Physics

Energy

Energy and its type

Energy is never destroyed Or never used or created
It only changes one form to another form
The unit of energy is joules J

Types of energy

1. Thermal energy
2. Kinetic energy
3. Gravitational potential energy
4. Elastic potential energy
5. chemical energy
6. magnetic energy
7. nuclear energy

Kinetic energy

Anything that moves has kinetic energy like you are moving on the road so you will have kinetic energy
 more mass so more speed so more kinetic energy

Formula

K.E = ½ mv2

Where m is the mass v is the velocity

Chemical energy

Chemical energy stored in food fuel or muscles
Example is when you throw a ball chemical energy is in your arm changes to kinetic energy of the ball

What type of energy is an or muscles before we move

Chemical energy

Gravitational potential energy

Energy stored in an object because of its height is called gravitational potential energy
When object Falls gravitational potential energy changes into Kinetic energy

Formulae
GPE = mgh

Elastic potential energy

Energy stored when an object is stretched or compressed example rubber band or spring

Formulae

E= 1/2kx2

Where K is spring constant
X is the displacement

Thermal energy

- **Energy transferred because of temperature difference**
- **Heat flows from hot to cold**
- **When you touch the hot cup of tea then what will be your reaction you will gently take of your hand from the cup of tea this is because heat from the hot object is flowing to the cold object**

Magnetic energy

- **From the magnetic field**
- **It is made by magnets and electromagnet**
- **It is used in making electricity**

Electrostatic energy

- **Energy from charged particles is called electrostatic energy**
- **It is stored in electric field around charges**

What type of energy stored in charge particles
Electrostatic energy

Nuclear energy

Energy released from the nucleus of an atom is called nuclear energy
Formula is
E= mc2

Specific heat capacity

Energy needed to raise the temperature of 1 kg of substance by 1 Degree Celsius

If you have 1 kg of milk and its temperature is 25 degree and you want to raise temperature to 26° So you need some energy to raise the temperature and that energy is called specific heat capacity
E= mc2
M is the mass C is the specific heat capacity and T is the temperature

How much energy is needed to heat 2 kg of water from 10 degree to Celsius 200 degree Celsius
E= mc Delta t
c= 4200 (100- 10)
C = 756, 000J

Efficiency

No devices 100% efficient some energy is wasted usually as heat

Energy Efficiency Formula:

$$\frac{\text{Energy Output}}{\text{Energy Input}} \times 100 = \%\ \text{Efficiency}$$

If you say an electrical applies is efficient so it means it will lose very less energy
Electrical heaters are nearly 100% efficient why because almost all energy becomes heat

Conservation of energy

- **Energy cannot be created and cannot be Des**
- **it Can only move from one place to another or transfer from one form to another form**
- **A close system is a system in which no energy comes in or goes out**

Ways energy is transfer

- **Energy can move in four main ways**
- **Mechanically, when a force move something like pushing or hitting**
- **Electrically when charges**

- heating from hot to cold
- radiation by waves like sound wave and heat wave and light wave

Example of energy transfer

Ball going up a slope

Kinetic energy is transferring into Gravitational potential energy

Bat hitting a ball

Bats kinetic energy transfers into heat and sound energy

Rock falling

Gravitational potential energy is converted into Kinetic energy

Car slowing down

Kinetic energy changes into heat energy

kettle boiling water

Electrical energy is converted into heating and then Water thermal energy

Useful energy is the energy you want

- wastage energy is mostly heat that is lost to surrounding
- wasted energy is dissipated energy

Reducing wasted energy

Lubrication

- It produces friction so less energy lost as heat
- For example oil on moving parts

Insulation

- Stops heat is escaping
- thick walls and air gaps reduce heat loss
- materials with low thermal conductivity slow the heat transfer

Renewable Sources

- Renewable energy sources are sources that will never run out
- energy is renewed as it is used

Wind power wind turbines

- They are built in exposure areas such as cost
- the blades turn generator then produces electricity

Advantages are

- No pollution
- low running cost no fuel needed
- can be removed without permanent damaged

Disadvantages

- It's spoil review because one 1500 turbines will be equal to 1 coal station
- It is unreliable initial cost is very expensive

Solar cells

- They produce electricity directly from the sunlight
- they are used in calculators watches satellite and road signs

Advantages

- they cause no pollution
- affective even in cloudy countries

Disadvantages

- high initial cost
- only generate electricity during the day time

Geothermal and hydroelectric power

- Uses underground thermal energy hot rocks near surface radioactive Decay of Uranium
- It generate electricity or directly heat the building

Hydroelectric

- it uses falling water turbines and generators

advantages are

- Reliable except drought
- can respond instantly on electricity

Disadvantages

- flooding lands destroy habitats farm and scenery
- Methane and carbon dioxide released from rotating vegetation
- expensive initial setup

Wave power tidal bridges

Wave power many small turbines connected to generator

advantages are

- no fuels cost
- useful for Small Island

Disadvantages

- disturb disable
- harmful for marine life
- It spoils the view
- dangerous for the boats
- unreliable

Tidal Barrage

- Dam like structure with turbines at the bottom
- It uses gravitational pull of moon and sun to Tidal movement and then it will generate electricity
- Advantages are no fuel cost. minimal running coast. environmentally friendly, disadvantages are alters animal habitats, its spoil the scenery, it blocks the boat

Biofuels

- Why fuels are made from plant products and animals waste
- they can be solid liquid or gas
- when we burn so electricity will produce

Advantages

- Renewable
- carbon neutral

Disadvantages

- expensive to produce
- large scale farming
- Lead Deforestation and food shortages