P.7 SCIENCE SELF STUDY LESSONS SET 5

LESSON 1

THEME : MATTER AND ENERGY

TOPIC : SIMPLE MACHINES
SUB TOPIC : FORCES

CONTENT : FRICTION

Learning outcomes:
By the of this lesson, the learner should be able to:

- Define friction
- Identify the types of friction
- State advantages and disadvantages of friction.
- State the properties of friction.

Introduction
- We have a lot of activities we do in our daily life. Some of them are very difficult for the human body to handle yet we have to do them.
- For this reason, people have invented different machines to ease the work we do when doing particular activities.
- Some of these machines are made of few parts and with low technology while others are made with many parts and with a lot of technology.
- In this topic, we are going to look at these machines and how they work.

FORCE
- A Force is a push or pull acting upon an object as a result of its interaction with another object.

- When a pull or push occurs on an object, there are common effects that take place. These effects can be termed as characteristics of force.

Characteristics of forces
- Forces can cause motion in a body.
- Forces can change direction of motion/movement.
- Forces can change size of an object.
- Forces can stop motion.

Types of forces
- Force of friction
- Force of gravity.
- Force of inertia.
- Force of up thrust /buoyancy force.

We already looked at the force of gravity, inertia and up thrust force in P5. You are encouraged to read through your P5 notes about them for that background.

Force of friction
- Friction is the force that opposes movement of objects.
- To oppose is to be against, stop or prevent something from progressing.
- Friction usually occurs between two surfaces which are in contact.

Situations where friction can be experienced in our daily life
- It is always difficult for you to pull or push a table along the floor because there is friction between the table and the floor that opposes the movement of a table as you pull or push it.

- Sometimes our doors become difficult to open, or when we are opening, they make some noise. This is because there is friction between the door hinges that prevents them from moving making movement of the door difficult.

> ***In your note book, write some other examples of where we experience friction in our daily life and explain them to your parent.***

Types of friction
The type of friction is determined by the position of the objects which are in contact.

This gives us the following types of friction.

1. Static friction:

This is a type of friction found between objects fixed in one position. For example a nail fixed in wood.

2. Sliding or rolling friction:
This is a type of friction found in moving objects. For example in the hinges of a door

3. Viscosity friction:
This is a type of friction which occurs in liquids and gases.
It is this type of friction which opposes movement of a fish in water and that of birds in air.

Properties of friction
1. There is more friction with rough surfaces than with smooth or slippery ones.

2. The greater the load (the weight of an object), the greater the friction force. This means that weight increases friction.

3. Whenever friction occurs heat is produced.

Friction as a useful force in our daily life.(uses of friction)
In opposing motion/movement, friction has a lot of uses to us. These include;

1. **Friction helps us to write.**
    -   There is friction between the paper and a pen as one writes. This friction enables the pen to grip on the paper and this is how we are

able to write. If our books/papers were slippery, the pens would just slide off. This is why if you smear Vaseline on paper, the pen cannot write.

2. **Friction is used in sharpening objects.**
   - It is friction which enables for example a cutting blade to grip on the pencil as we are sharpening.
   - Without friction, the blade would be sliding off the pencil.

3. **Friction aids in walking.**
   - It is the help of friction that our feet can get firm on the ground. Without friction, we cannot stand firm on the ground. This is why we slide or even fall on a slippery ground.

4. **Friction helps in lighting match sticks.**
   - For the match stick to light, you rub it against the match box. Friction opposes motion / movement of the match stick as you rub it against the match box. This is what makes it light.

5. **Friction enables brakes of vehicles to stop movement.** (explain this to your parent)

Think about other ways friction can be useful in our daily life.

Friction as a nuisance force/ disadvantages
1. **Friction causes wear and tear of objects.**
- When friction is too much, heat is produced and that excess heat weakens the material/object which in the long run results into objects reducing in size or tearing into pieces .This is what we call wear and tear.

2. **Friction delays work due to the much force required**.
- Since friction opposes motion, this means you will require more effort to do something and in this process, work is delayed since more time is needed.

3. Friction produces unnecessary heat in moving objects.
- Too much friction causes unnecessary heat in machines. This heat can result into fires. This is why water is used in factories and industries to cool the machines that get hot due to friction.

4. Friction causes unnecessary noise in moving objects.
- Due to opposition in movement, friction causes noise in moving parts of a machines or objects. This is why door hinges make noise when we are opening or closing doors.

Think about other dangers/ disadvantages of friction to us.

Exercise
1. Define the following terms.
   a) Force
   b) Friction
2. Mention any two properties of friction.
3. How is friction helpful to a candidate who is sitting her primary leaving exams?
4. Mention two ways friction can be nuisance to man.
5. Name the type of friction that opposes movement in water.
6. Identify the force that opposes movement in air as a bird flies.

LESSON 2

TOPIC   : SIMPLE MACHINES
SUB TOPIC   : FORCES

Learning outcomes:

By the end of the lesson, you should be able to:
- State ways of increasing friction.
- State reasons for tarmacking roads.
- Identify ways of reducing friction.
- Identify how different materials reduce friction

Introduction

- Friction, like we have seen above has a lot of advantages to us. Because of the above advantages, there are circumstances when friction is needed in order for work to be done efficiently.

How to increase friction

- For us to increase friction, we have to make surfaces rough (***remember friction is much on   rough surfaces. Check properties of friction in the previous lesson)***
- Different activities are done to make surfaces rough and these include,

i). Putting treads on vehicle tyres and shoe soles.

treads

treads on tyres
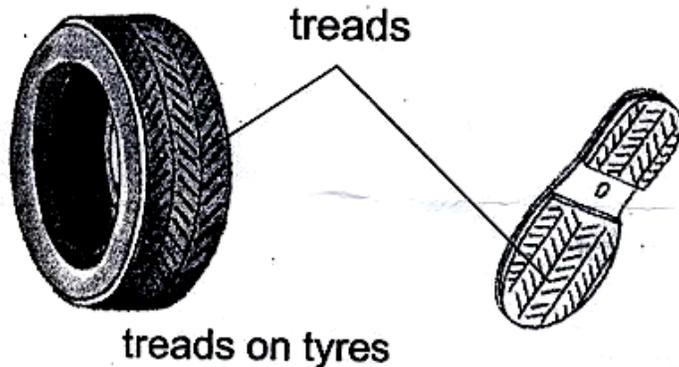
- The treads increase friction on shoe soles and car tyres which prevents them from sliding.

 ii) Putting spikes on sports shoes.
- The spikes increase friction between the shoes and the ground. This prevents the player from sliding.

iii) Putting grips on handles of bicycle and car steering wheels.
- Grips are put on handles of bicycles and steering wheels to increase friction so that the hands of the cyclist or driver do not slide off.
- Take a look at the steering wheel of any car at home. The steering wheel is rough to increase friction between the drivers hand and the wheel.

