

**Theme:** Matter and energy

**Lesson 1**

**Topic:** Simple machines and friction

**Read and spell**

- static
- sliding
- viscosity
- friction

**Friction**

Friction is the force which opposes motion between two surfaces in contact.

**Types of friction**

**1. Static friction**

This is a type of friction that occurs between two objects which are fixed in one place.

**2. Rolling/sliding friction**

This is a type of friction which occurs between objects in motion.

**3. Viscosity friction**

This is the type of friction which occurs in liquids and gases.

**Properties of friction**

- There is more friction with rough surfaces than with smooth surfaces.
- Increase in load increases friction over a surface.
- Whenever friction occurs, heat is produced.

**Activity**

1. Give a reason why friction opposes motion.  
\_\_\_\_\_
2. Why do fixed objects tend to resist movement when pushed for the first times?  
\_\_\_\_\_
3. State a reason why there is more friction on tarmac roads than on murram roads.  
\_\_\_\_\_
4. Mention any two properties of friction.  
(i) \_\_\_\_\_  
(ii) \_\_\_\_\_
5. Why do you think increase in load increases friction over a surface?

## **Read and spell**

Lesson 2

- matter
- sharpening
- tear
- nuisance

## **Effects of friction on matter**

### **Advantages**

- It helps in movement
- It helps in stopping moving objects
- It helps in sharpening tools
- It helps in writing
- It helps in climbing mountains and trees

### **Disadvantages (friction as a nuisance force)**

- It causes wearing of objects like tyres, shoe soles, clothes
- It causes tear and wear in some parts of machines
- It wastes a lot of energy (makes work difficult) since it opposes movements.
- It causes unnecessary noise
- It produces unnecessary heat.

### **Activity**

1. How is friction helpful to a P.7 candidate during exams?  
\_\_\_\_\_
2. What would happen to a person climbing a tree if there was no friction?  
\_\_\_\_\_
3. State one way friction is very important to a farmer.  
\_\_\_\_\_
4. What causes clothes to wear and start tearing faster at the bottom?  
\_\_\_\_\_
5. Mention any two disadvantages of friction.  
(i) \_\_\_\_\_  
(ii) \_\_\_\_\_

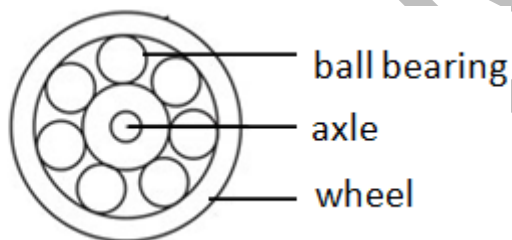
## **Read and spell**

### **Lesson 3**

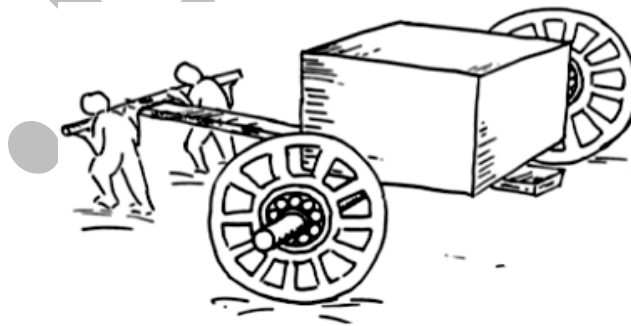
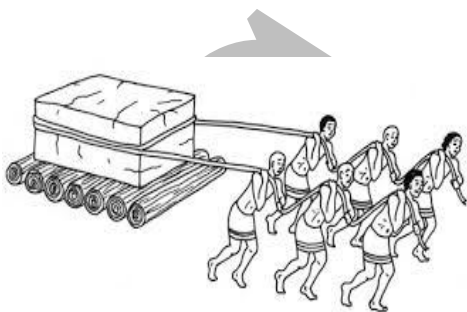
- ball bearings
- streamlining
- lubricating
- roller

## **Ways of reducing friction**

1. By making rough surfaces smooth
2. By lubricating moving parts of machines
3. Using ball bearings. This helps to keep moving parts of a machine separated.

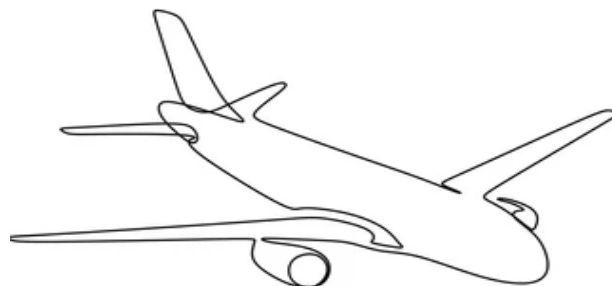
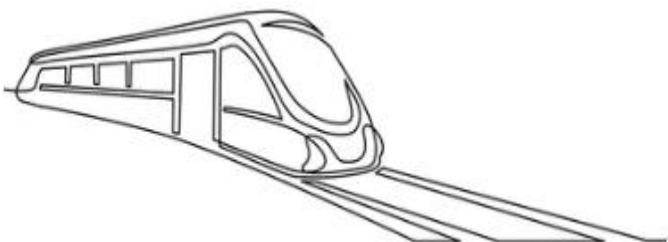
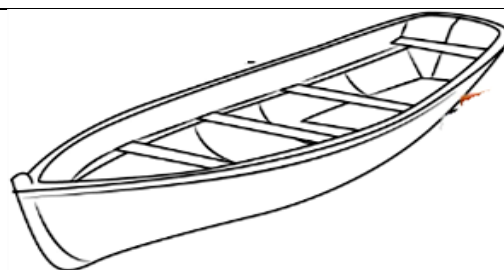


4. Using rollers. This helps to reduce surface contact between moving objects.



5. Stream lining objects that move in water and air. Stream lining also reduces surface contact between moving objects and water or air.

