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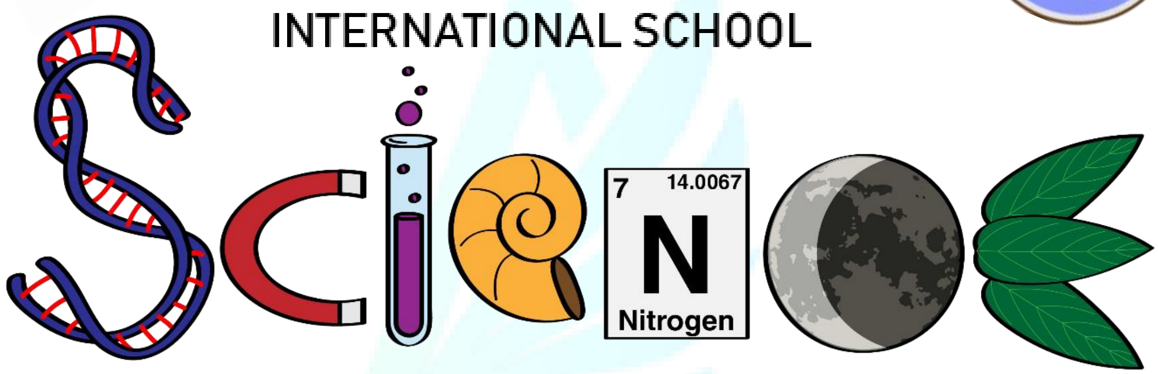


Science Department

2023/2024

Year 7

Term 1, Revision Pack (Unit 3)

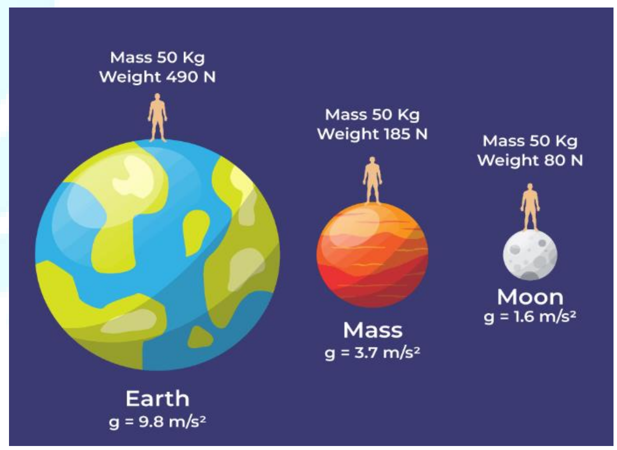
Name: ……………………………………………………..

Class: ………………………………………………………

3.1 Gravity

is the force that pulls any object towards the centre of the Earth.

- Each object has a gravity.
- Increasing the mass of the planet increases its gravity.
- Due to that the Sun has the greatest gravity in the solar system.
- The strength of gravity decreases as you go further from a large object such as Earth. For example, if you travel away from Earth in a spacecraft, the force of gravity from the Earth acting on you would get smaller.



What is the difference between mass and weight?

	Mass	Weight
Definition	Amount of matter in an object	Attraction force of gravity on any object towards the centre of the planet
Apparatus	Balance	Force meter (Spring scale)
Unit	Kg, g	N
Effect of changing the gravity	Constant whatever the gravity	The higher the gravity, the higher the weight and vice versa

