Chapter- 10

Force, Work and Energy

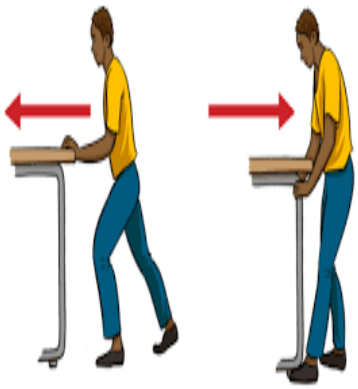
STUDY NOTES

- A push or a pull that makes a body move or stop moving is known as a **force.**

Force can be used in three different ways

a. Move a body
b. Stop a moving body
c. Change the direction of the moving body

Examples of applying force:



- A bowler uses force to bowl.
- We apply the force to push or pull something.
- We use force to press the brakes of bicycle to stop it.

Types of forces

- Muscular force
- Mechanical force
- Elastic force
- Gravitational force
- Frictional force

Muscular Force:

- The force exerted by the muscles of our body.

Mechanical Force:

- Various tools are used to exert the force.

Elastic Force:

- Force which is used to move a catapult.

Gravitational Force:

- The force by which the earth pulls an object towards it.

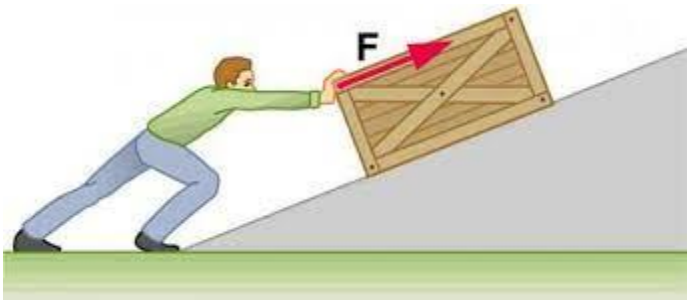
Frictional Force:

- A moving body slows down or stops on its own due to frictional force.

WORK

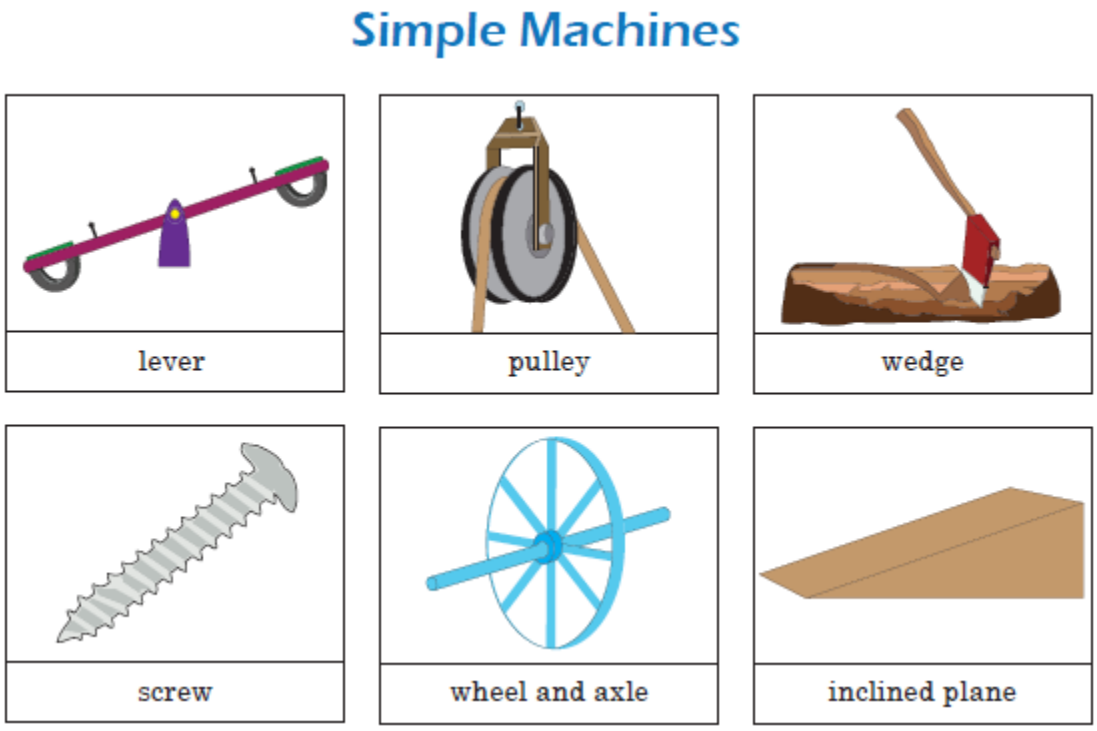
- When we use force on an object and the object moves through a distance, we say that work is done on the object.
- For ex: Work is done when a load is lifted, when a door is opened, when a nut is cracked or when a flag is hoisted.
- Work done can be calculated by following formula:

Work Done = Force applied on an object X Distance moved by the object



SIMPLE MACHINES:

- Tools are used to do some work.



Simple machines help us to

- Do our work faster and with less effort.
- Change the direction of the force used.
- Do work with less force.
- Some examples of simple machines are the lever, the pulley, the wheel and axle, the inclined plane, the screw and the wedge.

LEVER

- It is used to lift the weights
- Cut the things and open the lids

- Scissors and bottle-openers are examples of levers.
- A small child lifts up a heavier child on a see- saw which is also a type of lever.

PULLEY

- Pulley is made up of wheel and a rope.
- It is used to draw water from wells in villages.

WHEEL AND AXLE

- Wheel-and-axle arrangement is made up of two circular objects of different sizes.
- The wheel is the larger object.
- It rotates around the smaller circular object called axle.
- A steering wheel, a bicycle pedal and a screwdriver are some examples of wheel and axle.

INCLINED PLANE

- An inclined plane is a slope over which a load can be pushed up or down.
- A plank of wood is often used to load heavy barrels onto trucks.

SCREW

- A screw looks like a nail with grooves cut it into it.

WEDGE:

- A wedge is an object that tapers to a thin edge.

ENERGY:

- Energy is the ability to do work.
- Energy is needed for everything you do- laugh, eat, play, breathe and so on.
- All living things need energy to live.

SOURCES OF ENERGY:

- Sun, the atom and the hot interior of the earth are some important sources of energy.

SOLAR ENERGY

- The energy that we get from the sun is called as solar energy.

Solar energy can be changed into three different forms:

a) Heat energy
b) Light energy
c) Electrical energy

❖ Chemical energy can convert into heat and light energy on burning some fuels like coal, oil and wood.

ATOM

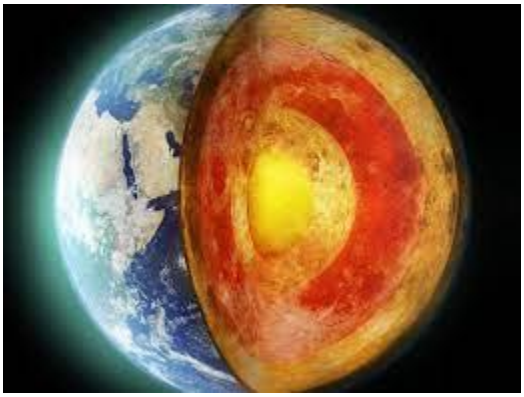
❖ An atom is the smallest particles of matter.

ATOMIC ENERGY

❖ Atomic energy comes from splitting of an atom.
❖ An atom is the smallest particle of matter.

GEOTHERMAL ENERGY:

❖ The hot interior of the earth is another important source of energy. This energy is called geothermal energy.



WIND AND WATER ENERGY:

- We also get energy from water and from wind.
- This energy is mainly used to generate electricity.

DIFFERENT FORMS OF ENERGY:

- Car gets the energy which is produced from fuel.
- When we beat the drum, our muscular energy is changed into sound energy.
- In loud speaker sound energy is changed to electrical energy.
- In electric motors electrical energy is changed into mechanical energy.