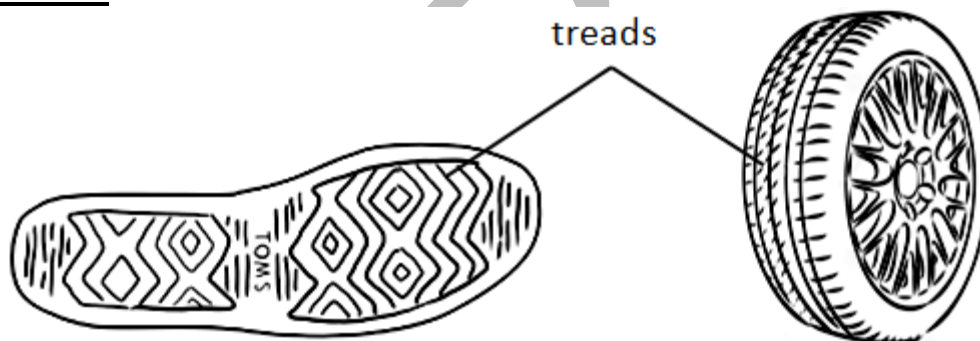
## **Illustrations**



### **Ways of increasing friction**

1. Making smooth surfaces rough.
2. Increasing weight of a moving body.
3. Adding more treads on shoe soles and vehicle tyres.

### **Illustration**



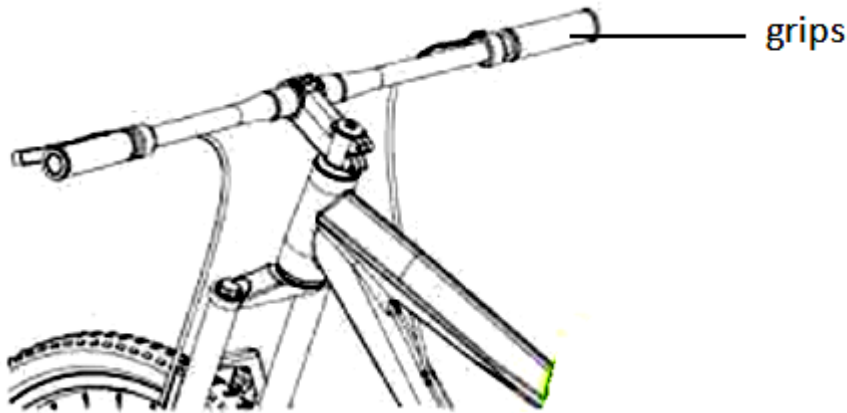
4. Putting spikes on sports boots.

### **Illustration**



5. Putting grips on bicycle handles.

### **Illustration**



### **Activity**

1. How does the use of grease on moving parts of machines reduce friction?  
\_\_\_\_\_
2. Why do you think friction is more on rough surfaces than smooth surfaces?  
\_\_\_\_\_
3. Jonathan poured oil on his bicycle rim before riding away from home. What problem do you think he is likely to face on the way?  
\_\_\_\_\_
4. Name one item that is made with rollers as a way of protecting it from the bad effects of friction when moving it.  
\_\_\_\_\_
5. How does streamlining objects help to reduce friction?  
\_\_\_\_\_

### **Read and spell**

- levers
- inclined plane
- screws
- pulleys

**Lesson 4**

### **Machines**

Machines are devices which simplify man's work.

#### **Types of machines**

##### **(a) Complex machines:**

These are machines which are made up of many parts and they require

training in order to use them e.g. sewing machines, tractor, bicycle etc.

**(b) Simple machines:**

These are machines which are made up of few parts and they do not require training in order to use them e.g. spanner, knife, pair of scissors etc

**Types of simple machines**

- levers
- wedges
- screws
- inclined plane
- wheel and axle
- pulleys

**Advantages of using machines**

- Machines simplify work by reducing the effort required
- They increase speed of work
- They make work convenient

**Activity**

1. Which class of simple machines would be very useful to a person who wants to cook matoke?  
\_\_\_\_\_
2. State one way in which machines simplify work.  
\_\_\_\_\_
3. Identify two challenges that would be faced if there were no machines to simplify work.  
i) \_\_\_\_\_  
ii) \_\_\_\_\_
4. Write down any two examples of complex machines.  
i) \_\_\_\_\_ ii) \_\_\_\_\_
5. How are complex machines different from simple machines?  
\_\_\_\_\_  
\_\_\_\_\_

