

**PONY**

سلسلة كتب الأستاذ

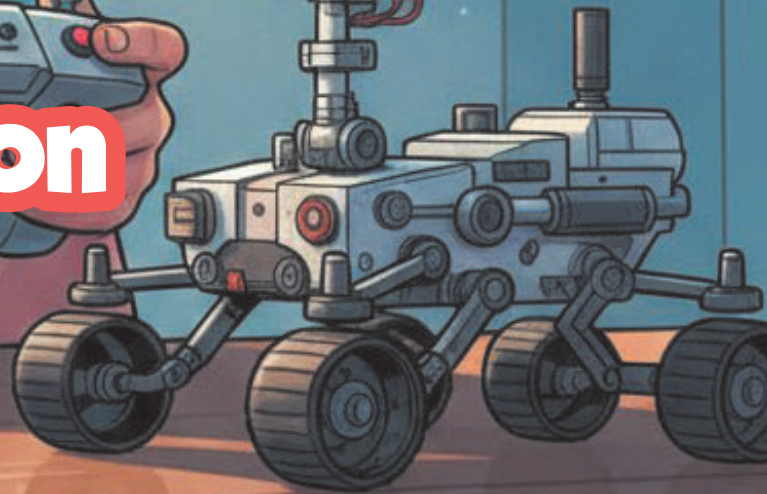
# SCIENCE

**4<sup>th</sup>**  
Primary

Second Term

## March Revision

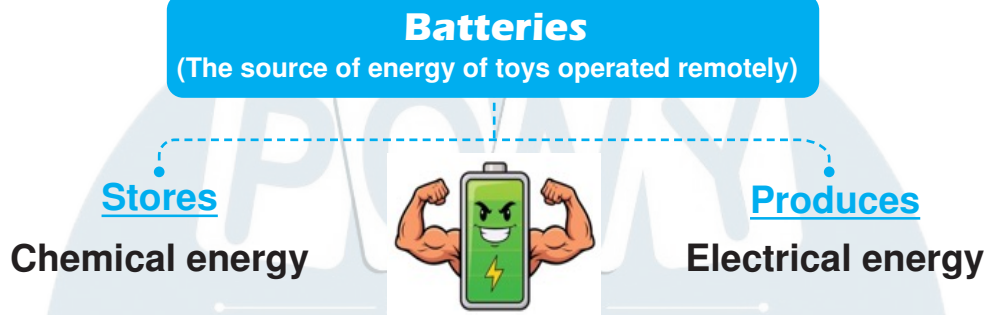
By: Amira Ahmed



## Concept 3.1 Energy and Devices

### 1 Toys operated remotely:

- » Many toys may be operated remotely (from a distance), such as:
  - Cars • Trucks • Boats • Planes • Robots
- » These toys need a source of energy such as a battery to:
  - Move (be operated). • Do different tasks.



- » If the battery runs out, the toy car will stop moving, so we can **replace** it or **recharge** it.

### 2 Curiosity Rover:

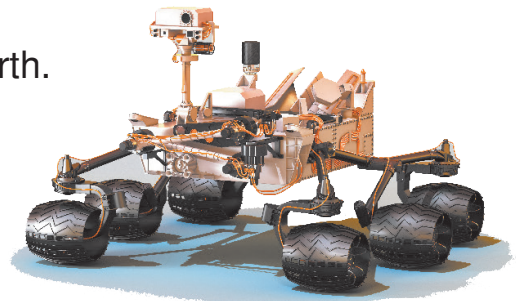
- The distance between Earth and Mars is **54 million kilometers**.
- Spacecraft takes **6 months or more** to reach Mars.
- Missions to Mars don't include **people**.
- Missions to Mars depend on **robots** and **vehicles**.



### Curiosity Rover

(It is a most famous robotic vehicle that explores Mars)

- It is operated remotely from a distance.
- It is too far from a store or charger plug on Earth.
- **It depends on:**
  1. Solar panels.  
(Solar panels convert solar energy into electrical energies)
  2. Batteries charged by solar energy.



### 3 Devices (Machines):

- People depend on devices (machines) to make their lives easier.
- In devices, energy can be converted from one form to another.

