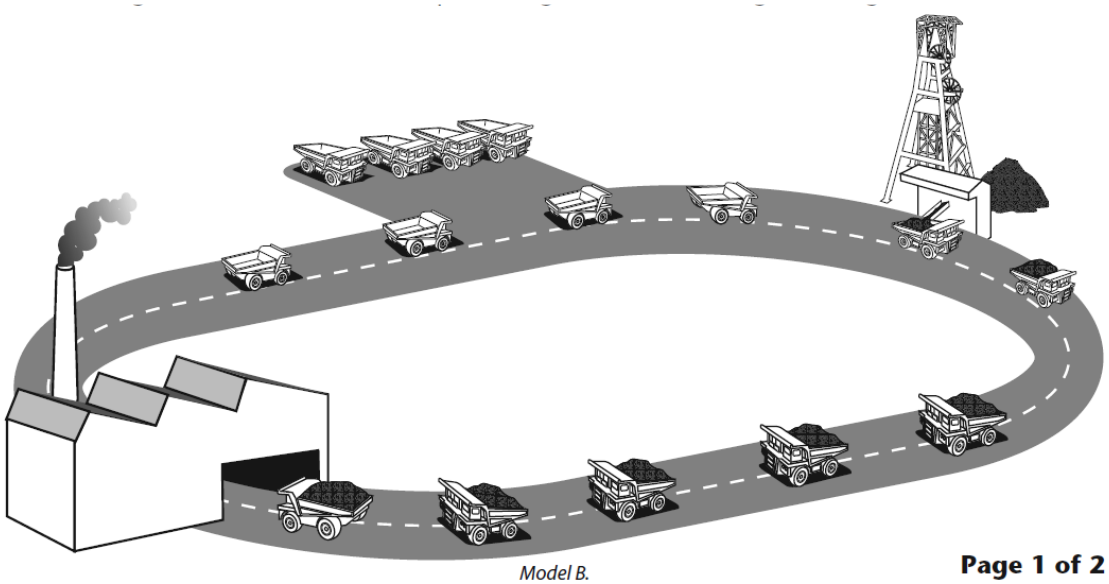
3. You can put cells with a higher voltage into a circuit. If you do this, what happens to:

   a) the current? ..... (1)

   b) the amount of energy carried by the current? ..... (1)

This drawing shows the same model representing a circuit with a higher voltage cell in it.



Model B.

Page 1 of 2

4. How is Model B different to Model A? (2)

.....

.....

.....

5. Describe how these both of these changes represent what happens in a circuit if you increase the voltage? (2)

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B: Power and Energy

Objectives:

- Explain what the power rating of an appliance shows
- Explain how we can reduce our energy bills

9I:4 - Energy and Power

1 These are the labels for a fan heater and an electric fire.

Fan heater – Model 35412
230 Volts 50–60 Hz
3000 Watts

Electric fire – one bar
50–60 Hz 230 Volts 1000 Watts

a Draw a circle around the parts that show you how much energy each appliance transfers each second.

b Which appliance transfers the most energy each second?_____

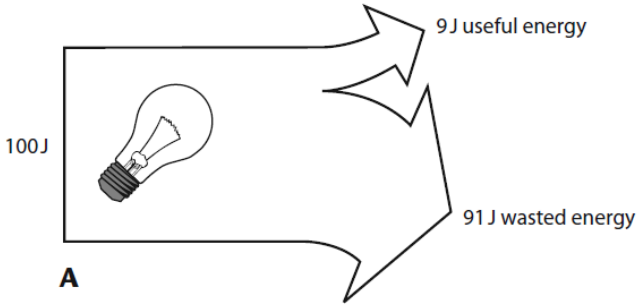
c How did you work out your answer to part **b**?

_____

2 Draw lines to match each piece of equipment with the energy it transfers each second.

Equipment	Energy transferred per second
electric fires and kettles	5000 J
electric ovens	1000 J
light bulb	400 J
televisions and computers	100 J

These diagrams show how much useful and wasted energy two different light bulbs transfer.