**Read and spell**

- load arm
- effort arm
- pivot

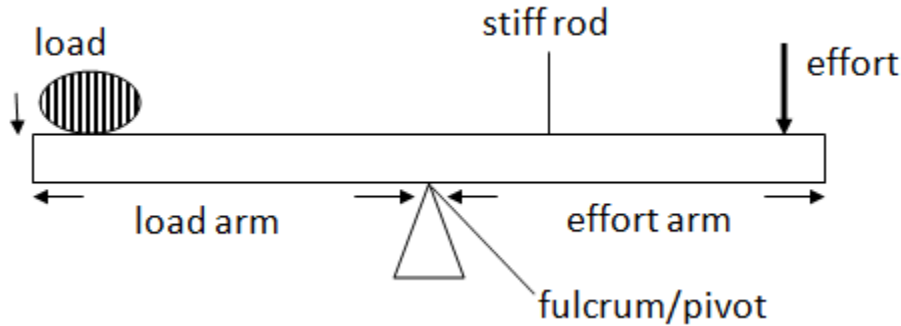
**Lesson 5**

- over-come

## **Lever**

A lever is a stiff rod that turns on a fixed point called pivot.

### **Parts of a lever**



- (a) Load is the force to be overcome.
- (b) Effort is the force applied to overcome the load.
- (c) Load arm is the distance from the fulcrum to the position where the load is placed.
- (d) Effort arm is the distance from the fulcrum to the position where the effort is applied.
- (e) Pivot (fulcrum) is a turning point of a machine

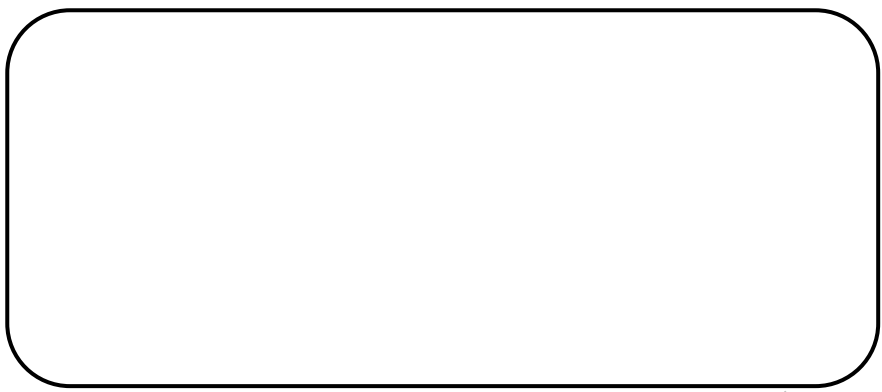
### **Classes of levers**

The classes of levers depend on the position of load, effort and fulcrum. These classes include

- 1. First class lever
- 2. Second class lever
- 3. Third class lever

### **Activity**

- 1. What name is given to the turning point of a machine?  
\_\_\_\_\_
- 2. Mention the three parts of a lever whose position are used to determine its classes.
  - i) \_\_\_\_\_
  - ii) \_\_\_\_\_
  - iii) \_\_\_\_\_
- 3. In the space provided below, draw a lever and use letter **P** to label the position of the fulcrum.



4. What name is given to the force applied on a machine so as to overcome the load?

\_\_\_\_\_

5. Write short notes on the following:

(a) Load arm

\_\_\_\_\_  
\_\_\_\_\_

(b) Effort arm

\_\_\_\_\_  
\_\_\_\_\_

### **Read and spell**

- scissors
- crow bar
- claw hammer
- pliers

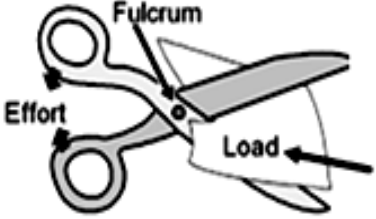
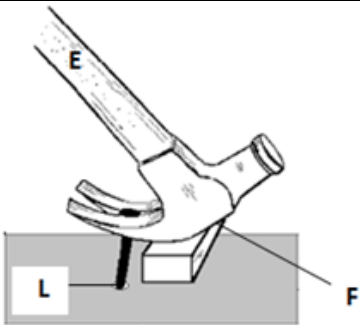
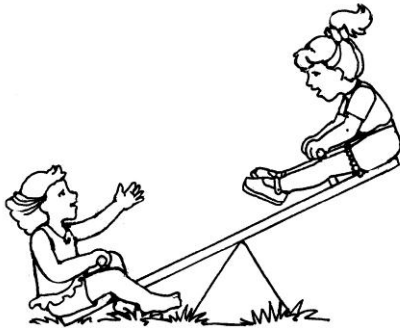
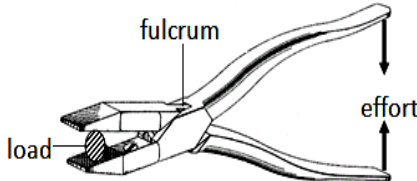

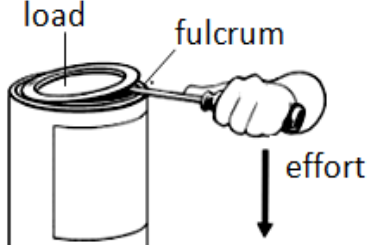
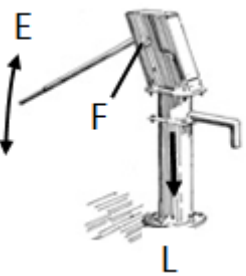

**Lesson 6**

### **First class levers**

This is a class of lever in which the fulcrum is in between the load and effort.

