

BASIC SCIENCE

FRICTION

Friction is a force which opposes motion between two surfaces in contact. The forces increase as the surface roughness increases.

Types of Friction

There are two main types of friction:

- a. Static friction: this type of friction occurs between two surfaces or objects that are not moving.
- b. Dynamic or kinetic friction: this type of friction occurs between two surfaces or objects that are in motion.

Uses of friction

Friction is very useful to our daily life. Some of the applications of friction includes:

- a. It enables people to walk on the ground without falling.
- b. It enables the fingers to hold objects.
- c. It helps in grinding machine or grinding stone to grind.
- d. It enables nails to join two pieces of wood tightly together.

Disadvantages of friction

Friction affects our lives negatively in some aspects. These includes:

- a. It wastes energy by converting some input energy that could have been useful into unwanted heat and sound.
- b. It causes wear and tear in moving parts of machine.
- c. It causes the sides of our shoes and tyres of our vehicles to wear, thereby making us to waste money on replacing them.

Reduction of friction.

Friction can be reduced by lubrication: That is, applying oil and grease between the surfaces in contact.

GRAVITATIONAL PULL (OR FORCE) AND WEIGHTLESSNESS

Gravitational pull or force is the force of attraction exerted by the earth on objects which are without support. The gravitational pull of the earth is called earth's gravitational pull or attraction.

Weightlessness is the loss of weight in the outer space due to the absence of earth's gravitational pull or force.

In the outer space, a person has no weight because, the gravitational pull of the earth is no longer acting there. For this reason, persons who go on space travel, call astronaut have to be given special training in artificially prepared conditions that stimulate weightlessness so that they can function in the outer space.

Effects of Gravitational Pull or Force

Gravitational pull or force comes into play in the following:

Weight: the weight of an individual is a measure of the earth's gravitational on that person.

Stability on earth- any human being irrespective of his location is stable, people on earth do not fall off because each person is attracted to the earth.

Revolution of the moon round the earth. The moon revolves around earth because, the earth's gravitational pull attracts the moon. If not for gravitational pull, the moon would move away from the earth in a straight line along the path.

Work is done against gravity in lifting an object from the earth, because it involves opposite gravity.

A spacecraft must acquire much speed that can overcome the earth's gravitational pull.

Calculations involving Weights

Example: calculate the weight of an object having a mass of 50kg (take $g=10\text{m/s}$).

Solution

Weight = mass x acceleration due to gravity ($W= Mg$)

Where: W = weight, M = mass, G = acceleration due to gravity.

$W = mg$

$W = 50 \times 10 = 500\text{Newton (N)}$.

SATELLITE

A satellite is a body that is orbiting (or moving) round a planet. The moon is a satellite of the earth which orbit round it. Some of the other planets too have satellites moving round them, these are all natural satellites.

In communication, a satellite is an artificial body placed in space to orbit round the earth for the purpose of easy communication and transfer of information, these are artificial satellites.

The satellites or moons of the planets in our solar system are shown in the table below:

| S/No | Planet | Number of moons or satellite |
|------|---------|------------------------------|
| 1 | Mercury | None |
| 2 | Venus | None |
| 3 | Earth | 1 |
| 4 | Mars | 2 |
| 5 | Jupiter | 12 |
| 6 | Saturn | 9 |
| 7 | Uranus | 5 |
| 8 | Neptune | 2 |

Natural and Artificial Satellite

Natural satellites are the moons that orbit the planets in our solar system, while artificial satellites are human made bodies, which were launched by various countries and now orbiting the earth.

The countries that have so far launched satellites independently into space to orbit the earth are shown below:

| S/No | Country | Year of first launch | First satellite |
|------|----------------|----------------------|------------------|
| 1 | U.S.A | 1958 | Explorer |
| 2 | Australia | 1964 | Blue streak |
| 3 | France | 1965 | Asterix |
| 4 | Japan | 1970 | Osumi |
| 5 | China | 1970 | Dong Fang Hong 1 |
| 6 | India | 1979 | Rohini 1 |
| 7 | United kingdom | 1971 | Prospero x-3 |
| 8 | Israel | 1988 | Ofeg 1 |

Uses of Satellite

Satellite is used in communication- by using a satellite dish, viewers can have access to many television stations with clear and high quality signal.

They are used for mapping. The information gathered from mapping can be used to monitor natural phenomenon such as clouds, deserts, etc.

They are used for Geographic Information Systems (GIS), example, in analyzing climate change, etc.

They are used to carry out biological experiments.

They are used to study the activities of other planets around us.

SPACE TRAVEL

Space travel simply means, going to the moon or other planets or orbiting the earth in a special craft called spaceship.

Space travel dated back to 4th October, 1957, when USSR (former Russian) successfully launched the first satellite.