Ways of increasing friction on a road.
1. Tarmacking the road
- Tarmacking is the application of tar mixed with small stones on the road. The mixture of tar and small stones make the road surface rough hence increasing friction between the road and the car tyres. (***look up the meaning of the word tar in your dictionary***.)
- Tarmacking is one of the permanent ways of increasing friction on roads.

2. Putting marrum on the road.
- Marrum is soil with small rock particles put on roads during construction. The small rock particles in it make the road surface rough hence increasing friction on it.

3. Putting small stones on a slippery road.
- When it rains, some roads become slippery so it becomes difficult for vehicles to move.
- To prevent this we can temporarily put small stone on them so as to increase friction and reduce sliding of vehicles.

How friction can be reduced
Sometimes too much friction becomes a nuisance/ disadvantage. In this case, we have to reduce it in order to do work smoothly.
The following are the ways of reducing friction.

Using rollers
- A roller is a cylindrical object that rotates to reduce friction between machines and surfaces.
- Rollers reduce friction by preventing contact between two surfaces.

Study the illustration below of how rollers reduce friction

More stretch
(greater friction)

Less stretch
(less friction)
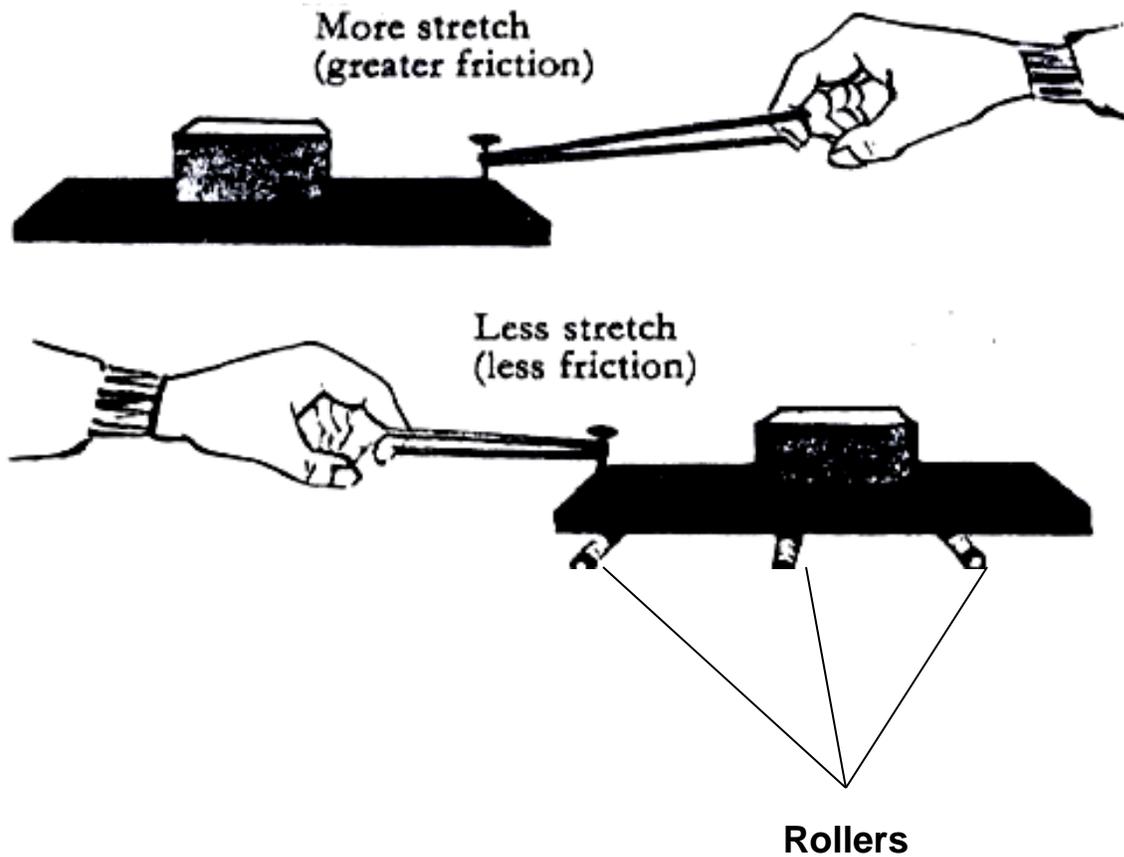
Rollers

In the first diagram, it is difficult to move the load on the surface due to much friction. But when you apply rollers as seen in the second diagram, they reduce contact between the load and the surface. This reduces friction and makes the movement of the load easier.

ii). **Using ball bearings**:
- These are round metallic balls which reduce friction by keeping moving parts separated.
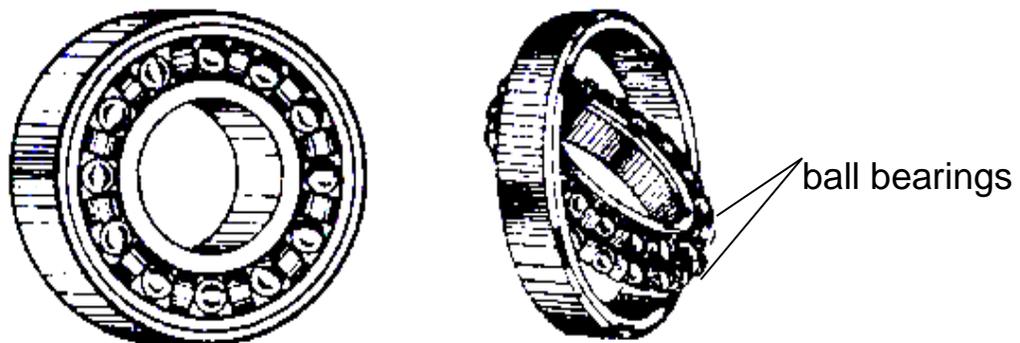
ball bearings

- Ball bearing are found in moving parts of machines. They reduce contact between moving parts.

iii). **Lubricating**
- Lubricating is the use of oil or grease to reduce friction in moving parts of machines. Oil and grease are referred to as **lubricants**.

iv. Streamlining objects.
- Streamlining is the making of objects pointed both ends to reduce viscosity (friction in liquids and gases).
- All water animals are streamlined to reduce viscosity. Such animals include; fish, whales crocodiles, snakes, earth worms etc.
- Birds are also streamlined to reduce viscosity. The streamlined bodies enable objects or animals to move through air and water easily.

Examples of streamlined objects
- Boats
- Ships
- Cars
- Arrows
- Spears
- Aeroplanes etc.