A

B

3 a Which light bulb transfers the most energy?

b Which one wastes the most energy?

c Which one is the most efficient?

4 a How is the useful energy transferred from the light bulbs? Tick the correct box.

☐ heating ☐ sound ☐ light

b How is the wasted energy transferred? Tick the correct box.

☐ heating ☐ sound ☐ light

9I:5 - Power and Energy

In a circuit, energy is transferred from the battery or power station to applicances like lights, stoves, water heaters and TVs. The amount of energy transferred depends on the current, the voltage and the length of time that the applicance is used.

The amount of energy used per second of time is called the power rating. The unit of power is Watts (W). It is possible to calculate the power rating using the equation:

$$power = current \times voltage$$

The amount of energy used is this value multiplied by the length of time (in seconds) that the applicance is used.

$$energy = current \times voltage \times time$$

1. What does power mean?

..... (1)

2. What are the units of power and what does the unit mean?

.....

.....

..... (2)

3. Explain why the power depends on the voltage and current.

.....

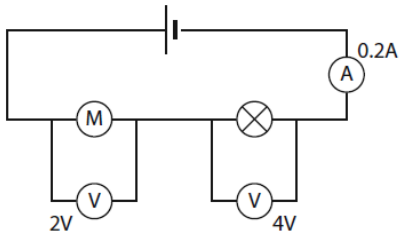
.....

.....

..... (2)

4. Sometimes you might know the voltage and the power of an item and need to calculate the current. Rearrange the equation to put the current on the left-hand side. (1)

5. Calculate the power of the components in this circuit: (2)



6. Complete the table below: (8)

Appliance	Power (W)	Voltage (V)	Current (A)
radio	12		0.052
fan heater		230	8.70
kettle	2400	230	
toaster	770	230	
light bulb	40		0.175
light bulb	100	230	
outside light		230	2.17
fridge		230	0.11
TV	500		2.17
electric oven	2800	230	
electric hob (4 rings)		230	30.43

7. What do you notice about the voltages? Explain. (2)

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8. Which type of item has the highest power rating? (1)

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9. How much energy is transferred by the following items?

a) a 40 W light bulb left on for 2 hours (2)

b) a 100 W light bulb left on for 2 hours (2)

c) A fan heater left on for an hour (2)

d) An oven left on for an hour (2)

C – Generating Electricity

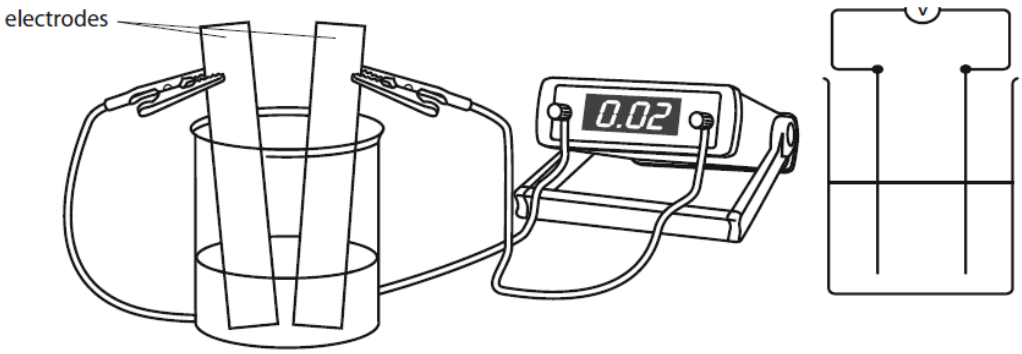
Objectives:

- Describe how electricity is generated.
- Consider the advantages and disadvantages of different ways of generating electricity.
- Explain why efficiency is important

9I: 6 – LAB Making a Battery

Aim: To investigate how to make the best battery.

Theory: A battery is made from placing two dissimilar metals (and/or carbon) into a beaker filled with a liquid called an electrolyte. There are many types of metal and many different electrolytes that can be used.