For ex: We use different energy in our daily life

a) Heat energy to move engine
b) Trapping solar energy

ACTIVITY

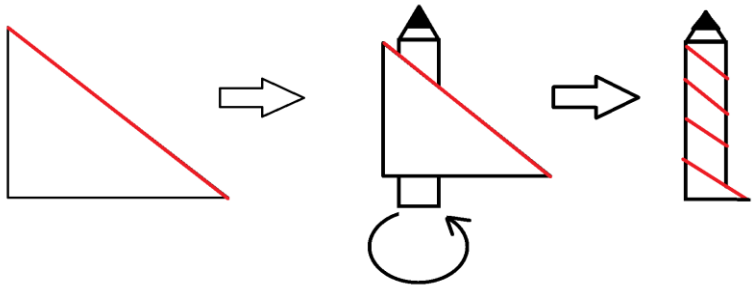
➢ **A screw is an inclined plane wound around a rod**

Material Required:

1. One white sheet
2. One big size pencil
3. Scissors

PROCEDURE:

- Take a sheet of paper.
- Cut a right-angled triangle from it to form an inclined plane.
- Colour the inclined edge.
- Now wrap the paper around a pencil as shown in figure below.
- The coloured inclined edge forms the grooves of a screw.



OBSERVATION:

- A screw is an inclined plane wound around rod.