Illustrations
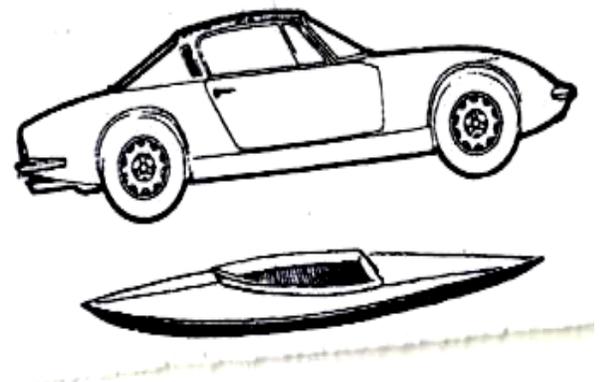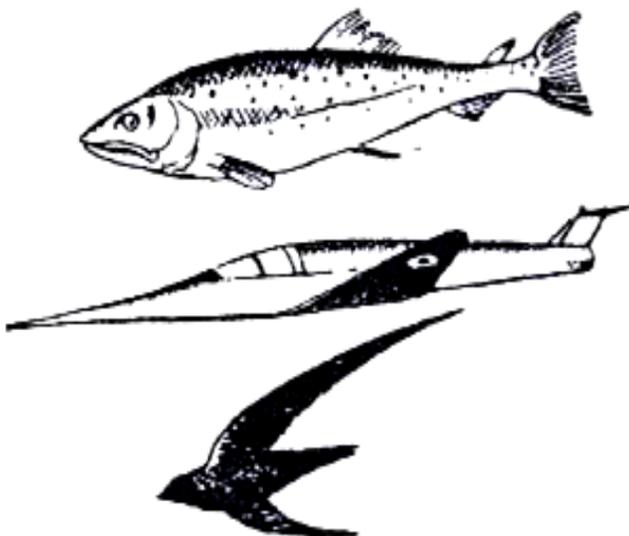
Activity
1. State the meaning to the term friction.
2. Cite one way of increasing friction on a slippery surface.
3. Write down any two advantages of friction in our lives.
4. Why is friction said to be a nuisance force?
5. Why are some objects stream lined?
6. State any two items that are stream lined?
7. How does tarmac increase friction on roads?
8. State any two ways friction can be reduced between moving parts of a machine.

LESSON 3
TOPIC   : SIMPLE MACHINES
SUB TOPIC   : MACHINES

Learning outcomes
By the end of this lesson, the learner should be able to;
- Define a machine.
- Give the types of machines.
- State examples of each type of machines.
- State ways machines simplify work.

Read, spell and write these words correctly
- machine
- wedge
- water pump
- stairs
- complex

Introduction
- In our day today life, there are things that we find difficult to do with our own hands or if we use our hands, we may take a long period of time to accomplish them.
- In this case we may need some tools to make work easy and timely done.

Machine
- A machine is a device that simplifies work*. (Look up the meaning of the term device in the dictionary)*

How machines simplify work
1. By changing the direction of force.
- When using a machine, you can easily move forward or reverse, depending on your choice of movement.

2. By reducing the effort required to do work.
- Effort is the force used to carry something (load). When using a machine, less energy is used compared to when you are using your hands.

3. By increasing the speed of work.
- When using a machine, work is done quicker than when you are using your hands.

Types of machines
- Machines are classified into two major groups. The grouping depends on how the machines are made and used. The two groups include;
  1. Simple machines
  2. Complex machines

Complex machines
- A complex machine is a machine that is made up of many parts and simplifies work. When two or more simple machines (tools) are put together, a complex machine is made.
- Complex machines require a lot of technical knowhow for one to use them.

Examples of complex machines
Tractor, Bicycle, Sewing machine, Car, Aeroplane etc.

Simple Machines
- A simple machine is a device that is made up of few parts and simplifies work. These machines do not require a lot of technical knowhow for one to use them.

Examples of simple machines

A hoe	See saw	Claw hammer	Nut cracker.	Human arm.	Nut cracker.
A wheel barrow	Pincers	Water pump	Pair of scissors	Spade.	Sugar tongs.
A pair of scissors	Crow bar	Bottle opener	Fishing rod	Ladder	Stairs

Classes of simple machines
- There are a lot of machines that we use for the different activities as we have seen in our introduction. By talking about 'A class of simple machines' **we mean a group of machines that work in the same way**.
- Simple machines are classified into six groups and each group of simple machines work in a uniform way. The six groups /classes of simple machines include;
  1. Levers
  2. Inclined planes/slope
  3. Pulleys
  4. Screws
  5. Wheel and axle
  6. Wedge

<u>Exercise</u>

1. What is a machine?
2. State two ways how machines simplify work.
3. Why a human arm is called a simple machine?
4. Identify one example of a complex machine.

LESSON 4

TOPIC   **: SIMPLE MACHINES**

SUB TOPIC   **: LEVERS**

Learning outcomes:
By the end of the lesson, you should be able to:
1. State the meaning of lever.
2. Draw and name parts of a lever.
3. Give classes of levers.
4. Identify examples of levers**.**

A Lever
- A lever is a stiff rod that turns on a fixed point called a pivot or fulcrum.

Facts about levers
a) The force exerted on a lever to lift a load is called **effort.**
b) The weight of the object to be lifted is called **load.**

c) The turning point of a lever is called **pivot/fulcrum**.

d) The distance from the pivot to the effort is called **effort arm**.

e) The distance from the pivot to the load is called **load arm**.

<u>**Illustration of a lever**</u>
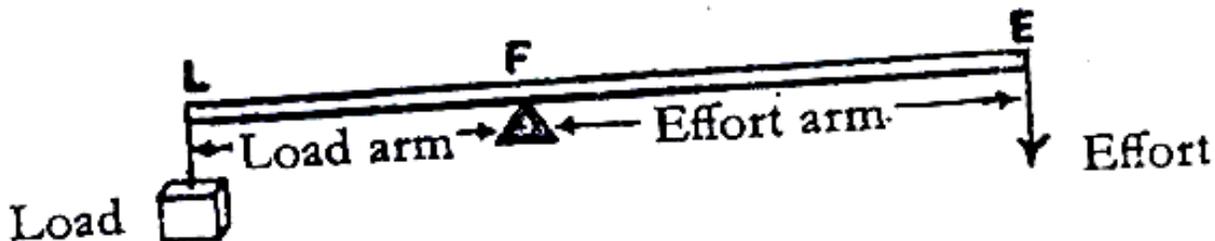
Examples of levers:
- Pliers
- Pair of scissors
- Wheel barrow
- See saw
- Pair of tongs etc

Classes of levers
- Machines are made with parts where you have to apply the force when doing work. This is called **effort**.
- There is a part where you place what you are carrying **(load**) ,
- The turning point of a machine is called a **pivot/ fulcrum**.