### **Examples of machines in the first class lever**



		
pairs of scissors	claw hammer	sea saw
		
pliers	crow bar	lid opener
		
water pump	beam balance	

### **Characteristic of first class levers**

- The effort arm is longer than the load arm.

### **Advantages of using first class levers**

- Less effort is used since it multiplies the force applied (it is a force multiplier).

### **Applications of first class levers in daily life**

- Cutting papers using pairs of scissors.
- Removing nails from wood using a claw hammer.
- Lifting objects using a crow bar.
- Opening container lids using lid openers.

### **Activity**

1. Name any one example of a double lever.

2. Which first class lever machine can be used for tightening nuts?  
\_\_\_\_\_
3. Give a reason why machines in the first class lever are able to multiply the effort applied.  
\_\_\_\_\_
4. Why is first class lever regarded as a force multiplier?  
\_\_\_\_\_
5. Mention any one application of first class lever in our daily life.  
\_\_\_\_\_

### **Read and spell**


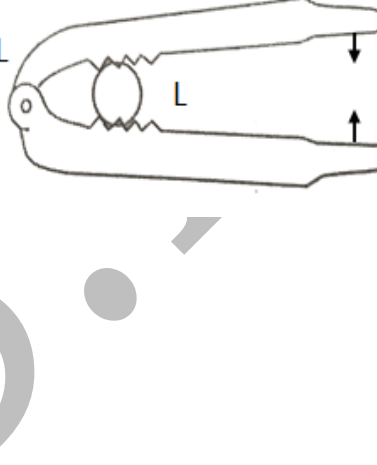
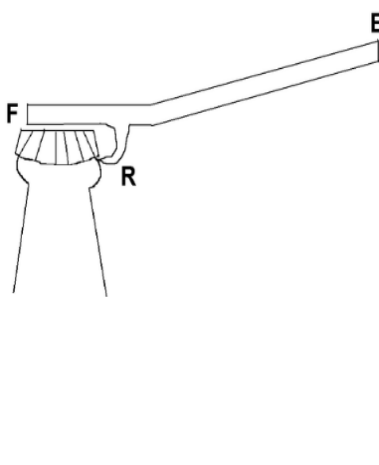
- oar
- nut cracker
- bottle opener
- wheel barrow

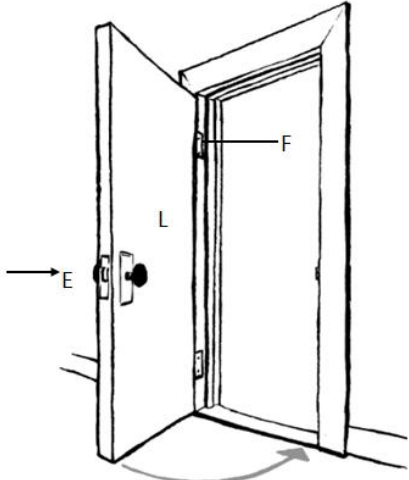
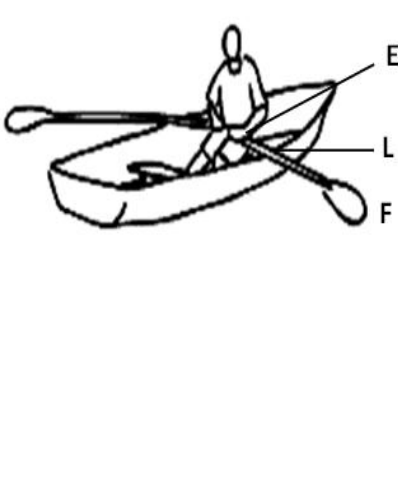
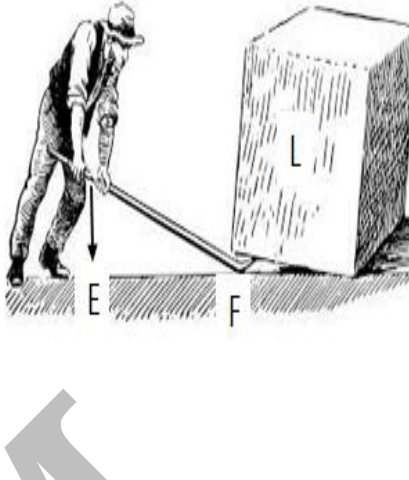
### **Lesson 7**

### **Second class lever**

This is a class of lever in which the load is in between the effort and pivot.

### **Examples of machines in the second class lever**

		
wheel barrows	nut cracker	bottle opener

		
doors	oar	crow bar

### **Characteristics of second class levers**

- The load is closer to the fulcrum than the effort.
- It makes both the load and effort move in the same direction.
- Distance moved by load is less than distance moved by effort.

### **Advantages of using second class lever**

- Less effort is applied since it is a force multiplier
- Work is done easily since both load and effort move in the same direction.

### **Applications of second class lever in daily life.**

- Applying force to move a boat forward.
- Opening bottle tops.
- Transporting manure using a wheel barrow.

