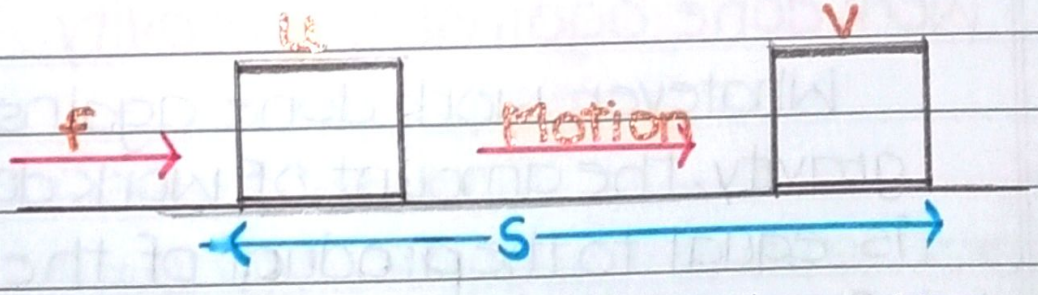
Work Energy And Power.

Work - Work is done when a force produce motion.

For example, when an engine moves a train along a railway line, it is said to be doing work.

→ Work done in a moving body is equal to the product of force exerted on the body and the distance moved by the in the direction of the force.

Work = force x distance.



→ When a body is moved on the ground by applying force, then work is done against friction.

Unit of work

→ The S.I unit of work is Newton Metre and Joule.

→ When a force a 1 newton moves a body through a distance of 1 metre in its own direction, then the work done is known as 1 joule.

1 joule = 1 newton x 1 metre

→ Work is a scalar quantity.

→ the condition for the force to do work is that it should produce motion in an objects.

Work done against the gravity.

Whatever work done against the gravity, the amount of work done is equal to the product of the weight of the body and vertical distance through which the body is lifted.

$$W = m \times g \times h$$

Work done by the force Acting Obliquely

In many cases, the momentum of the body is at the angle to the direction of the Force applied.

Note: In such casses we cannot use the fomulq $W=FxS$ to calculate the work done because the distanced moved .S. is not exatly in the direction of the force applied.

The Word done in pulling the body will be equal to the product of horizontal components of the force and distance moved by the body.

$$W = F \cos\theta \times S$$

F = force applied

θ = angle between the direction of the force and direction of the motion.

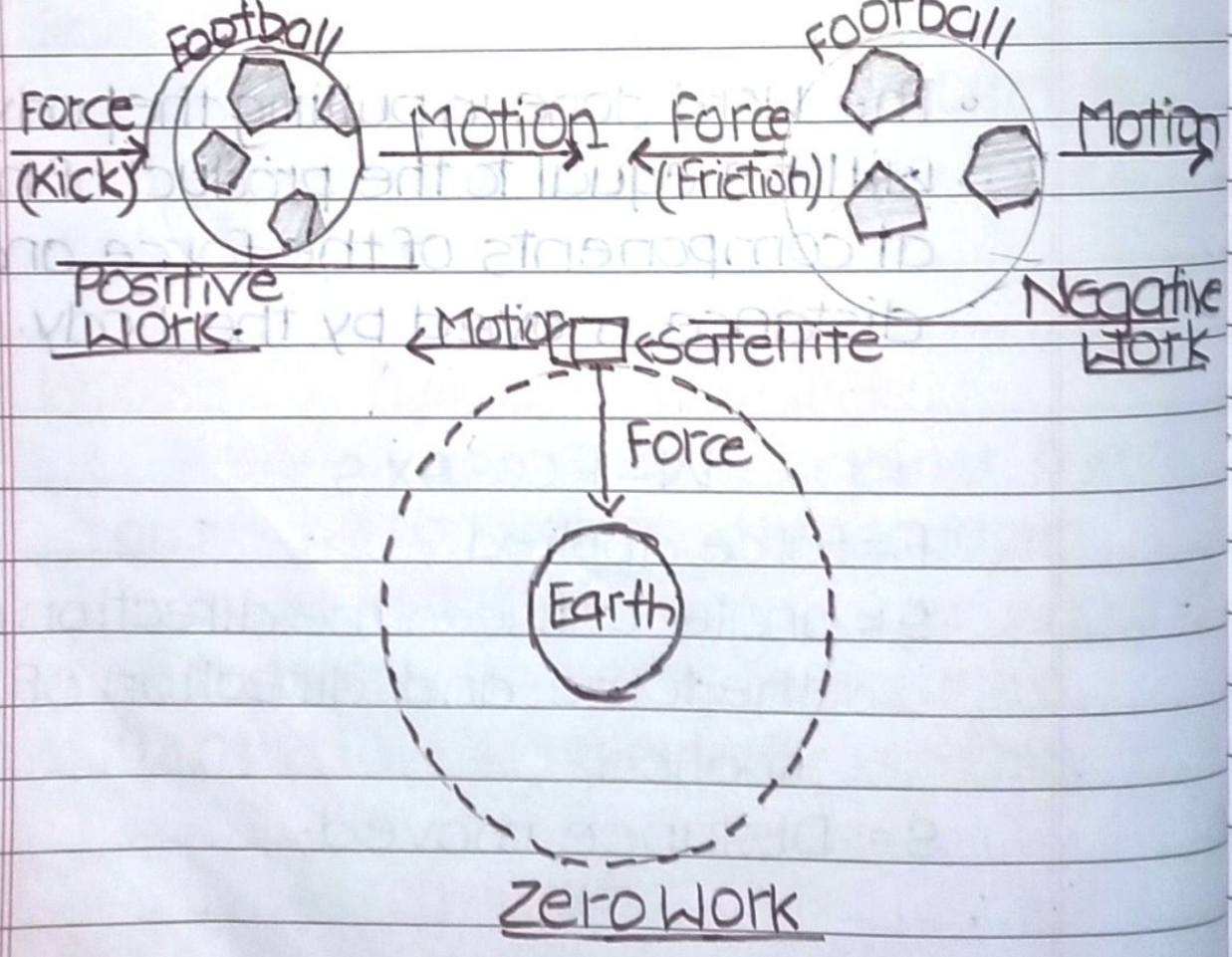
S = Distance moved.