Which variable will your group investigate? (1)

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Which variables should you keep the same and why? (2)

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Describe how you will carry out your investigation. (2)

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Results (only use one of the tables) (3)

Electrolyte used: ……

	Cu	**Zn**	**C**	**Pb**	**Al**	
Cu	x					
Zn		x				
C			x			
Pb				x		
Al					x	

Electrodes used: ……

electrolyte	**Voltage (V)**
1M Hydrochloric acid	
2M Hydrochloric acid	
Sulphuric acid	
Acetic (ethanoic) acid	
Water	
Saltwater	
Sodium hydroxide	

Conclusion and Evaluation

Write a conclusion for your experiment that explains what you have learned. (2)

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Is your evidence valid? Discuss. (2)

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How could you take this experiment further? (2)

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Based on the whole class data, which combination would make the best battery? Explain. (2)

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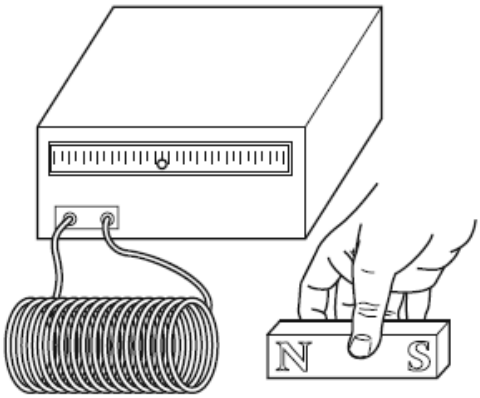
9I:7 - PhET Simulation Generating Electricity

Aim: Learning how to make electricity using a magnet and a coil of wire

You need a lot of wire and a very strong magnet to make enough electricity to light up a bulb. Your teacher showed you enough to generate only a few milliVolts! A very sensitive instrument can be used to detect this voltage. A computer simulation is easier to use!



Part A – Moving the Magnet

1. Describe in detail the effect of moving the magnet in and out of the coil. How does the speed affect the voltage produced? What happens if the magnet is not moving? (2)

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Part B – Number of Coils of Wire

2. What is the effect of increasing the number of coils of wire that is used in the experiment? (2)

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Part C – Direction of Movement

3. Describe how the direction that the magnet moves affects the electricity produced. Does switching the poles around make a difference? (2)

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Part D – Making a Generator

4. Use the next tab to show how a generator works. Describe in detail how to produce the maximum amount of electricity from the machine. Where does the energy that is given out as light come from originally? (2)

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Draw a diagram of the generator below (2):

9I:8 - Generating Electricity

D – Fossil Fuels

Objectives:

- Know that energy resources are required for everyday life
- Understand the formation and extraction of fossil fuels
- Know that fossil fuels are non-renewable and polluting, leading to acid rain and global warming

9I:9 - How Fossil Fuels Were Made

Fossil Fuels – True/False?

Some of these statements about fuels and energy are true and some are false.
Tick the boxes to show which statements are true and which are false.
Write a correct version of each false statement.

	True	False
1 Our bodies need fuel.	☐	☐
2 Living sustainably means harming the things around you.	☐	☐
3 Using energy resources may be contributing to global cooling.	☐	☐
4 Natural gas, oil and electricity are fossil fuels.	☐	☐
5 Coal is formed from the remains of plants.	☐	☐
6 Oil and natural gas take hundreds of years to form.	☐	☐
7 Fossil fuels are renewable fuels.	☐	☐
8 Oil is the fossil fuel that will run out first.	☐	☐
9 Electricity is not a fuel because it is made using other fuels.	☐	☐
10 Oil is a called a fossil fuel because it has fossils in it.	☐	☐

9I:10 - Fossil Fuels

1. Why are coal, oil and natural gas (methane) called fossil fuels? (1)

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2. Write down three different uses for these fuels. (3)

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3. Explain how coal is formed. (2)

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4. Explain why fossil fuels are called 'non-renewable' fuels. (2)

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5. The table below shows some facts about the different fossil fuels:

Fuel	How easy to light?	Does it produce smoke or soot?	How much energy is released?
coal	difficult	yes	30 kJ per gram
natural gas	very easy	no	55 kJ per gram
oil	easy	yes	45 kJ per gram

a) from which fuels do we get gasoline (petrol)? (1)

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b) Which fuel is easiest to light? (1)

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c) Which fuel will cause the least pollution when it burns? Explain. (2)

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d) Which fuel gives the most energy if one gram is burned? (1)

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e) Which fuel is a solid, which is a liquid and which is a gas? (1)

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6. Why do you think that gasoline (petrol) is used in cars instead of either coal or natural gas? (2)

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7. Why do you think that many homes in the UK use natural gas for heating instead of coal or oil? (2)

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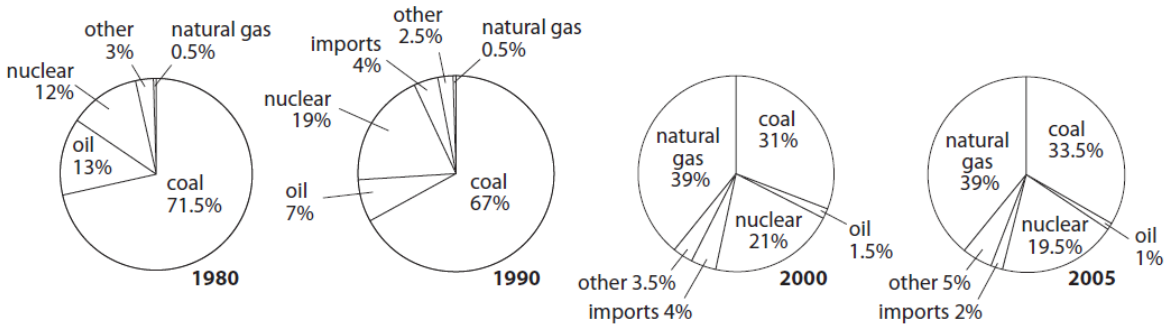
E: Using Less Energy

Objectives:

- Understand that we can reduce the impact of global warming by using less energy
- Understand that we can save money by using less energy
- Know a variety of methods of reducing energy consumption

9I:11 - Burning Fuels to Generate Electricity

Electricity is NOT a fuel. However, it is generated using other energy resources. The pie charts show which fuels were used to generate electricity in the UK over the years.



1. Which fuel was used the most in 1980? (1)

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2. Which fuel was used the most in 2005? (1)

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3. Which fuels have we used more of since 1980? (1)

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4. Which fuels have we used less of since 1980? (1)

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5. Try to give some reasons for the change in energy resource usage. (2)

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BERMUDA FOCUS: BELCO

BELCO's Central Plant is located on 23 acres of property in Pembroke. It is divided into the East and West Power Stations, containing a total of 21 diesel and gas turbine engines. All of these units generate power at a frequency of 60Hz. The de-rated maximum amount of power BELCO's generation plant produces is 167 MW of electricity.

The diesel engines carry the basic load of power used on a daily basis. They are slower to start up than the gas turbine engines but are more efficient to operate. In contrast, the gas turbine engines can be used almost immediately upon being started up.

The demand for electricity is always greater in the summer than in the winter. This is because the people of Bermuda begin using air conditioners as the weather gets hotter. To date, the highest summer peak demand of 122.8 MW was recorded in August 2010.

Fuel: The fuel used for the engines at BELCO varies, depending on which engines are in operation. Heavy fuel oil is used to operate the four newest diesel engines and light diesel fuel is used to operate the gas turbine engines.

BELCO imports all of its fuel. The fuel is pumped through a nine-mile pipeline from Esso's storage tanks to three bunker tanks on the BELCO property. In 2009, BELCO used approximately one million barrels of fuel to produce electricity for Bermuda.

(copied from www.belco.bm)

Important Facts

- 13 Diesel Engines ranging from 5 MW to 14.3 MW. East Power Station engines (base load plant) run on Heavy Fuel Oil. Old Power Station engines run on lighter-grade Marine diesel.
- 7 Gas Turbines ranging from 2.5 MW to 14 MW. Run on Marine diesel.
- Approximately 700 kWh is generated per barrel of fuel burned, which represents an average efficiency of 41%.