Levers are classified according to the position of the fulcrum (pivot), effort and load in a machine

There are three classes of levers namely;

1. First class levers
2. Second class levers.
3. Third class levers.

First class levers
- A first class lever is a class of levers where the pivot is in between the load and the effort (LPE)
- In this class of levers, the effort arm is longer than the load arm. The longer the effort arm, the smaller the effort applied.
  The advantage of the first class lever is that less effort is used.
- To reduce the effort used in a first class lever, you make the effort arm longer - than the load arm.
- First class levers change direction of force

Examples of first class levers
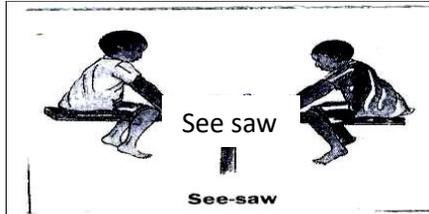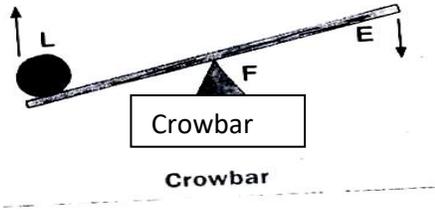
1	See saw		5	Crow bar
	See saw / See-saw			Crowbar / Crowbar
2	Pincers		6	pliers
				Pliers
3	Claw hammer		7	Water pump
	Claw hammer			Water pump
4	Pair of Scissors		8	Lid opener
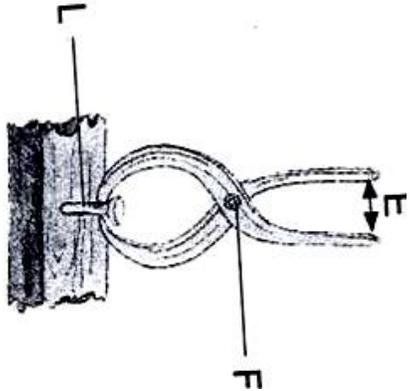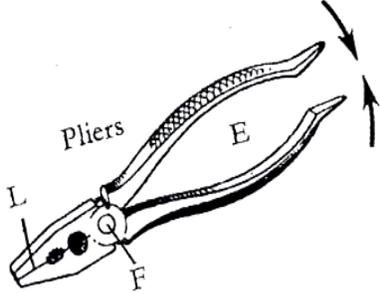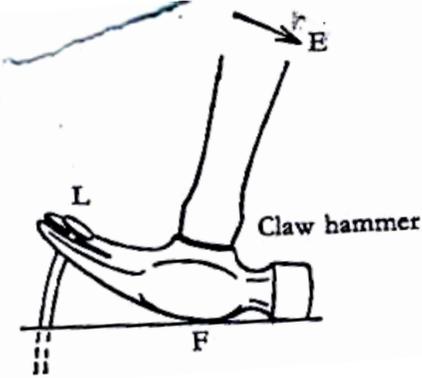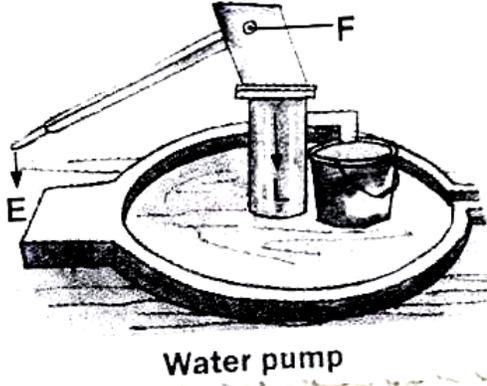
Scissors	
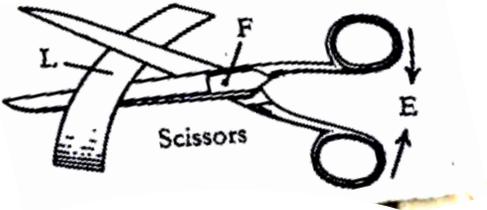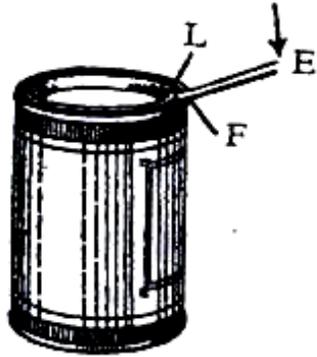
9	Sets of scales

Activity
1. Define the term levers.
2. What name is given to the turning point of a machine?
3. Mention one advantage of the first class lever.
4. State one way in which the effort is reduced in first class lever.
5. How do machines in the first class lever reduce effort?
6. Mention any two examples of machines in the first class lever.
7. Why is a see saw regarded as a machine in the first lass lever?

LESSON 5
TOPIC   : SIMPLE MACHINES
SUB TOPIC   : LEVERS

Learning outcomes:
By the end of this lesson, the learner should be able to:
1. Describe a second class lever.
2. State examples of machines in the second class lever.
3. Give the disadvantage of using second class levers.
4. Describe the third class lever.
5. Give examples of machines in the third class lever.

Second class levers
- A second class of lever is a class of levers where the Load is in between the pivot and effort **(PLE)**
- In this class of levers, the load is closer to the fulcrum than the effort. The effort applied is smaller compared to the load.

- First and second class levers are referred to as force multipliers because they reduce the effort needed to do work.

- Second class levers do not change direction of force.

Examples of second class levers

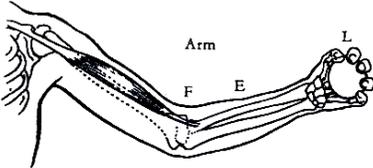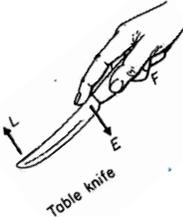| 1	Wheel barrow	3	Human Foot
2	Nut cracker	4	Bottle opener
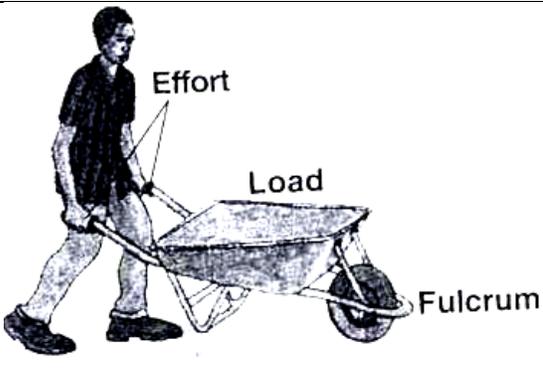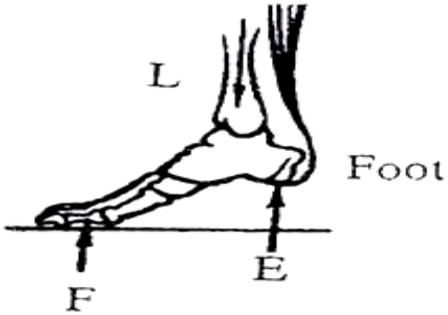
Nutcracker