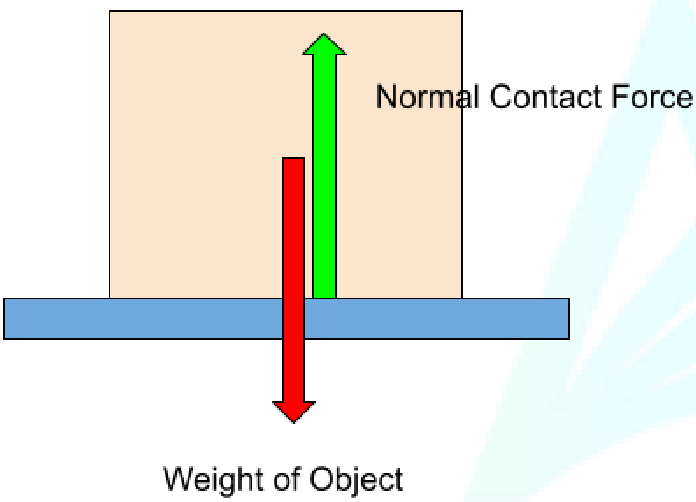
1- On a still surface:

- Why do some objects stay still on a surface and don't fall?
  (Example a book on a shelf)

Because the shelf is providing a pushing force in the opposite direction of the weight(gravity)

We call this a contact force.

- **Contact Force:** Always equal and opposite to the weight of the object

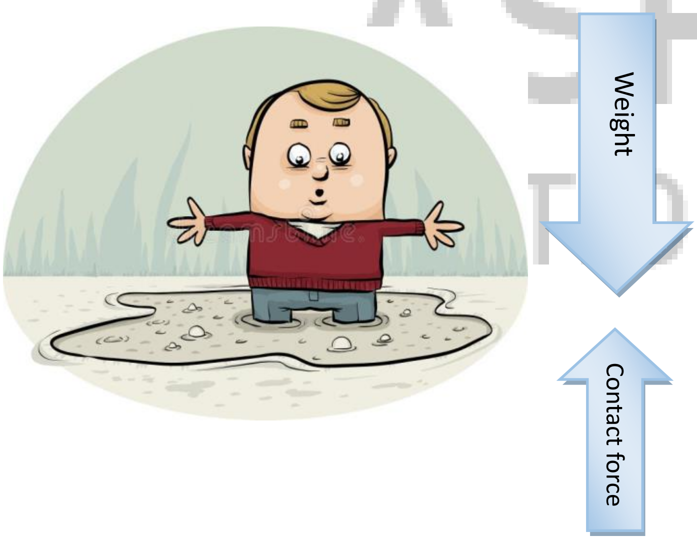


The object is still (doesn't fall down), because

The contact force = weight

2- On a moving surface:

If the force of weight is greater than the contact force, the object sinks.



The man sinks a quick sand, as

Weight is greater than the contact force

Note the difference of the size and length of the arrow.

The longer (or the thicker) the arrow, the greater the force

Calculating mass and weight on the Earth:

On Earth, the force of gravity is 10 N on every 1 kg of mass.

We use the following equation to calculate the weight:

$$\text{weight (N)} = \text{mass (kg)} \times 10\ \text{(N/kg)}$$

$$W = m \times 10$$

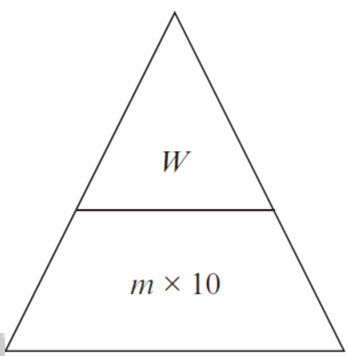
Example:

Calculate the weight of an adult who has a mass of 75 kg.

W= M × 10

= 75 × 10 = 750 N

If the mass is unknown but you know the weight use the formula triangle to figure it out



Mass = W ÷ 10

Remember to add the unit of the mass in Kg.

Example:

Calculate the mass of a car that weighs 8500 N.