#### Input Energy

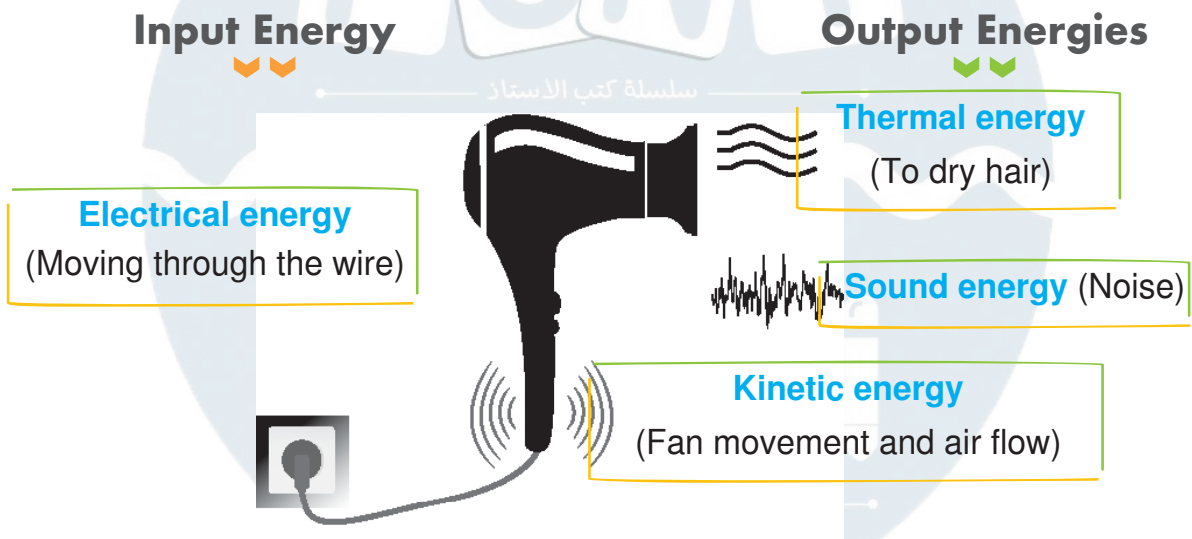
It is the energy **consumed in** the device.

#### Output Energy

It is the energy **produced from** the device.

- Some of the energy produced doesn't help the device do its function, and it is called "lost energy".

#### Hair Dryer Function: Drying hair



**Thermal energy is useful energy in hair dryer**

Because it helps the device to do its function.

**Sound energy (Noise) is lost energy in hair dryer**

Because it doesn't help the device to do its function.

#### Law of Conservation of Energy

Energy can neither be created nor destroyed; but it is only converted from one form of energy to another.

» The table shows the energy transformation in some devices in our homes.

| Device   | Input Energy<br>= Used energy = Consumed energy | Output Energy<br>= produced energy = Outcoming energy |
|--|---|---|
| • Hairdryer  | Electrical energy                               | Thermal energy<br>Kinetic energy<br>Sound energy      |
| • Washing machine<br>• Vacuum cleaner<br>• Blender (Mixer) | Electrical energy                               | Kinetic energy<br>Sound energy                        |
| • Television<br>• Mobile phone                             | Electrical energy                               | Light energy<br>Sound energy                          |
| • Electric fan   | Electrical energy                               | Kinetic energy  |
| • Electric iron<br>• Electric heater<br>• Kettle (Boiler)  | Electrical energy                               | Thermal energy  |
| • Radio<br>• Door bell                                     | Electrical energy                               | Sound energy  |
| • Hand bell<br>• Drum<br>• Guitar                          | Kinetic energy                                  | Sound energy  |
| • Electric bulb (Lamp)                                     | Electrical energy                               | Light energy<br>Thermal energy                        |
| • Flashlight   | Chemical energy                                 | Light energy<br>Thermal energy                        |
| • Clock  | Chemical energy                                 | Kinetic energy  |
| • Soap dispenser   | Potential energy<br>(Stored in the spring)      | Kinetic energy<br>(Movement of the soap upward)       |
| • Toy car<br>(Operated remotely)                           | Chemical energy                                 | Kinetic energy<br>Sound energy                        |
| • Toy car<br>(Operated by spring)                          | Potential energy<br>(Stored in the spring)      | Kinetic energy  |

When operating some devices for a long time, thermal energy (heat) is produced as a wasted (lost) energy.