Year	Annual kWh generated (thousands)	Maximum Demand (MW)
1999	522,470	102
2000	535,335	103
2001	553,920	106
2002	574,726	108
2003	590,032	114
2004	594,998	108
2005	616,654	114
2006	631,365	117
2007	643,821	117
2008	644,954	120
2009	656,083	122
2010	650,571	123
2011	636,517	118
2012	606,345	114
2013	586,700	
2014		
2015		
2016		
2017		
2018		

(information from BELCO)

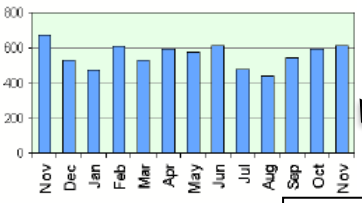
BELCO

BERMUDA ELECTRIC LIGHT COMPANY
P.O.BOX HM 1026, HAMILTON HM DX
www.belco.bm
Customer Enquiries:
Phone: (441) 299 2800
E-mail: info@belco.bm

Energy used (kWh)

Consumption Comparisons

	KWH	DAYS	KWH/DAY
CURRENT MONTH	615	33	18.64
PREVIOUS MONTH	597	29	20.59
SAME MONTH LAST YEAR	674	34	19.82



Historical data

Electricity Usage

METER NUMBER	PREVIOUS METER READING DATE	READING	CURRENT METER READING DATE	READING	CURRENT MONTH CONSUMPTION
55267426	Oct 11 13	46596	Nov 13 13	47211	615

Charges

PREVIOUS BALANCE		$266.11
PAYMENT RECEIVED		$252.81 CR
DISCOUNT GIVEN		$13.30 CR
OUTSTANDING BALANCE		$0.00
BILLING CHARGES:		
FIRST 250 KWHS	$0.1575 per kWh	$39.38
NEXT 250 - 700 KWHS	$0.2400 per kWh	$87.60
TOTAL USAGE CHARGES		$126.98
FACILITIES CHARGE		$33.00
FUEL ADJUSTMENT	$0.1700 per kWh	$104.55
TOTAL BILLING CHARGES		**$264.53**
GROSS TOTAL		$264.53
DISCOUNT DATE AND VALUE	Dec 02	$13.23 CR
NET AMOUNT DUE		**$251.30**
30 DAY		$0.00
60 DAY		$0.00
90 DAY+		$0.00

Total cost $

DATE OF BILL	Nov 13 2013
BILL DUE DATE	Dec 13 2013
ACCOUNT NUMBER	**2067848**
TELEPHONE NUMBER	(441) 292-6177
RATE CLASS	RESIDENTIAL
SERVICE ADDRESS	[redacted]

Please do not pay this bill, as it will be automatically drafted from your bank account in 7 calendar days.

The Fuel Adjustment Rate is 17.00 cents per kWh for readings taken on or after November 1, 2013 until further notice.

IMPORTANT PAYMENT NOTICE:
Payments made via ATM or Online Banking take 2 (two) working days to reach your BELCO account. Please check your discount date carefully to avoid losing your discount.

PAPERLESS BILLING & ONLINE ACCESS
Please call our Customer Service at 299-2800 or email us at gogreen@belco.bm to receive Bill Summary emails and obtain Online Access to view & print your bills in their entirety and see all of your account transactions.

Cost of electricity:

Bill $264.53

Units 615 kWh

= $264.53/615 = $0.43 per kWh

BELCO bill for an old, medium-sized house with 3 adults and no air conditioning.

BELCO

BERMUDA ELECTRIC LIGHT COMPANY
P.O.BOX HM 1026, HAMILTON HM DX

Failure to receive or loss of bill does not constitute a valid claim for discounts.
Payments made after date of bill are not included on this bill.
When making a payment please return this portion of the bill.