Mass = W ÷ 10
= 8500 ÷ 10 = 850 Kg

3.2 Formation of the Solar System

- Scientists try to look for <u>**evidence**</u> in the form of facts from observations or experiments to support their theory
- They think of a testable theory, known as a <u>**hypothesis**</u>, and look for evidence to support this hypothesis

<u>Facts about the solar system:</u>

1. All the planets in the solar system follow a path, called <u>**orbit**</u>, around the sun in the same direction.
2. The sun and all the planets (except Venus and Uranus) spin on their axes in the same direction.
3. Most of the moons of the planets orbit their planets in the same direction as the planets rotate around the sun
4. The direction of the spin of the sun and the planets (except Venus and Uranus) is the same as the direction in which the planets orbit the sun
5. All the planets orbit the sun in the **same plane** which means that it could be placed on a flat surface. Therefore, the Solar System looks flat.

How does the solar system form?

<u>1- Sun formation</u>

It started from a cloud of dust and gas called a **nebula**

All particles of dust and gas have their own weak gravity → The particles of dust and gas pull on each other with weak forces due to their own gravity → As they stick together, their mass increases → As their mass increases, the strength of their gravity increases too. → Therefore they attract more dust and gas with a stronger force and form a ball → The ball gets bigger and if it gets beyond a certain size, it gets hot enough to become a star

<u>2-Planets formation:</u> particles are collected together around the sun to move at a high speed, stick and form planets

- Most of the facts about the solar system support or agree with this hypothesis.
- The fact that Venus spins on its axis in the opposite way to all the other planets contradicts this hypothesis.

Using of models (Modelling):

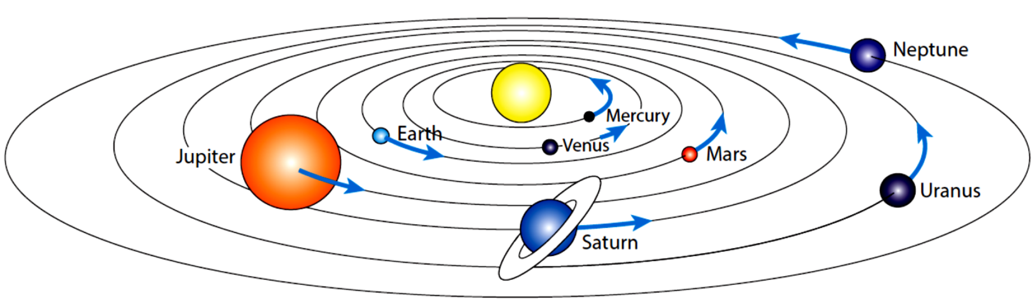
- Scientists cannot observe a star or Solar System forming in an experiment.
- Instead, they use computers to create models
- A model is a way of representing something that is difficult to observe directly.
- Models have strengths and limitations.

(The strength of a model is the way that matches the real thing, while a limitation is the defect or the factor in which the model doesn't match reality)

For example:

A model of the solar system

Strength	Limitation
The correct order of planets	Drawing orbits as lines (they are imaginary lines)
Showing the difference in sizes close to reality	Not representing the real distances between planets
The planets' colours are close to reality	Not showing moons and other small objects



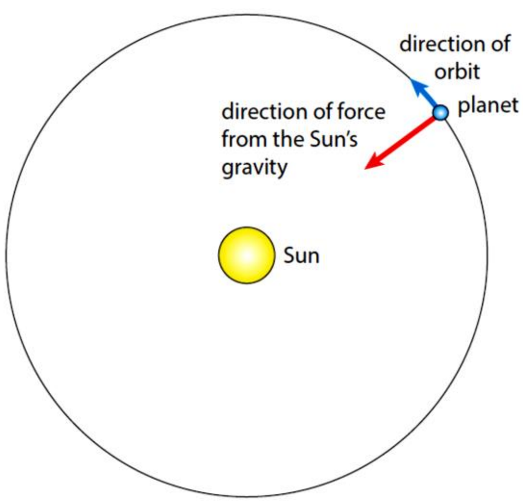
3.3 Movement is space

The Sun and its gravity

- The sun is the object with the largest mass in the solar system
- The mass of the sun is more than the mass of all the other planets added together.
- The strength of gravity on Earth is 10 N/kg. On the sun it is 270 N/kg (27 times stronger than Earth's gravity, so it holds all the planets in their orbits).
- The Sun's gravity gets weaker as the distance from the sun increases.