Positive, negavite, zero work.

I. Work done is positive when force acts in the direction of motion of the body.

II. Work done is negative when force acts opposite direction of motion of the body.

III. Work done is zero when a force acts at right angles to the direction of motion of the body.



Energy

Energy is the ablity to do work.

→ The amount of energy possed by the body is equal to the amount of work it can do when its energy is realeased.

⇒ The energy is scalar quantity.

Unit of Energy

→ The S.I unit of energy is joule (J.)

→ The energy required to do 1 joule of Work is called 1 joule energy.

1 Kilojoule = 1000 joules

Different forms of energy.

I. Kinetic energy
II. Potential energy
III. chemical energy
IV. Heat energy
V. Light energy
VI. Sound energy
VII. Electric energy
VIII. Nuclear energy

Kinetic energy

The energy of body due to its motion called kinetic energy.

The kinetic energy of moving body is measured by the amount of work it can do before coming at rest.

$$\text{Kinetic energy} \rightarrow \frac{1}{2} \times m \times v^2$$

Note: If the mass of body is double, its kinetic energy also gets doubled and if the mass of body is half, its kinetic energy also gets halved. Since the kinetic energy of a body is directly propersonal to the square of its velocity, therefore if the velocity of body is doubled, its kinetic energy becomes ~~one~~ forth time and its energy becomes one-forth.

Since the kinetic energy depands mass and velocity.

Potential energy

Energy possed by the body due to its virtue of its position or configuration.

→ the sum of its potential and kinetic energy is called machenical energy.

∴ Potential energy = m x g x h

Power

The rate of doing work called power.

$$\text{Power} = \frac{\text{Work done}}{\text{Time taken}}$$

→ When work is done the equal amount of energy is consumed.

→ Power is a scalar quantity.

Unit of power.

The S.I unit of power is watt.

1 Watt is the power of an appliances which consumes energy at the rate of 1 joules per second.

$$1\ \text{Watt} = \frac{1\ \text{joules}}{1\ \text{seconds}}$$

→ 1 Watt is equal to 1 joule per second.
→ Watt is the smallest unit of power.
→ bigger unit of power is called kilowatt and megawatt.

1 kilowatt = 100 Watts
1 kW = 1000 W
or 1 megawatt = 1000,000 Watts
1 mW = 10^6 Watts
yet the another unit of power is called Horse power. Which is equal to 746 Watts.
→ 1 h.p → 746 W

Commercial unit of energy.

The commerical unit or (trade unit) of energy is kilowatt-hour or kWh.
→ The S.I unit of electrical ~~unit is called~~ energy joule.
Joule represent the very small quantity of energy and therefore, it is inconvenient to use where a large quantity

of energy is involved. so the commercial ~~unit~~ purposes we use a bigger unit of energy which is called 'kilowatt-hour'

→ 1 kilowatt hour → 1 kilowatt for 1 hour

→ 1 kilowatt-hour → 1000 watts for 1 hour

1 kilowatt-hour = 36,00,000 joules
$(3.6 \times 10^6 J)$

→ Watt or kilowatt is unit of electrical power but kilowatt hour is the unit of electrical energy.

→ The electrical energy used in homes, shops, and industries is measured in kilowatt-hours (KWh).

→ 1 KWh is commonly known as '1 unit' of electricity.

Transformation of energy

→ The change of one form of energy into the another form of energy is known as transformation of energy.

→ When a body is released from the height the potential energy of the body is gradually transformed into kinetic energy.

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laws of conversation of energy.

According to the law, energy can neither be created or nor be destroyed. it can simple be converted into one form to another form. Hence, the total energy ~~and~~ before and after the transformation remains same.

→ The laws of conservation of energy is vaild in all the situations and for all kinds of transformation.