#### 4 Energy transformations in some activities:

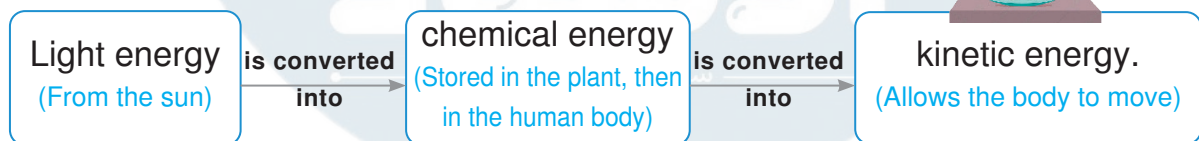
| Activity                 | Input Energy    | Output Energy  |
|--------------------------|-----------------|----------------|
| Rubbing hands (Friction) | Kinetic energy  | Thermal energy |
| Clapping hands           | Kinetic energy  | Sound energy   |
| Walking - Running        | Chemical energy | Kinetic energy |
| Burning wood             | Chemical energy | Thermal energy |

#### 5 Energy chains:

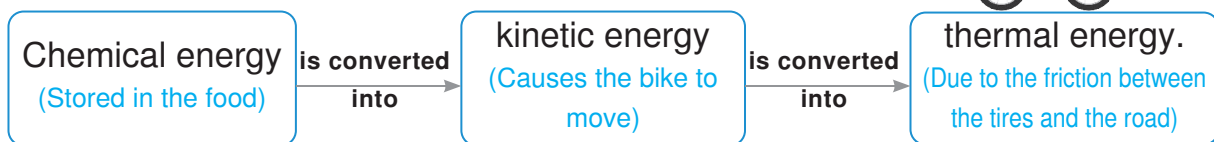
- The energy chain is the path of energy from the sun to different devices.
- Each energy chain starts with the **sun**.
- The sun is the **main source** of energy on Earth.

#### Examples of Energy Chains:

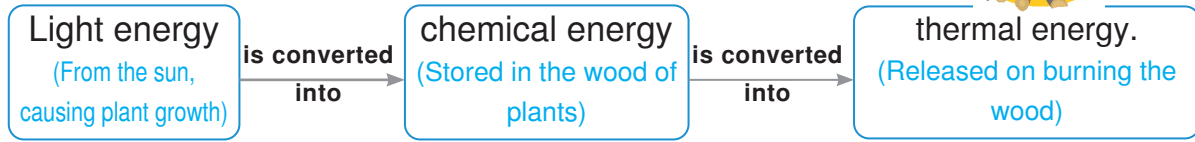
##### ① Energy chain when eating food:



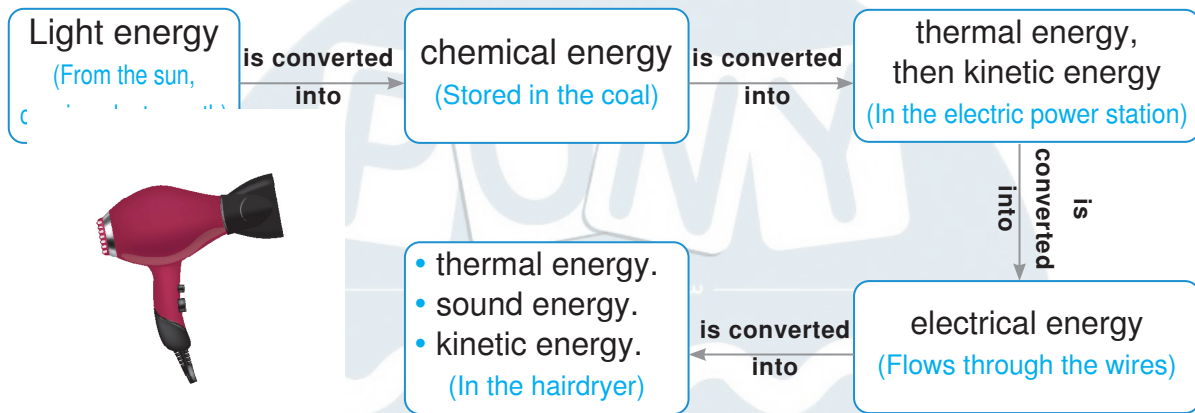
##### ② Energy chain while riding a bike:



③ Energy chain when heating a pot of water over a fire:



④ Energy chain when using the hairdryer:



## Concept 3.2 About Fuel

### 1 Fuel:

#### Fuel

It is any substance that produces thermal energy when it is burned.

#### Stores

Chemical energy

#### Produces

Thermal energy  
(when it is burned)

### 2 Types of fuel:

- They are two types of fuel on Earth, which are:



#### 1 Biofuel

- They are fuels that are made from living organisms that can be planted.

- Wood  
(The oldest fuel used by ancient people)
- Charcoal  
(It is made from wood)
- Liquid fuel  
(It is formed corn, grass, and wood chips)

#### Examples:

- Coal  
(Decomposition of old trees)
- Oil and Natural gas  
(Decomposition of sea animals)
- Gasoline  
(It is made from oil)

#### 2 Fossil Fuel



- They are fuels that were formed from the decomposition of old animals and plants.