### **Activity**

1. In a second class lever, load is closer to the fulcrum than to the effort. How is this important?  
\_\_\_\_\_
2. State one way in which second class levers are useful in our daily lives.  
\_\_\_\_\_
3. Identify any one advantage of using a second class lever over first class lever.  
\_\_\_\_\_
4. Mention two examples of machines in the second class lever.  
(i) \_\_\_\_\_  
(ii) \_\_\_\_\_
5. Why is a wheel barrow grouped under machines in the second class  
\_\_\_\_\_

lever?

## **Read and spell**

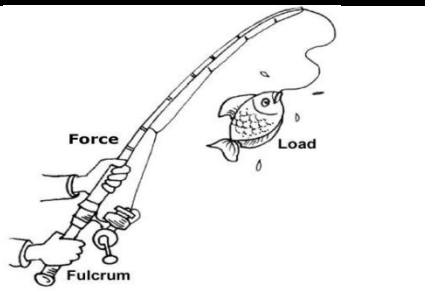
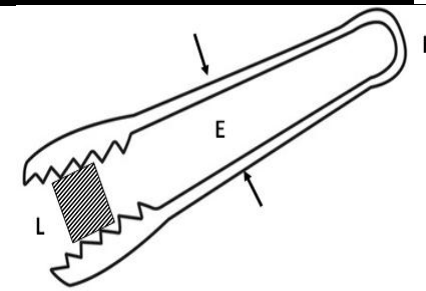
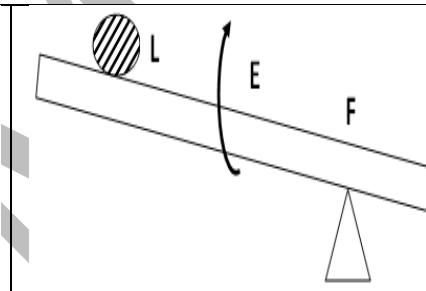
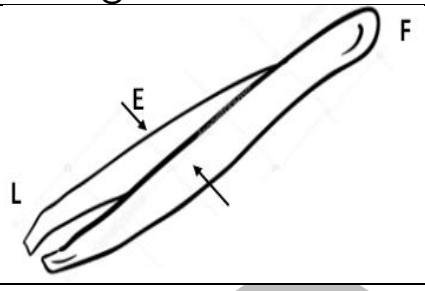
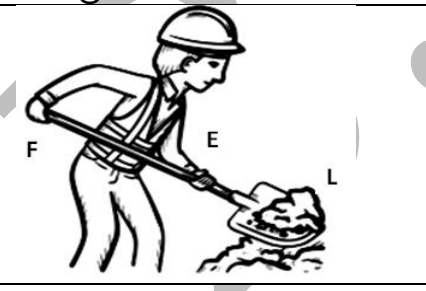
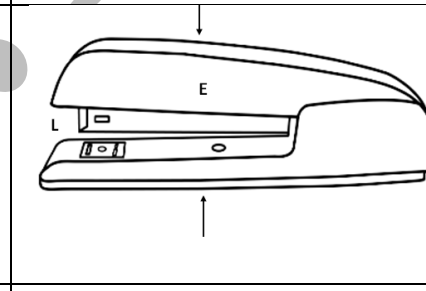
## **Lesson 8**

- tweezers
- tongs
- fishing rod
- fulcrum

## **Third class lever**

This is a class of lever in which the effort is in between the load and fulcrum.

## **Examples of machines in the third class lever.**

		
Fishing rod	tongs	crow bar
		
Tweezers	spade	stapling machine

## **Characteristics of third class levers**

- Effort applied is greater than the load.
- It is a distance multiplier since the load moves a greater distance than the effort.

## **Advantages of third class lever**

- It makes the effort move a shorter distance than the load.

## **Applications of third class lever in daily life**

- Holding hot charcoal using tongs.
- Picking small medical equipment using tweezers.
- Fishing using a fishing rod.
- Stapling papers using the stapling machine

## **Activity**

1. State any one importance of using third class levers.

2. How are third class levers different from second class levers?
3. Name one machine that belongs to all the three classes of levers.
4. When is a crow bar classified as a third class lever?
5. List down any two ways in which people use third class levers.
- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_

### **Read and spell**

- moments
- momentum
- principle
- equilibrium

**Lesson 9**

### **Force**

- Force is the pull or push on an object.
- Force is measured in Newtons.

### **Types of force**

- Friction
- Inertia
- Gravity
- Momentum

### **Effects of force on an object**

- It can make an object to start moving
- It makes objects to stop moving
- It can make objects to change shape or size

### **Moments**

- Moment is a turning effect of force.
- Force acting on the right side of a lever causes the lever to turn in a clockwise direction while force acting on the left side of a lever causes the lever to turn in an anti clockwise direction.