Bottle opener
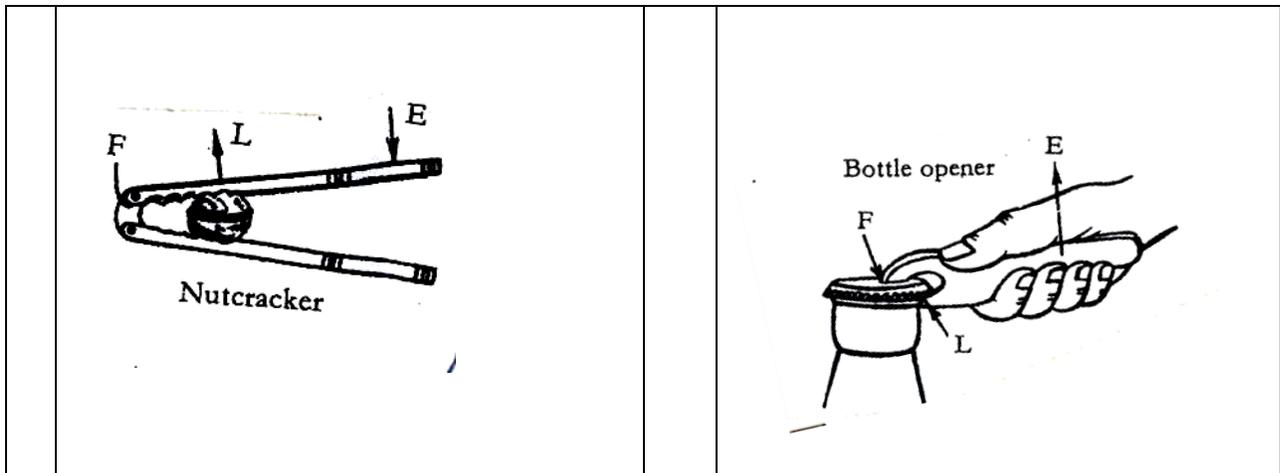
Third class levers

- A third class lever is a class of levers where the effort is in between the load and the pivot (PEL).

- In this class of levers, the effort is closer to the pivot than the load. The effort used is greater than the load.
- Third class levers are referred to as distance multipliers because the load moves through a longer distance than effort.
- The advantage of using this class is that the effort moves through a shorter distance than the load.

Examples of third class levers

1	Sugar tongs	3	Fishing rod.
	 Tongs		 Fishing rod
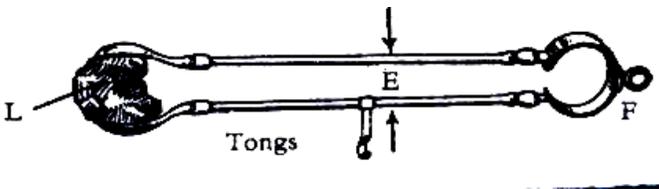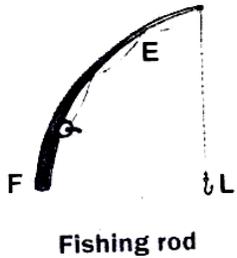
2	Human arm.	4	Spade.
5	Tweezers	6	Table knife

Exercise

1. Write down any two examples of each of the following.
   a) 1st class lever   b) second class lever
2. State any one advantage of using first class levers
3. Draw any two machines classified as 1st class levers
4. How are machines important in life?
5. State any two ways by which machines improve their efficiency?
6. How are the first class levers different from second class levers?
7. Give two examples of the third class lever.
8. Give one advantage of the first class lever over other classes of levers.

LESSON 6
TOPIC   : SIMPLE MACHINES.
SUB TOPIC   : LEVERS

Learning outcomes:
By the end of this lesson, you should be able to:
1. Define moment.
2. State the law of moments.
3. State one application of moments in our daily life.

Moments
- A moment is a turning effect of a force at a point.
- For the lever to balance or to be in equilibrium, the left side moments must be equal to the right side moments.

The principle of moments (The law of levers)
- It states that clock wise moments are always equal to anti-clock wise moments.
- Therefore, the load force multiplied by the load arm is equal to the effort force multiplied by the effort arm.
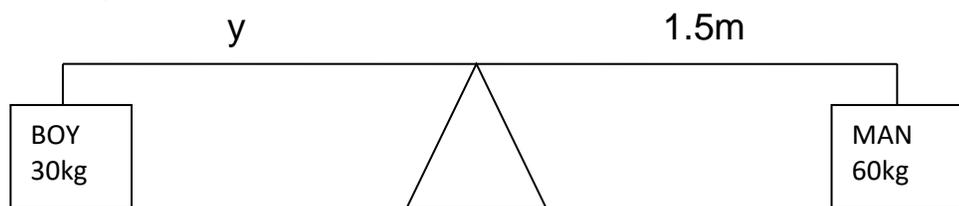- This helps to balance the lever when working.

Calculations about moments
Examples
1. A man weighs 60kg. He sits 1.5 metres from the fulcrum of the see saw. How far from the fulcrum will the boy whose weight is 30 kg sit in order to balance with the man?

   <u>solution</u>

Let the man be the effort and the boy be the load.

Let the load be y metres.

Load x Load arm = Effort x effort arm.

30kg x y=60kgx 1.5m

$$\frac{30y}{30} = \frac{90}{30}$$ ³

y=3 metres

2. A boy weighing 60kg sits 2 metres away from the fulcrum of the see saw. A girl sits on the other side at a distance of 3 metres from the fulcrum in order to balance the see saw. Find the weight of the girl.