#### Give a reason for:

- Biofuels are renewable resources of energy. Because they can be renewed as plants grow.
- Fossil fuels are nonrenewable resources of energy. Because they can't be renewed easily after they are used.

#### Disadvantages:

- To get wood, it requires cutting down trees with a fast rate, which may lead to deforestation.
- Burning fossil fuel produces carbon dioxide gas, which causes:
  1. Air pollution
  2. Acid rain
  3. Global warming

### 3 Uses of fuel:

- Humans depend on fuel as a resource of energy in their daily lives, such as in:

|  |  |  |   |
|--|--|--|---|
| <p>Cooking food</p>  <p><b>Natural gas</b><br/><b>Coal Wood</b></p> | <p>Warming houses</p>  <p><b>Coal</b><br/><b>Wood</b></p> | <p>Operating cars</p>  <p><b>Gasoline</b><br/><b>Natural gas</b></p> | <p>Generating Electricity</p>  <p><b>Coal Oil</b><br/><b>Natural gas</b></p> |
|--|--|--|---|

### 4 Disadvantages of burning fossil fuel:

- Burning coal and oil, produces carbon dioxide gas, which causes:

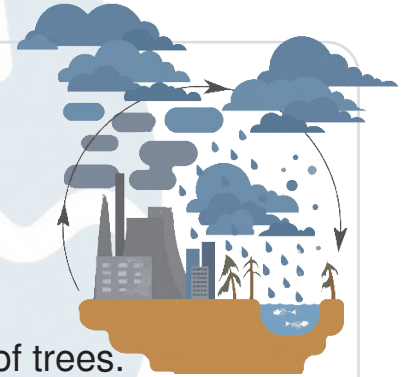
#### Acid Rain:

##### How it is formed:

- Carbon dioxide gas combines with water in the air to form **acid rain**.

##### Its disadvantages:

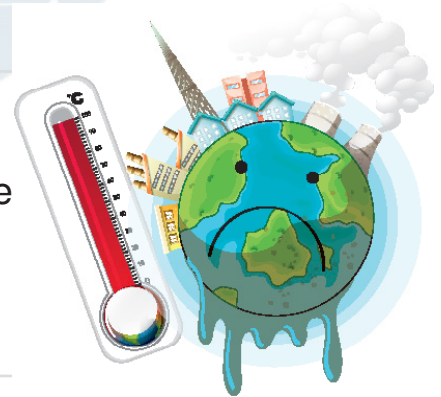
- It changes the chemical structure of soil causing death of trees.
- It changes the chemical structure of lakes causing death of fish.
- Dissolving some rocks, and bricks of buildings.



#### Global Warming:

##### How it is formed:

- Carbon dioxide gas forms a layer in the atmosphere that traps heat on the Earth, causing a slow rise in the Earth's temperature.

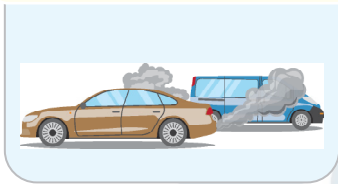


## 5 Pollution in Big cities:

### Reasons of Pollution in Big Cities

1

**Burning fuel** produces smog that pollutes the air.



2

**Pesticides** used on farms are carried into canals and rivers by rainfall, leading to **soil** and **water** pollution.



3

**Using chemicals** in factories pollutes the **air**, **water**, and **soil**.



### Effects of Air Pollution on Humans' Health

Smog from cars and factories in big cities causes:

- 1 Irritation of humans' **eyes** and **lungs**.
- 2 Damage of the **respiratory system tissues**.



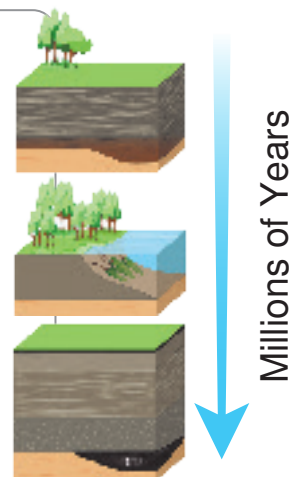
## 6 Origin of fuel:

- The sun is considered the main source of all forms of fuel on Earth.

### Formation of Coal

Over many millions of years ago:

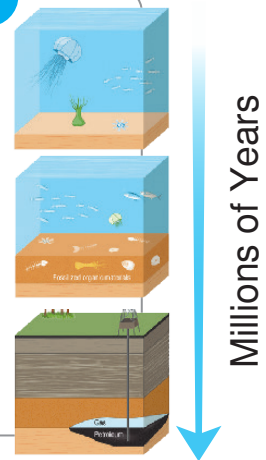
- 1 Large areas of Earth were covered in swamps, with a lot of plants growing nearby.
- 2 When those plants died, their remains were covered with mud and rocks.
- 3 Those remains turned into coal due to the effect of heat and pressure.