[redacted]

DATE OF BILL	Nov 13 2013
BILL DUE DATE	Dec 13 2013
ACCOUNT NUMBER	**2067848**
OUTSTANDING BALANCE	$0.00
THIS MONTH TOTAL	$264.53
GROSS TOTAL	$264.53
DISCOUNT DATE	**Dec 02 2013**
DISCOUNT VALUE	$13.23 CR
NET AMOUNT DUE	**$251.30**

F: Other Energy Resources

Objectives:

- Recall a variety of alternative energy resources
- Explain the difference between non-renewable and renewable energy resources
- Explain some of the advantages and disadvantages of various energy resources

Source of energy	*For*	*Against*
***1* Biofuel (biomass)** • Plants, especially fast-growing trees, can be grown for fuel. • Rotting plants and animal manure can make methane gas (in a digester tank).	Plants are renewable – you can grow some more. It uses natural waste products.	Burning fuel makes some air pollution.
***2* Solar energy** • Solar cells transfer some of the Sun's energy into electricity. • Solar cookers and solar panels use the heat from the Sun.	The Sun's energy is freely available whenever the Sun is shining. Solar panels are a cheap way of supplying warm water.	It only works when the Sun shines. Solar cells do not produce much electricity. You may need a large area, and they are expensive.
***3* Geothermal energy** • Water in the ground can be heated by hot rocks inside the Earth.	The energy is free and available day and night.	It is only possible in parts of the world where the hot rocks are near the surface.
***4* Hydro-electric energy** • When water runs down-hill, its kinetic energy can turn a water-wheel or a turbine. This can be used to generate electricity.	Every time it rains, there is more water to provide energy.	It can only be used in wet hilly areas. Building a dam to flood a valley may damage the environment.
***5* Tidal energy** • Tidal water can be trapped behind a barrier, like a dam. Then it can be used like hydro-electric energy.	Wherever there are tides, free energy is provided.	It only works well in places where there are high tides.
***6* Wind energy** • The wind can be used to turn wind-mills and generators, to make electricity.	Whenever the wind blows, energy is provided.	It only works well in windy places. Many generators are needed to provide enough electricity for a town.
***7* Wave energy** • Waves are caused by the wind. The movement of floats can be used to make electricity.	Whenever there are waves, energy is provided.	It only works in places where there are usually big waves. Many kilometres of floats are needed to provide enough electricity for a town.

9I:12 - Energy Resources

1 Underline three renewable energy resources:

coal oil biomass wind natural gas hydroelectric power

2 The missing words in these statements are shown jumbled up at the end of each statement.

a Nuclear power stations use a metal called _____. (um a ruin)

b Uranium is dangerous because it can cause illnesses like _____. (can rec)

c Renewable energy resources will _____ run out. (nerve)

d Solar cells turn energy from the Sun directly into _____. (tricycle tie)

e A _____ can be powered by a solar cell. (ocular talc)

f Solar panels can be used to provide _____ to homes. (wheat rot)

g Solar power can be used to generate _____ if the heat from the Sun is used to turn water into _____. (eelcityric, meats)

h A biomass fuel is one made from _____ or _____ waste. (st plan, laminas)

i Wood is an example of a _____ fuel. (aim boss)

j Geothermal power uses the heat from underground _____. (corks)

k There are not many hydroelectric power stations in the UK because we do not have many high mountains with trapped _____. (we rat)

9I:13 - Wordsearch

There are 25 words connected with energy and energy resources in this wordsearch.