<u>Solution</u>
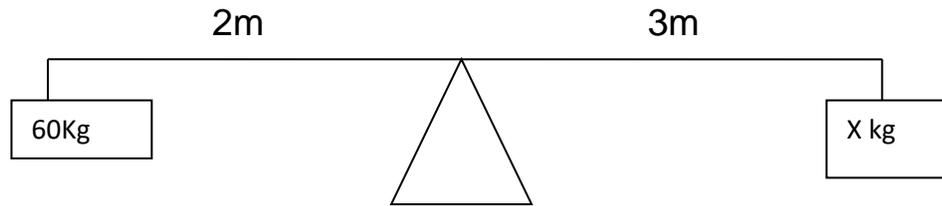
Let the boy be the effort and the girl the load.
Let the girl's weight be y

Load x Load arm=Effort x Effort arm

$$y \times 3m = 60Kgf \times 2 \text{ metres.}$$

$$\frac{3y}{3} = \frac{120}{3}^{40}$$

$$y = 40kgf$$

3. A weight of 120Kgf at a distance 3cm from the fulcrum is balanced by a weight of 30Kgf on the other side. Find the distance from the 30kg weight to the fulcrum.
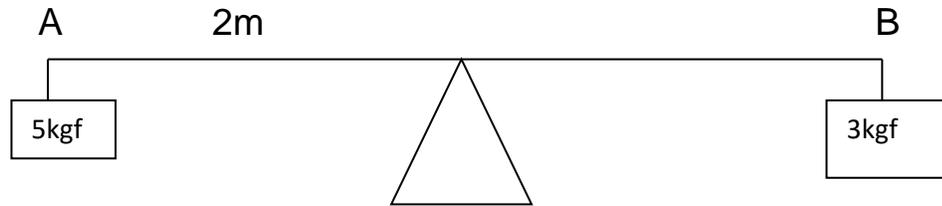
<u>Solution</u>
Take 120kgf as the effort and 30kg as the load
Let y be the distance of the load from the fulcrum.

Load x load arm=Effort x Effort arm.

$$30xy = 120gf \times 3cm$$

$$\frac{30y}{30} = \frac{360}{30}^{12}$$

$$y = 12cm$$

1. Using a see-saw shown below, find the length of the wooden plank AB.

```
   A            2m                                    B
   ┌────────────────────────┐         ┌────────────────────────┐
   │  ┌──────┐            ╱ ╲         ┌──────┐
   │  │ 5kgf │           ╱   ╲        │ 3kgf │
      └──────┘          ╱     ╲       └──────┘
                       ╱       ╲
                      ╱_____╲
```

2. A boy weighing 60kg sits 3 metres away from the fulcrum of the see saw. A girl sits on the other side at a distance of 3 metres from the fulcrum in order to balance the see saw. Find the weight of the girl.