Moving in an orbit

- The orbit of the planets including Earth is almost circular. To keep any object moving in a circle, there needs to be a force causing it to turn.
- The force of gravity from the sun that acts on a planet always acts towards the sun.
- If this force did not act, the planet would travel in a straight line into space.



Speed of movement:

<u>On the Earth:</u> All objects that move have forces acting upon them, called ***air resistance.***
Acts in the opposite direction to movement.
The faster the movement, the higher the air resistance working upon it.

The larger the surface area, the greater the air resistance.

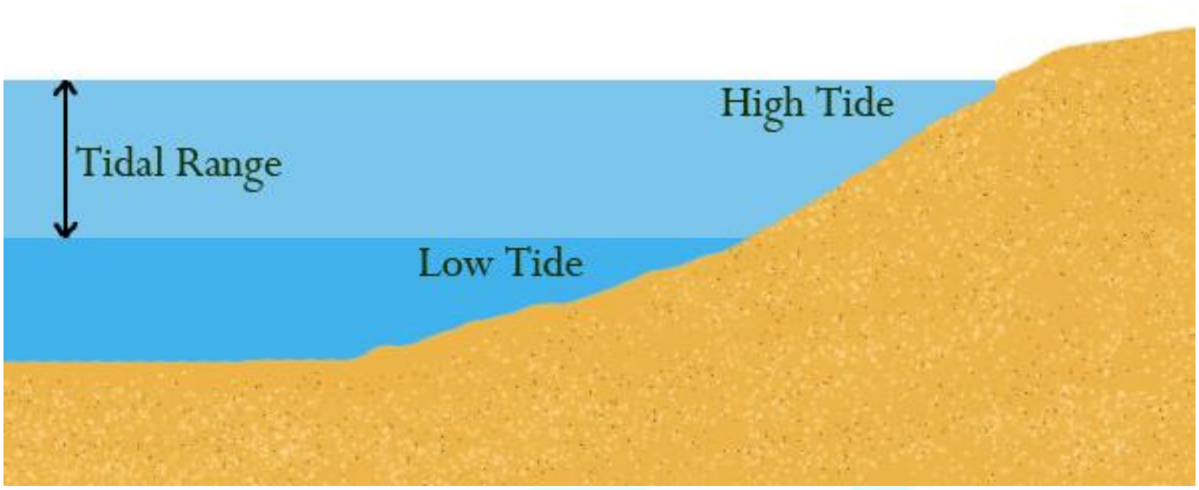
<u>In space (vacuum):</u> there's no air resistance, nothing slows down orbiting planets, except the gravity of a planet.

3.4 Tides

Tide is the change in depth of the water.

The tidal range is the difference in depth of the water between high and low tides.

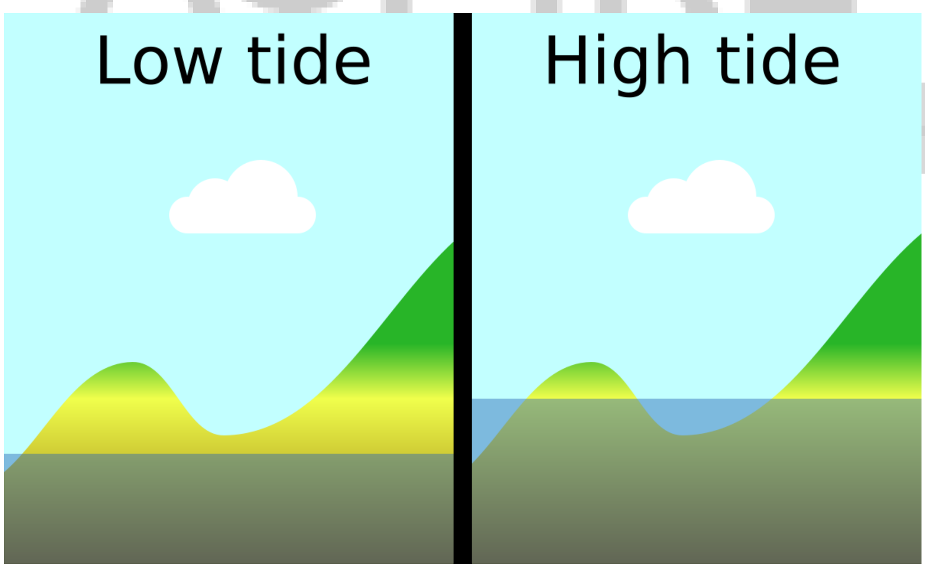
Tides also cause the land to change in height throughout the day! This is called Earth Tide.