Purpose of Space Travel

The purpose of travelling to space are many, these include:

Gathering information about the existence of life in space.

Performing various experiments in space relating to medicine, technology, science, agriculture, meteorology, etc.

Scientist also embark on space travel for the purpose of improving Information Technology (I.T) e.g. the use of SAT1 satellite launched by Nigeria in 2003.

The problems of Space Travel

Space travel is very expensive and sometimes, it can involve a lot of tragedy.

They are no medical facilities in space and therefore, minor injuries can be turned to life-threatening ones.

There are dangerous radiations or particles that can cause havoc to astronauts.

Human beings who stay in space for long, develop weak bones due to loss of calcium.

Benefits of Space Travel

It has led to the discovery and development of three commercial lubricants for corrosion, electric power company and rail track maintenance.

It contributes, through radiation hazard detector, to protect people from dangerous levels of microwave radiation.

It leads to provision of better brakes which are used by vehicles.

It helps in weather forecasting.

It helps in discovery of new technologies, example, artificial heart, kidney dialysis, telephone, etc.

THE EARTH AND SPACE.

Components of the solar system.

The solar system consists of the sun and the moon and natural heavenly bodies which move around it. These bodies are called the planets.

The order of planets from the sun is:

Mercury

Earth

Mars

Jupiter

Saturn

Uranus

Neptune and

Pluto.

All the planets revolve (or move) round the sun, each in its own orbit.

Rotation and Revolution of the Earth.

The earth carries out two types of movements. These are:

Rotation

Revolution

Rotation of the earth

The earth rotates on its axis and completes one revolution in 24hrs, that is a day. The rotation of the earth brings about day and night.

Revolution of the earth

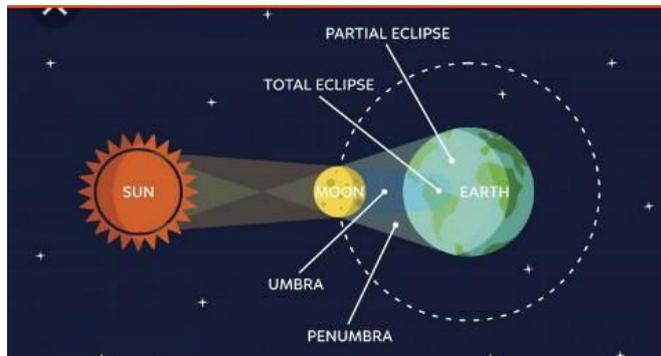
The earth revolves round the sun. The revolution of the earth causes seasons. That is one complete revolution of the earth around the sun takes a year.

ECLIPSE OF THE SUN AND THE MOON

An eclipse is the total or partial disappearance from view of heavenly bodies as a result of another heavenly body coming between that heavenly body and the observer. They are caused by the revolution of the earth and the moon.

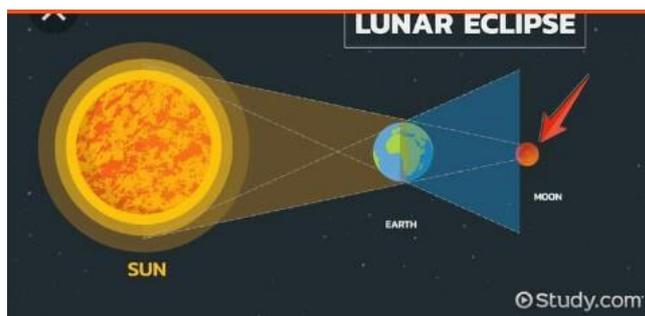
Eclipse of the Sun

Eclipse of the sun (or solar eclipse) occurs when the moon comes between the sun and the earth. The moon blocks the sunlight from reaching the earth. During solar eclipse, the sun, moon and earth are all in straight line.



Eclipse of the Moon

Eclipse of the moon occurs when the earth comes between the sun and the moon. The earth blocks all direct sunlight to the moon, causing it not to reflect anything visible back to earth.



THE CLIMATES AND SEASONS OF THE YEAR

A season is a period of time in a year e.g. rainy season. The revolution of the earth round the sun causes the occurrence of the seasons, the earth completes one revolution round the sun in 365 and quart days. This is why 365 days make one year.

Every fourth year, one additional day is added to make up the one quarter day which should be included in each year. The fourth year with 365 days is called leap year. The month of February has 28 days (leap year).

There are four seasons in Europe:

- a. Winter, its days are very cold.
- b. Spring its weather starts getting warm.
- c. Summer, its weather is hot.
- d. Autumn, it starts getting cold.

Meanwhile, in West Africa, there are only two seasons: a.

- a. Rainy season. It starts from the end of April to October.
- b. Dry season, starts from November and ends March.