1 Find as many words as you can, and write them down on a separate piece of paper.

2 Write down two key facts for each word, or two examples that help to explain what the word means.

S	H	Y	D	R	O	E	L	E	C	T	R	I	C	I	T	Y	Y
O	K	D	B	Q	S	A	N	K	E	Y	D	I	A	G	R	A	M
U	N	G	R	A	V	I	T	A	T	I	O	N	A	L	T	R	K
N	B	K	V	N	D	Z	Z	N	Y	L	F	O	R	C	E	S	N
D	Y	R	T	X	J	F	T	W	A	F	Y	K	M	C	T	W	U
K	B	M	L	B	K	K	K	K	F	T	D	T	I	D	E	S	C
E	F	I	C	H	E	M	I	C	A	L	U	W	Z	C	L	W	L
F	F	Y	O	M	T	R	A	N	S	F	E	R	I	R	F	A	E
O	T	F	N	M	F	Q	X	Y	E	Q	M	S	A	N	C	V	A
S	H	W	I	T	A	M	N	N	R	T	M	T	T	L	D	E	R
S	E	A	Y	C	P	S	X	N	R	H	I	L	L	R	G	S	P
I	R	S	R	U	I	N	S	F	X	K	E	C	V	J	A	A	L
L	M	T	T	L	S	E	G	E	N	E	R	A	T	E	D	I	S
F	A	E	M	I	B	E	N	H	V	B	M	P	T	J	Z	L	N
U	L	D	A	G	M	Q	F	C	J	M	N	T	W	I	N	G	M
E	H	Y	I	H	L	K	T	U	Y	B	K	Z	R	L	N	F	R
L	J	D	N	T	T	R	V	C	L	D	F	J	N	Q	R	G	K
S	Q	P	S	M	C	K	T	P	Y	T	S	O	L	A	R	N	M

SUMMARY SHEETS

Energy

Energy can be **transferred** in different ways:

- electricity
- heating
- forces
- light
- sound.

Energy can also be stored.

- **Thermal energy** is stored in hot things.
- **Chemical energy** is stored in food, fuels and cells.
- **Kinetic energy** is stored in moving things.
- **Gravitational potential energy** is stored in high up things.
- **Strain energy** is stored in stretched or squashed things.
- **Nuclear energy** is stored inside atoms.

Energy is measured in **joules** (**J**) or **kilojoules** (**kJ**). A kilojoule is 1000 joules.

Energy cannot be made or destroyed, but can only be transferred from one place to another. This is the **law of conservation of energy**.

Efficiency

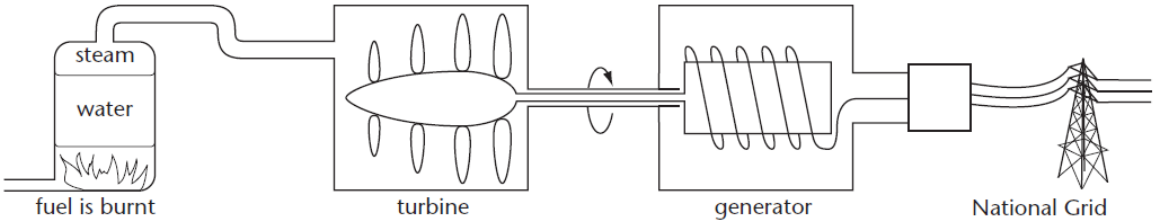
Not all energy is transferred usefully. Often it is turned into heat that we cannot use. This is **wasted energy**. Light bulbs transfer most energy to heat, which is wasted energy.

The percentage of useful energy produced by something is known as its **efficiency**. The light bulb in the diagram is 15% efficient.

Page 1 of 2

Generating electricity

Fossil fuels are transported to **power stations** where they are burnt to transfer heat energy. This heats water, turning it to steam. The steam drives **turbines** which turn **generators**. The electricity generated flows along cables into the **National Grid**.



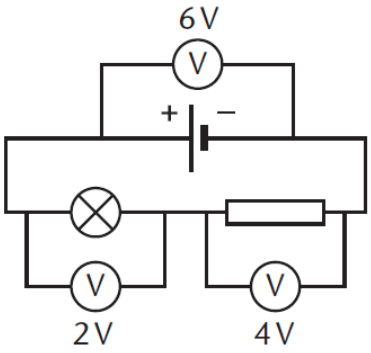
Some power stations use **nuclear fuel**. Electricity also can be generated from **renewable resources** such as wind and moving water. These will become more important as fossil fuels run out.