## Formation of Oil or Natural Gas

Over many millions of years ago:

- 1 Marine organisms died, their remains settled on the sea floor.
- 2 Layers of sediments and rocks covered the remains.
- 3 Over time, those remains were exposed to extreme heat and pressure.
- 4 The remains were converted into oil or natural gas.



### 7 Water and oil:

- Water and oil are two different natural resources that are used by human daily.

#### Water

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#### Oil

#### Its type:

##### **Renewable energy resource:**

They are natural resources that can be replaced soon after they are used.

##### **Nonrenewable energy resource:**

They are natural resources that are used faster than they can be replaced.

#### Its use:

Water is used to generate hydroelectricity.

Water is used to generate electricity.

#### How to conserve them?

##### We can conserve water by:

- 1 Growing plants that don't require watering.
- 2 Avoid wasting or polluting water.

##### We can conserve oil by:

- 1 Driving less private vehicles.
- 2 Taking public transportations.

## 8 Gasoline and cars:



**Chemical energy**  
(stored in fuel)

is converted  
into

**Thermal energy**  
(when fuel burns)

is converted  
into

**Kinetic energy**  
(when car moves)

- If the speed of driver increases, the amount of used fuel increases.
- If a car runs out of fuel, it will stop moving.

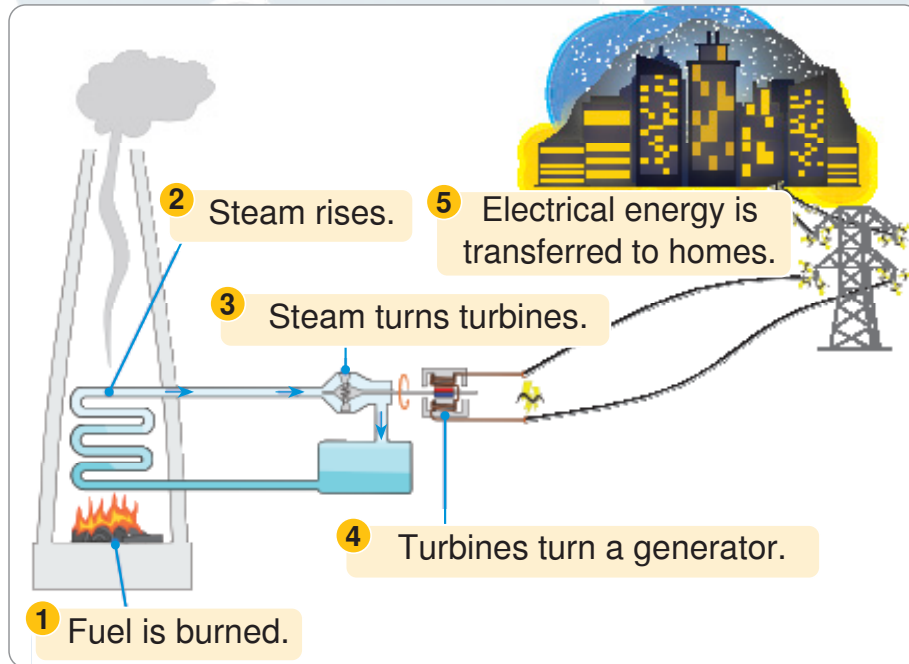
## Gasoline pointer (fuel indicator)

**Function:** It helps the driver to check the amount of gasoline in the car's tank.



- On going on a long trip by car, we must check the **gasoline pointer**.
- If the gasoline pointer is close to zero, we must fill the car's tank from the nearest **gas station**.

## 9 Generating Electricity:



## 1 Fuel is burned.

- When fuel (coal, oil, or natural gas) burns, it produces thermal energy.

## 2 Steam rises.

- This thermal energy is used to heat water to produce steam.

## 3 Steam turns turbines.

- The steam is directed to tubes to turn turbines.

## 4 Turbines turn a generator.

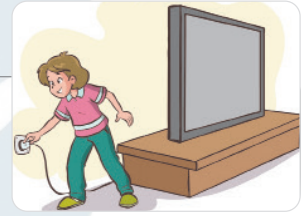
- Turbines make the generator spin to convert kinetic energy into electrical energy.

## 5 Electrical energy is transferred to homes.

- Electrical energy travels through wires to homes and factories.