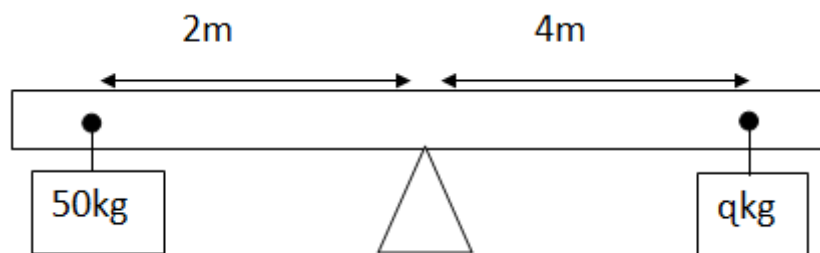
### **Principle of moments/the law of levers.**

- The principle of moment states that for a body to be in equilibrium, the sum of the clockwise moment about any point equals the sum of anti-clockwise moment.
- The law of lever states that a lever is balanced when the sum of the clockwise moment about any point equals the sum of anti-clockwise moment.

### Calculations on moments

#### Example 1

1. Find the load at q



$$\begin{aligned}
 L \times La &= E \times Ea \\
 qkg \times 4m &= 50kg \times 2m \\
 q \times 4 &= 50 \times 2 \\
 4q &= 100 \\
 \frac{4q}{4} &= \frac{100}{4} \\
 q &= 20
 \end{aligned}$$

#### Activity

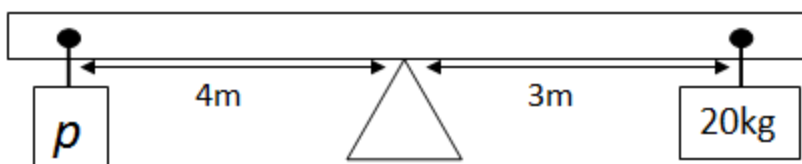
1. State the principle of moment.

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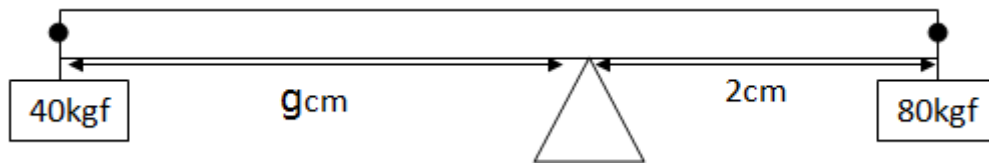


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2. Find the weight at p



3. Two forces are balanced on a wooden plank as shown in the diagram below.



(a) Find the distance at **g**.

(b) To which class of machines does the one above belong?

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(c) Find the length of the wooden plank.

### **Read and spell**

- ramp
- ladder
- stair case
- winding road

**Lesson 10**

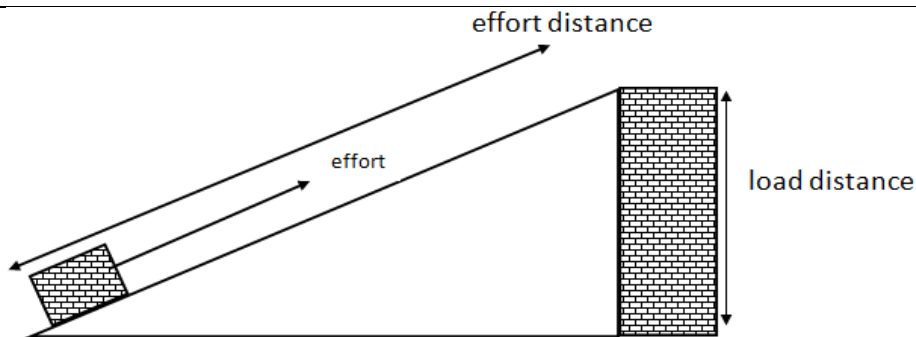
### **Inclined planed (slope)**

This is a class of simple machines with slanting surface.

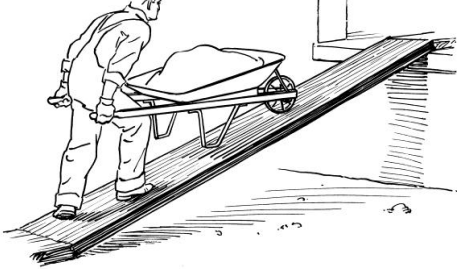



### **Characteristics of inclined planes**

- It has/ is used in a slanting surface.
- It has a vertical height.

### **Illustration**



### **Examples of machines under inclined plane.**

	
ramp	stair case
	
ladder	winding road

### **Advantages of using inclined plane**

- It makes climbing upwards easier.
- It reduces effort applied for lifting up objects.

### **Applications of inclined plane in daily life**

- Moving upstairs on a stair case
- Climbing trees using ladder
- Vehicles ascending a steep hill on a winding road
- Loading goods on lorry truck using a plank of wood.

### **Activity**

1. How is an inclined plane important to a candidate whose class is in the second floor of a storeyed building?

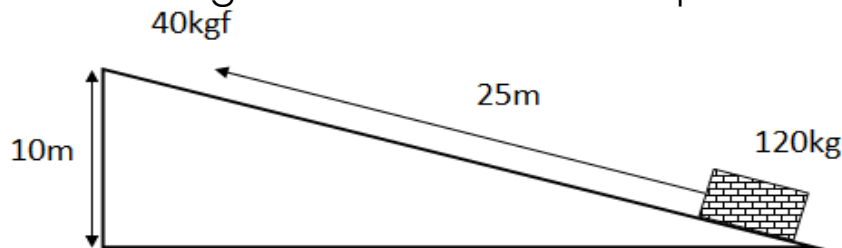


2. Mention any two applications of inclined planes in daily life.

i) \_\_\_\_\_

ii) \_\_\_\_\_

3. Use the diagram below to answer questions that follow



a) To which class of simple machines does the one above belong?