What causes tides?

The gravity of the moon pulls the Earth's water to the side that faces the moon.

The tidal force is the pull from the Moon's gravity.

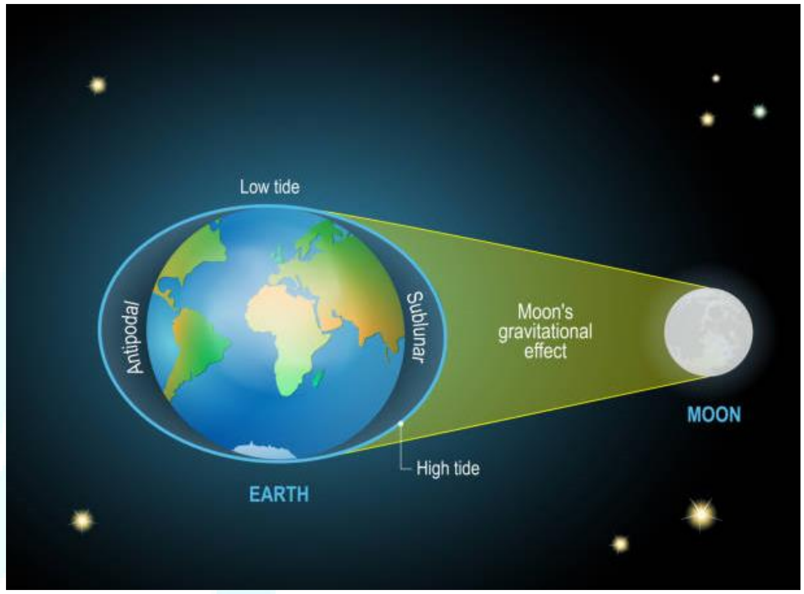


High Tide

- [ ] The closest side to the moon
- [ ] The side furthest away
- [ ] The greatest high tide is when the Earth, the moon and the sun are in a line

Low Tide

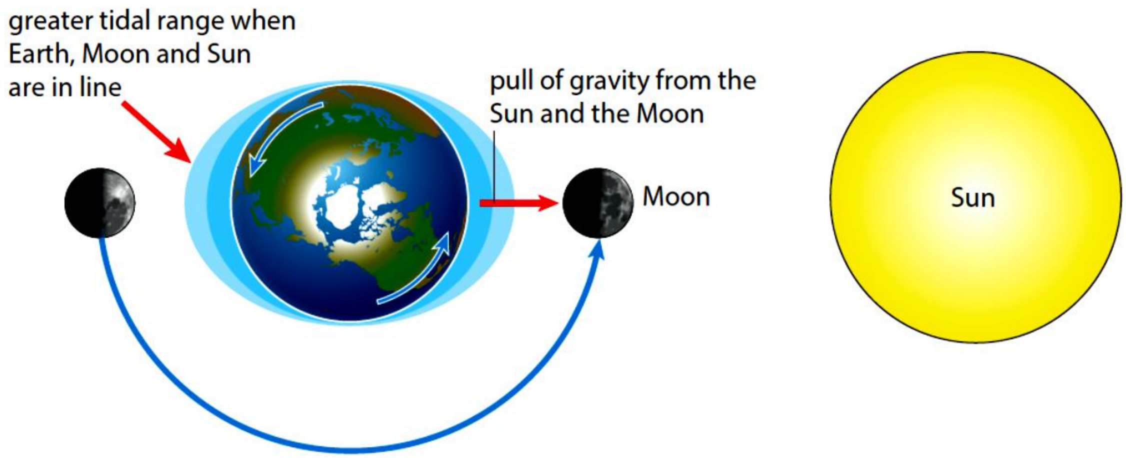
- [ ] The two positions of the Earth between the two high tides