How do we conserve electricity ?

- 1 Turning off the lights we don't need.
- 2 Unplugging unused electrical devices.



## Concept 3.3 Renewable Energy Resources

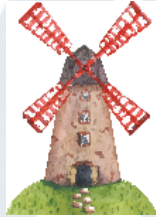
### Renewable resources of energy

They are natural resources that are replaced (renewed) at a rate faster than they are consumed.

#### 1 Old machines:

- In the past, people needed **machines** to make their lives easier.

##### 1 Windmill



##### 2 Watermill



#### Way of Working:

- |  |   |
|--|---|
| <ol style="list-style-type: none"><li>1 The <b>wind's</b> kinetic energy moves the <b>mill's</b> blades.</li><li>2 The <b>kinetic energy</b> is then transferred to other parts of the mill.</li></ol> | <ol style="list-style-type: none"><li>1 The <b>water's</b> kinetic energy moves the <b>mill's</b> blades.</li><li>2 The <b>kinetic energy</b> is then transferred to other parts of the mill.</li></ol> |
|--|---|

#### Importance:

- They are used to crush (grind) grains and make flour.



#### Advantages:

- Low cost
- Renewable energy resources

#### Disadvantages:



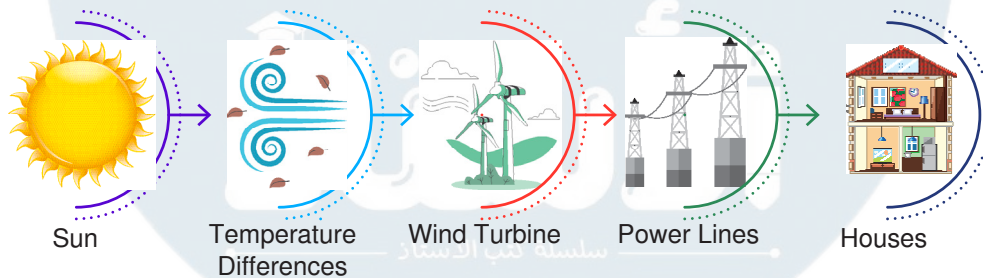
- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>• Sometimes the <b>wind doesn't blow</b>, so it can't do its main job.</li></ul> | <ul style="list-style-type: none"><li>• Sometimes, <b>the water supply</b> may <b>dry up</b>, so it can't do its main job.</li></ul> |
|--|--|

## 2 Wind energy:

**Modern turbines are used now instead of old windmills.**

| 1 Modern Wind Turbines  | 2 Old Windmills  |
|---|--|
| <b>Function</b>   |  |
| • Generating electricity  | • Grinding the grains to make flour  |
| <b>Differences</b>  |  |
| • They are <b>taller than</b> windmills.<br>• They have <b>fewer</b> blades than windmills.<br>• The blades have <b>no openings</b> . | • They are <b>shorter</b> than wind turbines.<br>• They have <b>more</b> blades than wind turbines.<br>• The blades have <b>openings</b> . |
| <b>Similarity</b>   |  |
| • They depend on the kinetic energy of the wind to be operated.   |  |

### Generating Electricity Using the Wind:



1 **Solar energy** causes the air to move and the wind to blow.

2 The kinetic energy of the **wind** rotates the blades of the **wind turbines** that are used to spin the generators.

3 The **generators** change kinetic energy into electrical energy.

4 **Electricity** is transferred through big wires towards cities.

## 2 Solar energy:

1 It is the main source of all kinds of energies on Earth.

3 The sun provides us with **light** and **heat**.



2 The sunrays have a kind of energy called **radiant energy (radiation)**.

4 The energy received from the sun is called **solar energy**.

## Uses of Solar Energy:

- We can use solar energy as a source of **thermal energy**.

1

### Greenhouses



#### Importance:

- They help farmers plant crops that grow in **warm climate**.

#### How does it work?

- 1 A greenhouse allows the entry of **radiant energy**.
- 2 **Radiant energy** is changed into **thermal energy** inside it.
- 3 Thermal energy warms the inside of the greenhouse.

### 2 Warming



#### a Warming our bodies:

- When exposing yourself to the sun, you feel warm.

#### b Warming houses:

- By placing large windows on the walls that face the sun.

### 3 Concave mirrors



#### Concave mirrors are used in cooking food, where:

- They **collect** and **focus** sunlight on a metal pot to cook the food inside it.

### 4 Solar water heater



**Structure:** • It contains panels made of **black pipes**.

**Location:** • It can be placed on the roof of a house.

#### How does it work?

- 1 As water passes through the pipes, it heats up.
- 2 The heated water is stored in a water tank to be used later.