\_\_\_\_\_

b) What is the load distance on the diagram above?

\_\_\_\_\_

c) How can the machine be used to raise the same load using less effort?

\_\_\_\_\_

### **Read and spell**

- wedges
- needle
- sword
- axe
- razor blade

**Lesson 11**

### **Wedges**

These are tools with sharp edge for cutting or piercing.

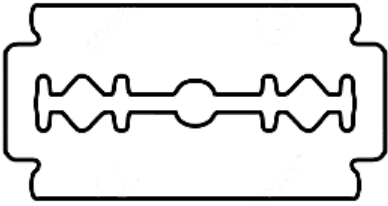
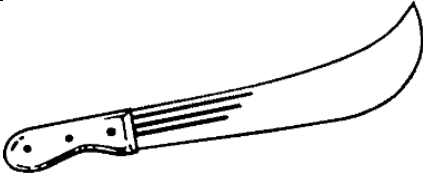
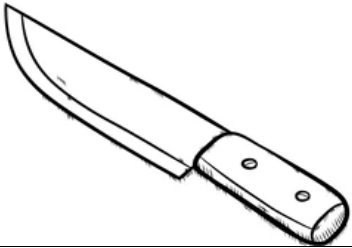
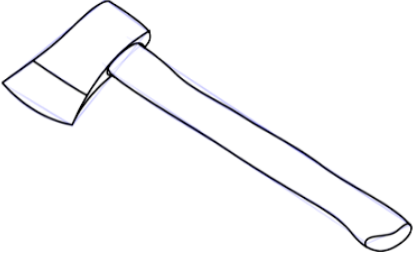
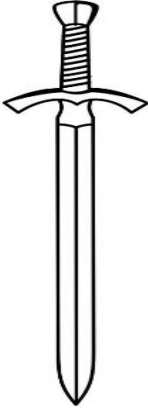

### **Characteristics of wedges**

- It is a double inclined plane placed together.
- It has a sharp edge

### **Illustration showing a wedge**



### **Examples of wedges**

		
razor blade	panga	knives
		
axe	sword	needle

### **Advantage of using wedges**

- Less effort is applied to overcome the load.

### **Application of wedges**

- Knives are used for peeling some food stuffs.
- For splitting wood.
- For cutting tree branches.

### **Activity**

1. What is a wedge?  
\_\_\_\_\_
2. State one importance of wedges when giving first aid.  
\_\_\_\_\_
3. How are wedges similar to inclined planes in terms of their nature?  
\_\_\_\_\_
4. Mention any one wedge that may be used by a person who has a torn dress.  
\_\_\_\_\_
5. List down any two ways wedges can be used in daily life.
  - i) \_\_\_\_\_
  - ii) \_\_\_\_\_

### Spelling exercise

- mechanical
- advantage
- simplifies
- ratio

### Mechanical advantage

- Mechanical advantage is the number of times it simplifies work.
- It is expressed as a ratio of load to effort
- It has no unit since it is a ratio.

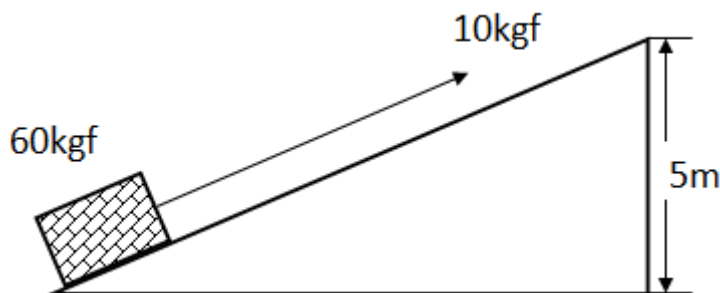
**Note:** If the mechanical of a machine is one, then the machine requires less effort to lift the load but if it is one then the machine uses effort equal to the load

### Calculating mechanical advantage.

Formula;  $M.A = \frac{\text{Load}}{\text{Effort}}$

### Examples

1. John used a slope to raise a load of 60kgf from the ground to the higher level as shown below.



Work out the M.A of the machine

$$M.A = \frac{\text{Load}}{\text{Effort}}$$

$$M.A = \frac{60\text{kgf}}{10\text{kgf}}$$

$$M.A = \frac{60}{10}$$

$$M.A = 6$$

### Activity

1. Write the meaning of the word mechanical advantage.
2. Otim used 20kgf to lift a load of 50kg on a slope. Work out the

mechanical advantage of the slope.