Between each <u>two high tides</u> 12 hours

Between each <u>two low tides</u> 12 hours

Between <u>a high tide and a low tide</u> 6 hours



- Note: The greatest high tide is when the Earth, the moon and the sun are in line at that time the moon will be a new moon or a full moon.

Effects of tides

1- Coastal areas may be submerged with water when there's a high tide

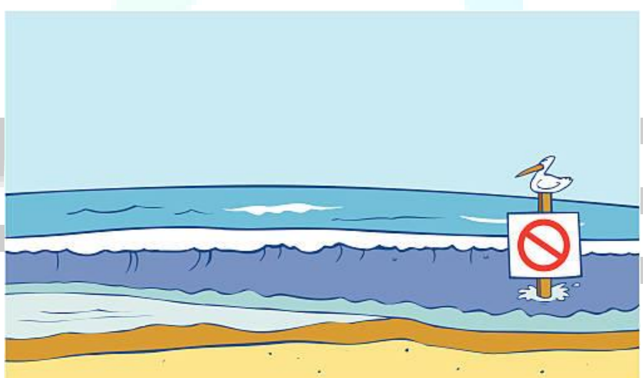
2- Harbours can only be used at certain times of the day, when the water is deep enough

3- Affects food chains, including the human. Birds may find new types of food when it's a low tide

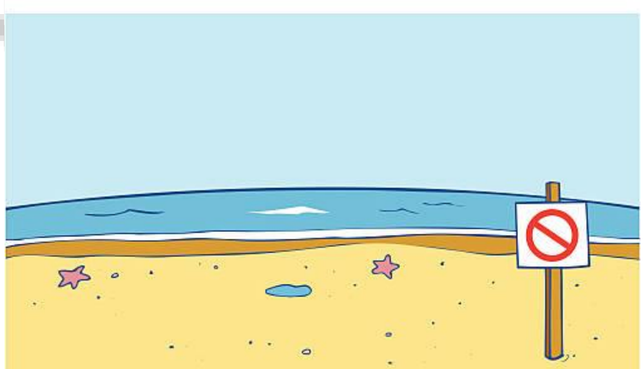
4- Volcano and Earthquakes

- The movement of water with tides can be used to generate electricity.

High Tide



Low Tide



3.5 Energy

Energy is something that must be changed or transferred to do something.
There are many different ways that energy can be stored or transferred.

The unit for measuring the amount of energy is called the joule (J).

The table describes some of these stores and transfers.

energy	description	energy store or energy transfer
kinetic	energy stored due to movement of an object	store
chemical	energy stored in food, batteries, chemical **fuels** such as wood, oil and coal	store

energy	description	energy store or energy transfer
thermal	heat energy stored in hot objects and transferred to colder objects	store or transfer
elastic potential	energy stored when things are stretched or squeezed to change their shape	store
gravitational potential	energy stored when an object is lifted away from a source of gravity	store
electrical	the flow of current in a circuit transfers electrical energy	transfer
sound	energy transferred from vibrating objects	transfer
light	visible energy from **luminous** objects (objects that give out their own light) that you can see	transfer

Stored Energy:

Energy can be stored for a long time	Energy can be stored for a short time
Chemical energy Example: grains, fuel, batteries	Thermal energy Example: a hot cup
Potential energy Example: Water lifted in a tank	Kinetic energy Example: a moving ball