## Solar Panels:

|                  |   |
|------------------|---|
| <b>Structure</b> | <ul style="list-style-type: none"><li>• They consist of a large number of small solar cells.</li></ul>  |
| <b>Idea</b>      | <ul style="list-style-type: none"><li>• Solar cells capture the radiant energy coming from the sun and turn it directly into electricity.</li></ul>   |
| <b>Size</b>      | <ul style="list-style-type: none"><li>• Some are very small to supply one light bulb only with energy.</li><li>• Others are very large to supply buildings or cities with energy.</li></ul>   |
| <b>Uses</b>      | <p><b>Most solar panels are used to generate electricity to:</b></p> <ol style="list-style-type: none"><li>1 Light houses and streets.</li><li>2 Operate electric devices.</li><li>3 Recharge batteries of solar-cell calculators.</li><li>4 Power irrigation equipment in some villages.</li></ol> |

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**1 A) Complete the following sentences:**

- ..... mirrors are used in cooking food by focusing sunlight on cooking pots..

**B) Write the scientific term:**

1. It is the substance from which electrical wires are made from. (.....)
2. It is any substance that produces thermal energy when it is burned. (.....)

**2 A) Read the following statements then correct the incorrect ones**

1. Wind is non-renewable resource of energy.  
.....
2. The energy produced by sun is light energy only. ....

**B) Give a reason for:**

1. The occurrence of global warming.  
.....
2. The battery is a source of energy of toy car operated remotely.  
.....

**3 A) Choose the correct answer:**

- Radiant energy is the energy produced from ..... .
- a) water     
  b) the sun     
  c) wind     
  d) the moon

**B) What happens when:**

- You put your hand near lighted electric bulb.  
.....

**C) Mention two ways to conserve fuels and avoid wasting electricity?**

.....

**1 A) Complete the following sentences:**

- Energy can neither be ..... nor ..... ,but it can only be ..... from one form to another.

**B) Write what the following statement refers to:**

1. It is the pathway of energy from the sun to different devices. (.....)
2. It is the main source of all forms of energy on Earth’s surface. (.....)

**C) Cross out the odd word**

- Solar water heater – Hand mixer – Solar panel – Greenhouse (.....)

**2 A) Determine the disadvantage of burning fossil fuels.**

.....

**B) 1. Give a reason for:**

- Biofuel is considered renewable resource of energy.

.....

**2. What happens when:**

- Decomposition of sea creatures occurs under the Earth surface.

.....

**3 A) Put true or false:**

- Mars Curiosity can be operated from a distance. ( )

**B) Compare between biofuel and fossil fuel (definition).**

.....

**C) Mention the nonrenewable and renewable resources of energy that is used in generating electricity.**

.....



1 A) Complete the following sentences:

- The output of the solar panels system is ..... energy.

B) Write the scientific term:

- It is natural resources of energy that take a short period of time to be renewed. (.....)

C) Mention the use of old windmills

.....

2 A) What is meant by: energy chain?

.....

B) Cross the odd word: سلسلة كتب الأستاذ

- Coal – Oil – Water – Natural gas (.....)

C) Give a reason for:

1. A spacecraft takes a long time to reach Mars.

.....

2. Water is considered a renewable resource of energy.

.....

3 A) What happens if: سلسلة كتب الأستاذ

1. Hair dryer is operated?

.....

2. Carbon dioxide gas combines with water vapor in air?

.....

B) Mention energy change in the following table:

| Device         | Consumed (input) energy | Produced (output) energy |
|----------------|-------------------------|--------------------------|
| Soap dispenser | .....                   | .....                    |

**1 A) Complete the following sentences:**

- ..... and ..... are from renewable energy resources.

**B) Write what the following statement refers to:**

1. It is the energy that stored inside the battery of toy car. (.....)
2. It is a phenomenon in which the Earth's temperature increases when carbon dioxide gas increases in the air. (.....)

**C) Mention the use of gasoline.**

.....

**2 A) Mention:**

- The function of mars rover curiosity.

.....

**B) Give a reason for:**

- Generators are important in electric power stations.

.....

**C) What happens if:**

- You burn a piece of coal? (According to the change of energy)

.....

**3 A) Put true or false:**

- Energy can be converted from one form to another. ( )

**B) Cross out the odd word**

- Water – Oil – Coal – Natural gas (.....)