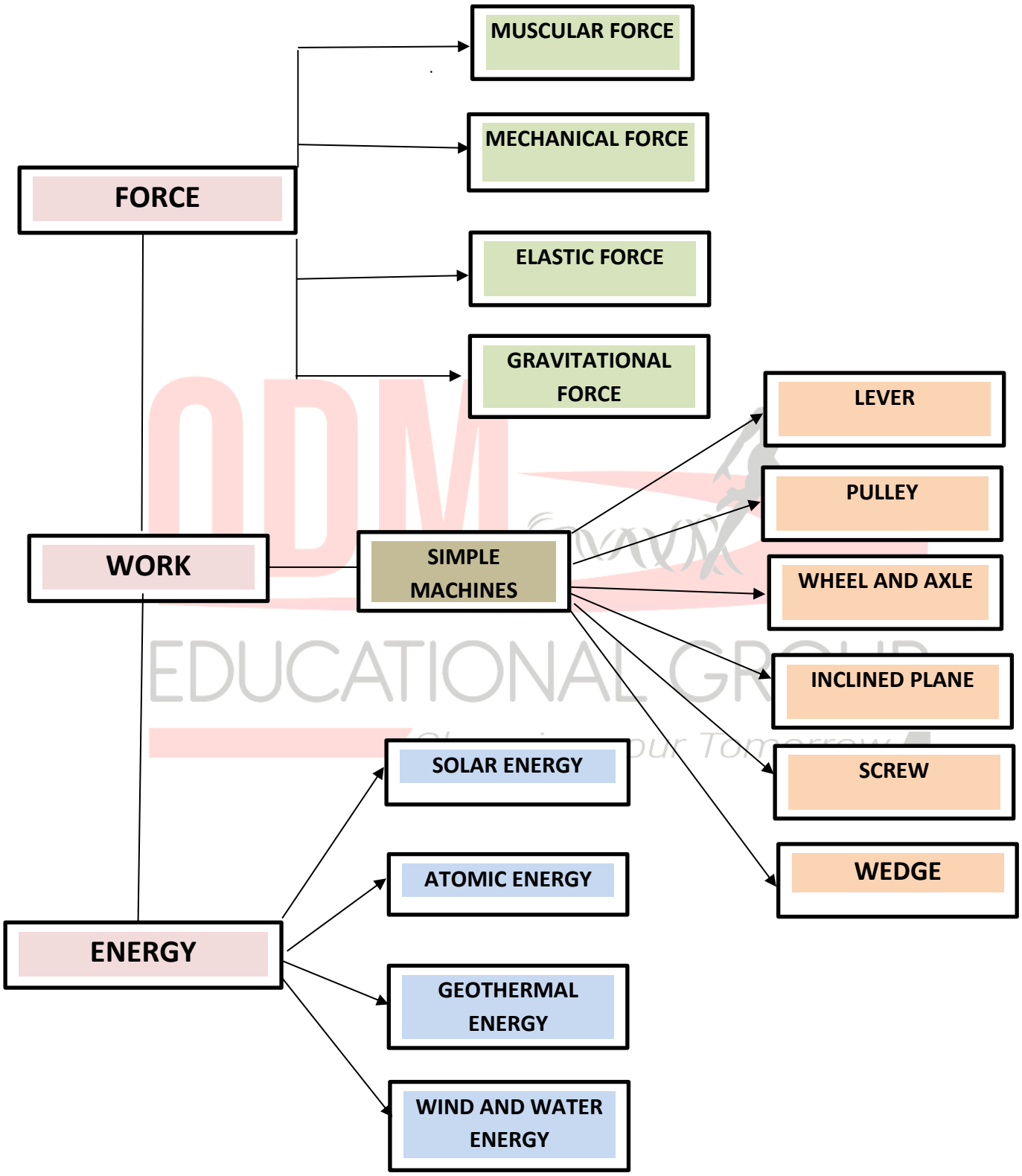
Improve your GK

- Water is sometimes drawn up from a river, to irrigate fields, with a device called an Archimedes' screw.
- Each time the screw turns, it lifts the water a little inside a tube.
- This device was invented by Archimedes nearly 2200 years ago to pump out water from a large ship.

Teacher's note

- Students will visit to playground, and observe the children playing by - force used and work done by them.
- Display some simple appliances in the class while teaching simple machines, like sharpener to sharp a pencil.

MIND MAP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WEDGE
ENERGY
SOLAR ENERGY
ATOMIC ENERGY
GEOTHERMAL ENERGY
WIND AND WATER ENERGY

Let us answer

A. TICK THE CORRECT ANSWER.

1. A moving body slows down or stops on its own due to this force.
   a) Gravitational b) elastic c) mechanical d) frictional
2. This is used to open lids.
   a) pulley b) lever c) wheel and axle d) inclined Plane
3. Tools make work
   a) hard b) easy c) soft d) complex
4. This energy comes from splitting of an atom.
   a) atomic b) solar c) geothermal d) wind
5. In electronic motors electrical energy is changed into this energy.
   a) mechanical b) solar c) wind d) atomic

B. WRITE SHORT ANSWERS:

1. Name the different sources of energy.
2. Write name of the force exerted by the muscles of our body.
3. What is gravitational force?
4. What are simple machines?
5. Name five simple machines.

C. ANSWER THESE QUESTIONS:

1. What are the different forms of energy into which solar energy can be changed?
2. Write a short note on atomic energy.
3. What is geothermal energy?
4. How do simple machines help us?
5. Write two machines being used at home in which one form of energy is changed into another.

ANSWERS

A1. frictional

2. lever

3. easy

4. atomic

5. mechanical

B Ans1. Five different sources of energy are:

a) Solar energy
b) Atomic energy
c) Geothermal energy
d) Wind energy
e) Water energy

Ans 2. Muscular force is exerted by the muscles of our body.

Ans 3. Gravitational force is a force by which the earth pulls an object towards it.

Ans 4. Simple machines are tools which is used to do some work.

Ans 5. Five simple machines are:

a) Lever
b) Pulley
c) Wheel and axle
d) Screw
e) Wedge

CAns1. The different forms of energy into which solar energy can be changed into heat energy, light energy and electrical energy.

Ans 2. Atomic energy comes from the splitting of an atom.

- An atom is the smallest particle of matter.
- For example, atomic energy is used for producing electricity.
- However, weapons like atom bombs, which can kill lakhs of people, have also been made and used.

Ans 3. Geothermal energy is the heat which comes from the interior part of the Earth. It is an alternative energy source that can be used for cooking, bathing and heating.

Ans 4. Simple machines help us in many ways:

- To do our work faster and with less effort.
- To change the direction of force used.
- To do work with less force.

Ans 5. Two machines being used at home in which one form of energy is changed into another are:

a) In loudspeakers, the electrical energy is changed into sound energy.
b) In electrical motor like grinder mixer, the electrical energy is changed into mechanical energy.

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