Transferred Energy (can't be stored):

1- Electrical Energy
2- Sound Energy
3- Light Energy

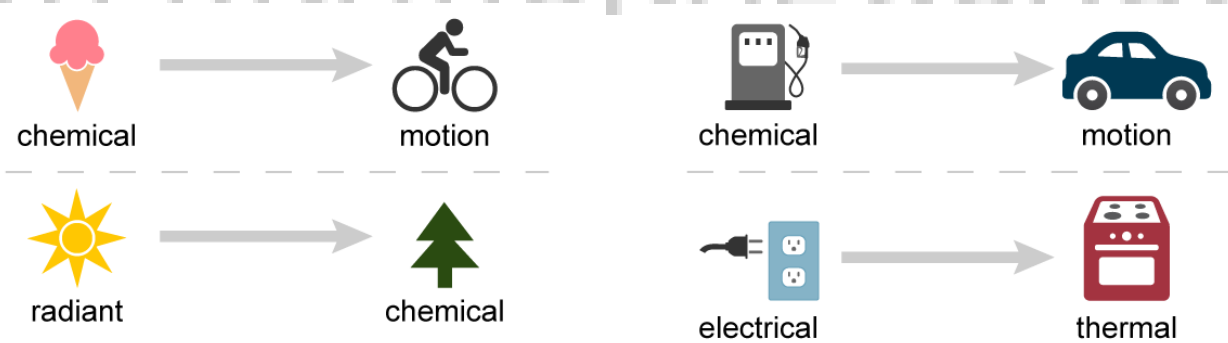
3.6 Energy Changes and 3.7 Where does Energy go?

Energy may change from one form to another.

When the energy changes to a type that we need or use efficiently, we call it a useful energy.

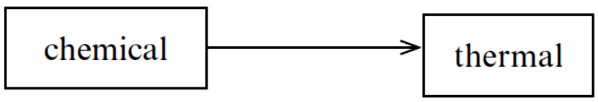
But when it changes into a type that we don't want or use, we call it dissipated or wasted energy.

- **Dissipated:** spread out into the surroundings in a way that cannot be recovered
- **Recovered:** collected and used again

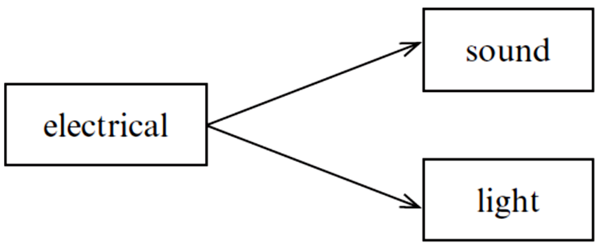


To follow the energy changes, we draw a diagram

A fire that burns wood changes chemical energy to thermal energy.

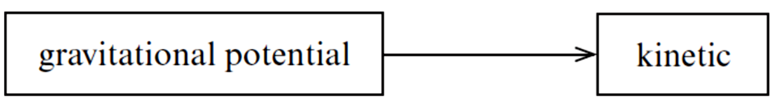


A television converts electrical energy to sound and light.



When a book falls from a shelf, that is an event. When the book is on the shelf, the book has stored gravitational potential energy. This energy is changed to kinetic energy as the book falls.

You can also represent events such as this in a diagram.



Some of the energy transferred or changed is useful, but some are dissipated (wasted) and can't be recovered.

Example	Initial Energy (input)	Useful energy produced (output)	Dissipated energy (Wasted) (output)
Using an electric toothbrush	Electrical energy	Kinetic energy	Heat and sound energy
Playing cricket	Chemical energy from food digested	The kinetic energy	Heat and sound energy
Using an MP3 player	Chemical energy from batteries	Sound and light energy	Heat energy
Using a torch	Chemical energy from batteries	Light energy	Heat energy