**C) Determine the input and output energies in:**

| Device                 | Input energy | Output energy |
|------------------------|--------------|---------------|
| a) Wind turbines       | .....        | .....         |
| b) Solar panels system | .....        | .....         |

# Models answers

## March Tests Model Exam (1)

**Q 1 A) Complete the following sentences:**

- Concave

**B) Write the scientific term:**

- 1- Copper      2- Fuel

**Q 2 A) Read the following statements then correct the incorrect ones**

- 1- Hydropower is renewable resource of energy.
- 2- The energy produced by sun is light energy and heat energy.

**B) Give a reason for:**

- 1- Because of increasing of the amount of carbon dioxide gas which forms a layer in atmosphere that traps heat on Earth causing increasing rise in Earth's temperature.
- 2- Because battery is source of energy (chemical energy stored in battery changes into electrical energy) that changes into kinetic energy to move the toy car.

**Q 3 A) Choose the correct answer:**

- b

**B) What happens:**

- I feel warm, because light bulbs change electrical energy changes into light energy and thermal energy.

**C) 1- Walking or using bicycles instead of driving a car.**

**2- Turn off light when you are not in the room.**

**3- Replacing fossil fuels with renewable energy such as water, wind and solar energy.**

## March Tests Model Exam (2)

**Q 1 A) Complete the following sentences:**

- created, destroyed, changed

**B) Write what the following statement refers to:**

- 1- Energy Chain      2- Sun

**C) Cross out the odd word**

- Hand mixer

**Q 2 A) • Burning fossil fuel makes pollution because it produces carbon dioxide which causes acid rain and global warming.**

**B) 1- Give a reason for:**

- Because biofuel renewed as plant grow.

**2- What happens when:**

- Formation of oil and natural gas.

**Q 3 A) Put true or false:**

- ✓

**B) • Biofuels are fuels made from living organisms that can be planted (such as plants).**

- Fossil fuels are fuels formed from the remains of plants and animals that were buried and decomposed over a very long period of time.

**C) • Nonrenewable sources: oil, coal and natural gas.**

- Renewable resources: sun, water and wind

## March Tests Model Exam (3)

**Q 1 A) Complete the following sentences:**

- Light – chemical

**B) Write Scientific term:**

1- Fossil fuels

2- Mars rover Curiosity

3- Oil

**Q 2 A) Put true or false:**

- ✓

**B) Give a reason for:**

- Because when it burns, it produces thermal energy.

**C) • Energy can neither be created nor destroyed but only converted from one form of energy into another.**

**Q 3 A) Choose the correct answer**

- c

**B) • The car movement decreases until it stops.**

**C) • Electrical energy changes into kinetic and sound energies.**

**March Tests Model Exam (4)**

**Q 1 A) Complete the following sentences:**

- Electrical energy

**B) Write the scientific term:**

- Renewable energy resources

**C) They crush grains to make flour.**

**Q 2 A) It is a way to describe the flow of energy and its conversion from one form into another.**

**B) Cross the odd word:**

- Water

**B) Give a reason for:**

- 1- Because Mars is 54 million kilometers away from Earth.
- 2- Because it can be replaced soon after it is used.

**Q 3 A) What happens if:**

- 1- Electric energy changes into thermal energy, kinetic energy and sound energy.
- 2- Formation of acid rain which cause death of trees, changes chemical nature of soil and lakes and kill fish.

**B) • Input energy: Potential energy  
Output energy: Kinetic energy**

**March Tests Model Exam (5)**

**Q 1 A) Complete the following sentences:**

- Water, wind

**B) Write what the following statement refers to:**

- 1- Chemical energy
- 2- Global warming

**C) It is used to generate electricity and to operate all means of transportation.**

**Q 2 A) Mention**

- Explore Mars planet

**B) Give a reason for:**

- Because it changes kinetic energy into electrical energy.

**C) • Chemical energy changes into Thermal energy.**

**Q 3 A) Put true or false:**

- x

**B) Cross out the odd word**

- Water

**C)**

| Device                   | Input energy   | Output energy   |
|--------------------------|----------------|-----------------|
| (a) Modern wind turbines | Kinetic energy | Electric energy |
| (b) Solar panels system  | Solar energy   | Electric energy |

تطبيق



مذكرات جاهزة للطباعة

لتحميل الملفات التعليمية مجاناً للمعلم والطالب

مذكرات وملازم / مراجعات وملخصات / امتحانات / كتب الوزارة /  
أدلة المعلم / دفاتر التحضير / سجلات مدرسية / أوراق تأسيس

امسح الكود بموبايلك علشان تقدر تثبت التطبيق

وتقدر ف أي وقت تحمّل ال نفسك فيه ببلاش

هيغنيك عن البحث والجروبات والقنوات الكثيرة