Burning fossil fuels produces carbon dioxide, which is causing global warming. We need to reduce the amount of fossil fuels we burn.

Voltage

A circuit must have a **cell** or power supply to provide a **voltage**. The voltage pushes **electrons** around the circuit and gives them energy. This electrical energy is transferred to other **components** in the circuit, which then transfer it to other forms of energy. For instance, a buzzer transfers electrical energy to sound.

The voltage of a cell can be measured using a **voltmeter**. The units for voltage are **volts** (**V**). The voltage across a component is a way of measuring how much energy the component is transferring.



9I:14 - QUICK QUIZ

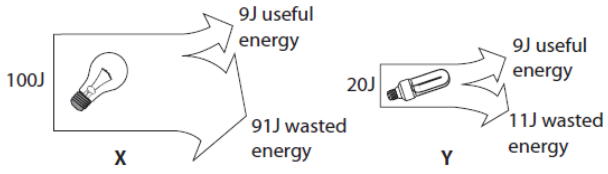
9Ia

1 Which of these is *not* a way in which energy is stored?
A chemical
B kinetic
C electrical
D thermal

2 Which of these is *not* a way in which energy can be transferred?
A heating
B petrol
C light
D sound

3 Which forms of energy are often produced as wasted energy?
A heat and light
B heat and sound
C sound and light
D sound and kinetic

4 Which of these light bulbs is the most efficient?



A Y because it does not waste as much energy as X.
B Y because it wastes more energy than X.
C X because it transfers the most energy.
D X because it wastes more energy than Y.

9Ib

1 Which is the best description of how electricity is generated?
A it is made in power stations
B by letting falling water make turbines spin
C by burning fossil fuels
D spinning generators make the electricity

2 How does electricity get to our homes?
A under the ground
B through the wires of the National Grid
C through the air
D in cells or batteries

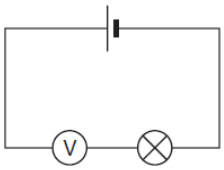
3 The energy transferred by most of the electricity in the UK comes from:
A energy stored in fossil fuels.
B energy stored in food.
C energy stored inside atoms.
D energy in wind and waves.

4 Which statement gives an advantage of nuclear power stations?
A Uranium is a non-renewable resource.
B It is easy to shut them down.
C They cost a lot to build.
D They don't produce carbon dioxide.

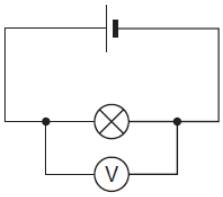
9Ic

1 The units for voltage are:
A amps.
B ohms.
C volts.
D metres.

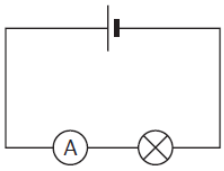
2 Voltage is measured:
A using a voltmeter in the circuit like this.



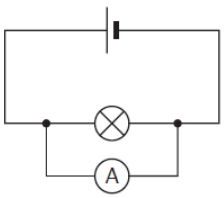
B using a voltmeter in the circuit like this.



C using an ammeter in the circuit like this.



D using an ammeter in the circuit like this.



3 Voltage is:
A another name for current.
B a way of counting how many cells there are in a circuit.
C a way of saying how much energy the electricity is carrying.
D something that makes it difficult for electricity to flow.

4 Which statement is not true for a series circuit?
A The voltage is always the same for all the components.
B The voltage across each component depends on how much energy it uses.
C The voltage across all the components adds up to the voltage across the cell.
D The voltage can be measured using a voltmeter.

9Id

1 What are the units for measuring power?
A joules
B watts
C volts
D kilowatt-hours

2 How can you find the power of an appliance?
A see how hot it gets when it is switched on
B see what voltage it needs
C look for the efficiency label
D look for the power rating on the label

3 Which kinds of appliances transfer the most energy?
A heaters and cookers
B lights
C TVs and radios
D computers

4 Which is not a reason to use more efficient appliances?
A they save on electricity bills
B they mean less electricity has to be generated
C they usually cost more
D they help to cut carbon dioxide emissions