   Solution

```
          3m                     5m
   ┌───────────────┐    ┌──────────────────────┐
   ┌───────┐          ╱ ╲          ┌──────┐
   │ 60Kg  │         ╱   ╲         │ X kg │
   └───────┘        ╱     ╲        └──────┘
                   ╱       ╲
                  ╱_____╲
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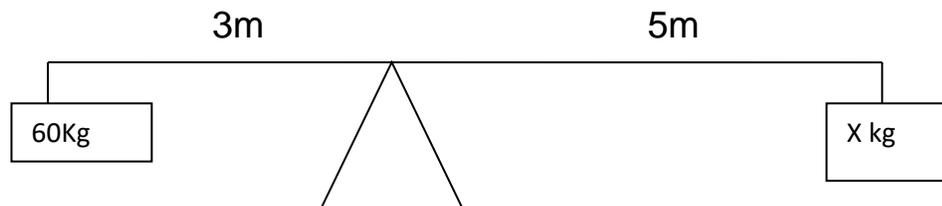
3. A man weighs 60kg. He sits 1.5 metres from the fulcrum of the see saw. How far from the fulcrum will the boy whose weight is 30 kg sit in order to balance with the man?

LESSON 7

TOPIC: SIMPLE MACHINES

SUB TOPIC: INCLINED PLANES

LEARNING OUTCOMES

By the end of the lesson, the learner should be able to

1. Give the meaning of an incline plane.
2. State examples of inclined planes.
3. Identif**y** the uses of inclined planes in our daily life.

Introduction

- In our day today life, we have moved objects from a lower level to a higher level. For instance, as a P7 child at cornerstone junior school, your class room is located at the second floor at the eastern wing.
- This means that if you want to go to your class room from the ground floor, you need to use the stair case which is a slope that will help you to move to your class room easily.
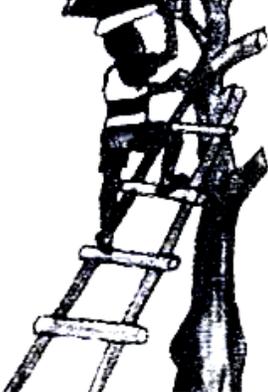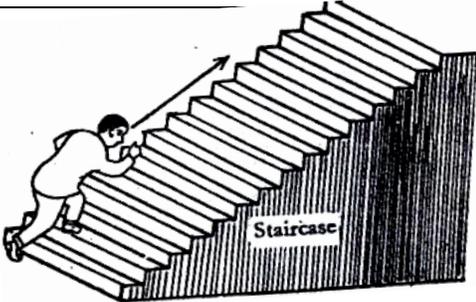
An inclined plane

- An inclined plane is a slanting surface.
- Inclined planes are also called slopes.
- An inclined plane connects a lower level to a higher level. It is used when we want to lift a load through a certain height we cannot reach directly.
- For example if you want to get to the top of the roof, you will use a ladder because you cannot directly jump or climb from down to the top. But using a ladder makes it very easy for you to climb slowly from down to the top of the roof.
- ***A ladder in this case is called an inclined plane and this is how inclined planes work.***

Importance of an inclined plane

1. Inclined planes are used for loading and offloading vehicles.
2. Inclined planes are used for climbing tall buildings.
3. Inclined planes make movement in hilly areas easy.
4. Inclined planes are used for climbing tall trees.

Examples of inclined plane

1	Winding road	3	Ladders
2	Stairs/ steps.	4	

Mechanical Advantage of machines

- As machines simplify work, they do it at different rates. The rate at which a machine simplifies work determines its mechanical advantage and efficiency.
- Mechanical advantage is the number of times a machine simplifies work.
  Mechanical advantage has no units.
- A machine is said to have a mechanical advantage if the effort used to carry the load is less than the load.

Note

- The mechanical advantage of a machine can be lowered by friction.
- Mechanical advantage has no units.

- To get the mechanical advantage of a machine, we divide the load by the effort.

    i.e. **M.A** = $\dfrac{load}{effort}$

What is efficiency of a machine?
- Efficiency of a machine is the ratio of work in put to the work out put expressed as a percentage.

Mechanical advantage of an inclined plane
Study the diagram below
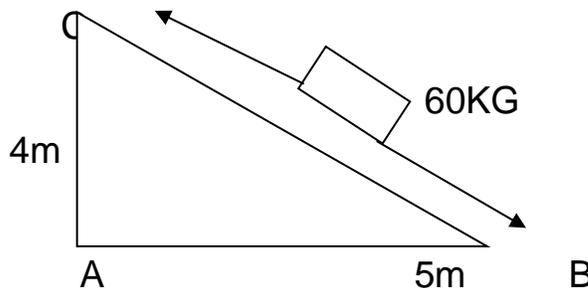
Note
- On an inclined plane, there are two distances i.e. The load distance and the effort distance.
- The load distance is the distance through which you want to lift the load. For instance, on the above diagram, the load has to move from A to C. Therefore AC is considered as the **load distance**.
- But because it is very difficult for anyone to lift the load from A to C directly, we place the load along the slope at point B and slowly push it until it reaches point C where we want it to be. This makes the work easier.

- So, BC is the distance through which we move the load on an inclined plane to reduce effort used and because of that we call it **effort distance.**
- If you want to use less effort, you increase the length of the slope. The longer the slope, the less effort used on an inclined plane.

In summary, AC is the **load distance** while BC is the **effort distance**.

The mechanical advantage of an inclined plane can be got in two ways;

1. $\quad$ M.A = $\dfrac{load}{effort}$

We use this formula when the load and effort have been given.

2. $\quad$ M.A = $\dfrac{effort distance}{load distance}$

We use this formula when the effort distance and load distance have been given.

Example
1. John used a slope to raise a load of 60kg from the ground to the higher level using an effort of 20kg as shown below.
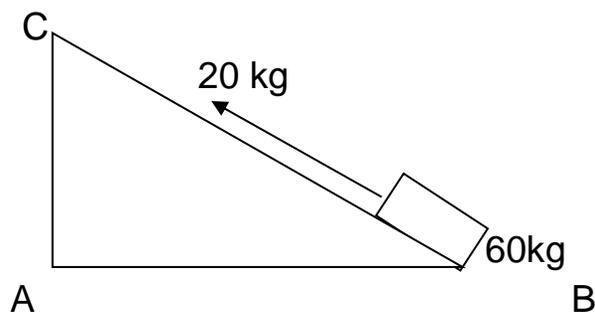
In this case, 60kg is the load and 20kg is the effort

so M.A $= \dfrac{load}{Efffort}$

$= \dfrac{60kg}{20kg}$

=3.

Therefore the mechanical advantage is 3

2. Lumolo raised a load through a distance of 6m. If the effort he used moved through a distance of 12m. Find the mechanical advantage of the machine he used.

In this case, 6m is the load distance and 12m is the effort distance.

M.A $= \dfrac{Effortdistance}{loaddistance}$

M.A $= \dfrac{12m}{6m}$

M.A. = 2 (remember mechanical advantage has no units).

Activity
1. Olupo raised a load of 600kg using an effort of 300kg on an inclined plane. Work the mechanical advantage of the machine he used.
2. A builder raised a load through a distance of 12m.if the effort moved through a distance of 36m. Calculate the mechanical advantage of the machine he was using.

3. An effort of 40kg was used to raise a load of 80 kg using an inclined plane.

a) Represent the above information on a diagram.

b) Calculate the mechanical advantage of the above machine.

4. Juma raised a load 100kg through a distance of 25m. if the effort moved through a distance of 50m.

i) Represent the above information on a diagram.

ii) Find the mechanical advantage of using the machine above.

LESSON 8
TOPIC   : SIMPLE MACHINES
SUB TOPIC   : WORK
By the end of this lesson, you should be able to;
 1. Define work
 2. State units in which work, force and distance are measured.

Work
-   Work is a product of force and the distance moved in the direction of force.

-   Work is said to be done when a force moves another force through a certain distance. For example when you carry a jerry can of water from one place to another, you have done work.

-   Carrying a jerry can, you are using energy (force). A jerry can you are carrying is another force. So when you carry it through a distance you have done work.

 - Work is measured in units called **joules.** To find work done, we multiply the force by the distance. i.e.

$$\boxed{\textbf{Work = force x distance}}$$

Note
 - A joule is the work done when force moves through a distance of 1 metre.
 - The standard unit for measuring force is **Newton.**
         1 kg = 10N
 - The standard unit of distance is the **metre.**

Examples

1. A cook carried a load of 50N through a distance of 5m. Calculate the work   done by the cook.

Solution.

Work done = force X distance.

> =5ONX5m
>
> =50x5
>
> =250 Joules

   3. A load of 20kg was moved through a distance of 3m. Find the work done.

Work done =force x distance

For this case, force has been given in kg. So we shall first have to change it into   Newtons. This is because force is measured in Newtons.

1kg =10N

20kg = (20x10) N

> =200N

 Therefore force= 200N.

(We shall now go back to our formula)

Work done = force x distance

> = 200N X3m
>
> =200x3
>
> =600J.

Activity

1. An object of weight 10N was moved through a distance of 5m. find the work done

2. A man used a wheel barrow to push a load of 20kg through a distance of 10m. Calculate the work done.

3. An inclined plane was used to lift a load of 50kg through a distance of 10 m using an effort of 25kg.

   a) Represent the above information on a diagram.

   b) Calculate the mechanical advantage of using the above machine.

4. An effort of 40N is applied on a lever to overcome a load of 200N. Calculate the mechanical advantage.

5. The diagram below shows a simple machine. Use it to answer questions that follow.
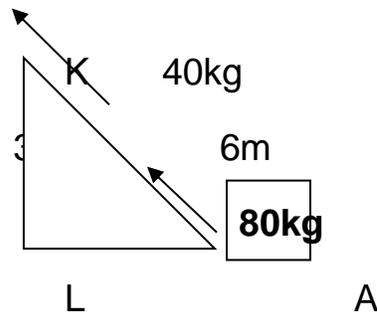
6. Identify the following

   i)   Effort distance.

   ii)   Load distance.

7. Calculate the mechanical advantage of the machine above.

8. How can the machine above be used with less effort?

LESSON 9
TOPIC   : SIMPLE MACHINES
SUB TOPIC   : WEDGES AND SCREWS

Learning outcomes
By the end of this lesson, the learner should be able to:
1. Give the meaning of the term wedge.

2. State examples of wedges.

3. Give applications of wedges in our daily life.

4. Describe a screw.

5. Give examples of screws.

6. State application of screws in our daily life

Wedges
  - A wedge is a cutting tool.
  - It is made up of double inclined plane/slope.

Illustration of a wedge.

Slopes
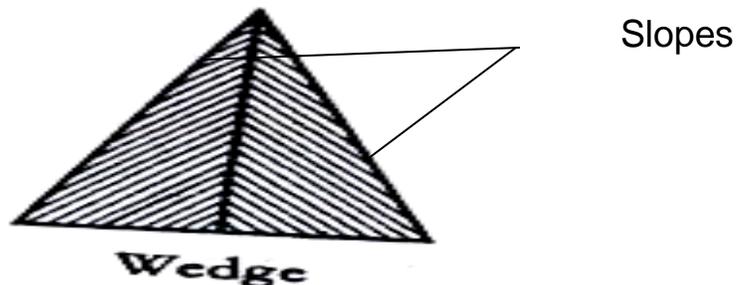
Wedge

Examples of wedges
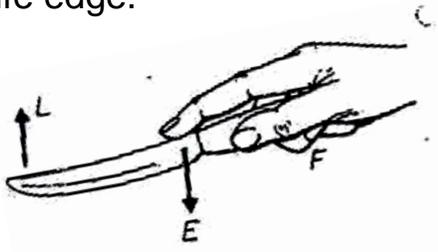
Knife edge. Table knife	Axe bladder Axe
Hoe	Razor blade
Nail	Needle
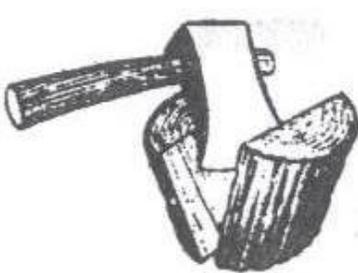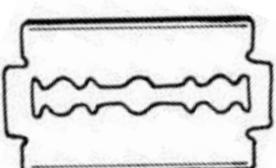
Uses of wedges

1. Wedges are used for cutting objects.

2. Wedges can be used for sewing.

3. Wedges are used for splitting wood.

4. Wedges are used for digging.

Screws

- A screw is an inclined plane wound round the rod. A rod is a thin straight bar made of either wood or metal.
- Wound is a past participle tense of the word wind.
- To wind is to move in a spiral/ twisted way.

DIAGRAM SHOWING A SCREW
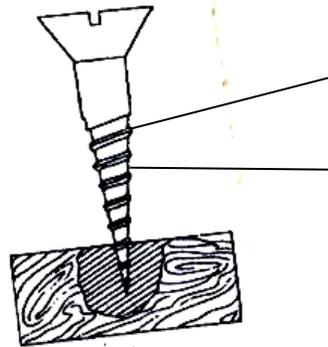
Pitch

Thread

USES OF SCREWS
- Screws are used for lifting very heavy things.
- Screws make movement upstairs easier.
- Screws are used to fasten things together.
- Screws can also be used for drilling holes in wood and walls.

Examples of screws

Spiral staircase

Screw jack

handle

Screw nails

Screw nails
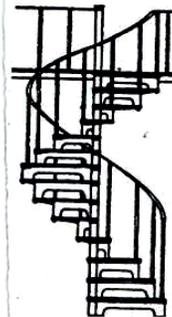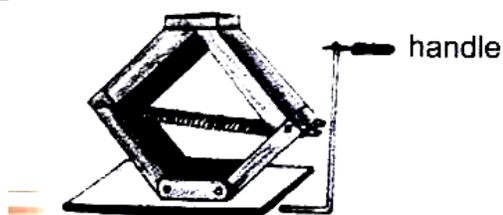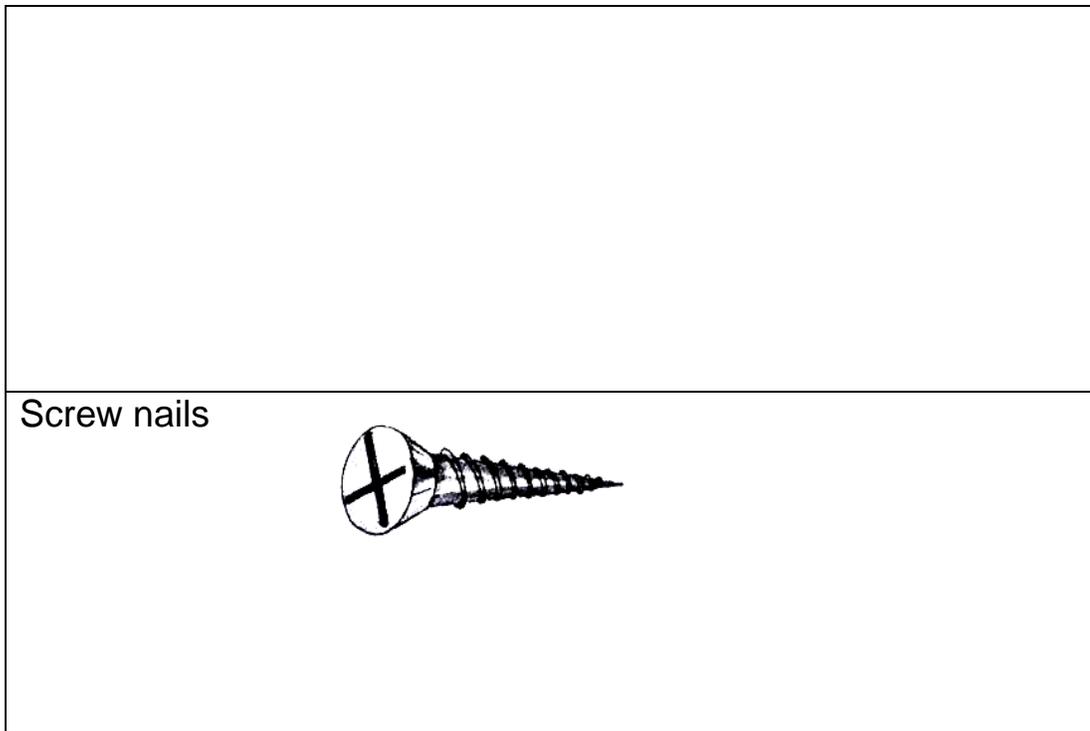
Activity

1. Name any one wedge used in the preparation of land.

2. Give a reason why a razor blade is regarded as a wedge.

3. Give any two applications of screws in our daily life.

4. Identify any two examples of screws

LESSON 10

TOPIC: SIMPLE MACHINES

SUB TOPIC: WHEEL AND AXLE:

LEARNING OUTCOMES

By the end of this lesson, you should be able to;

1. Describe the wheel and axle.
2. Give examples of machines under wheel and axle.
3. Identify importance of wheel and axle machines in our daily life.

Wheel and axle

- An axle is a rod passed through a wheel.
- The wheel rotates on an axle.

Examples of devices that use wheels and axles

Door Knobs	Pedal wheels
Steering wheel	Egg beaters
Screw drivers	Brace
Windlass	Handles of a bicycle.

Uses of wheel and axle

There are several ways people use wheel and axle machines. These include

- They are used for drawing water from underground tanks.
- They are used for drilling holes in wooden materials.
- They are used for tightening screws to fix things together.
- They are used to loosen screws.
- They are used for whisking eggs for frying.

Activity

1. Give any two examples of each of the following:
   a) Wheels and axles
   b) screws
2. How are screws important to people?
3. Give any two groups of people who use screws in their work
4. Cite any two examples of wedges at home
5. How are inclined planes important to human beings?