3. If the mechanical advantage of a lever system is 4, find the effort required to lift a load of 80kgf using the lever.

### **Read and spell**

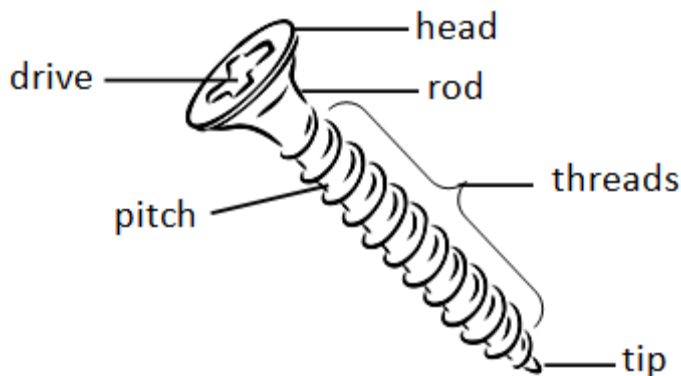
- pitch
- bolt
- engineer
- screw jack

**Lesson 12**

### **Screws**

- A screw is a nail or bolt with threadlike windings.

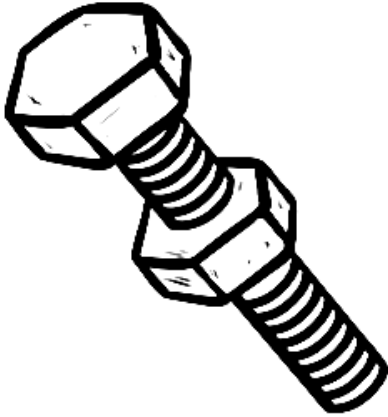
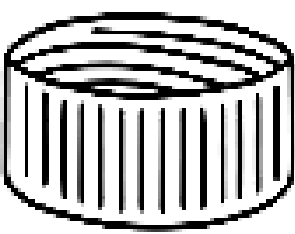

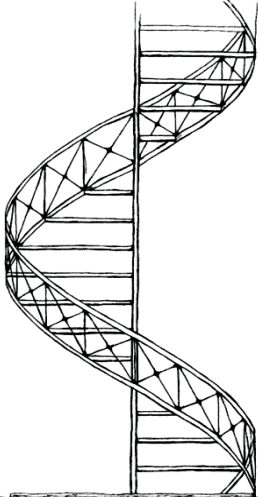
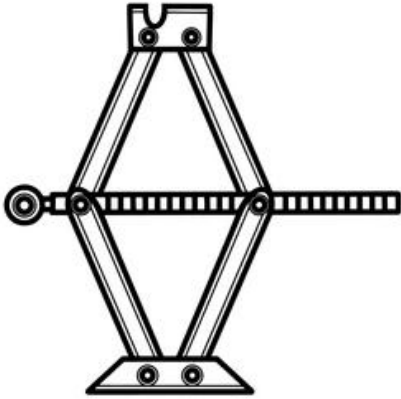
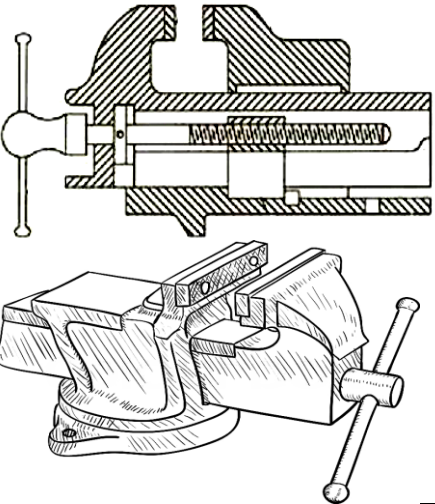
### **Nature of screws**



### **How screws work**

- For a complete rotation of the effort, the load moves through a distance equal to one pitch while the effort moves a distance equal to the circumference of the handle.

### **Examples of screws**

		
Bolts and nuts	Bottle lids	Screw nail
		
Winding stair case	Screw jack	Engineer's vice

### **Uses of screws**

- Fixing objects together.
- Lifting heavy objects.
- To tighten bottle tops.
- To drill holes in metals or wood.

### **Application of screws**

- In car jacks for lifting cars.
- In bottle tops for tightening lids.
- In braces for drilling holes.

### **Activity**

1. Write down any one example of a tool which is a screw.

\_\_\_\_\_

2. How is an engineer's vice useful to a carpenter?

\_\_\_\_\_

3. Draw any one machine which belongs to screws.



4. Mention two ways how screws are useful in our daily life?

- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_

### **Read and spell**

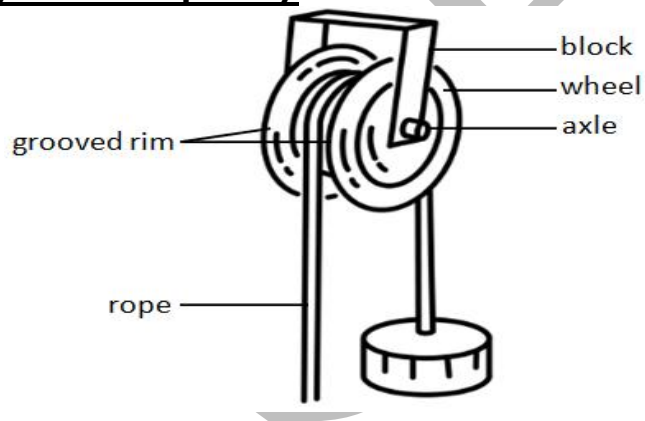
Lesson 13

- fixed
- movable
- block and tackle
- anti-clock wise

### **Pulleys**

- A pulley is a wheel with grooved rim that rotates freely about an axle through a centre.

### **Diagram of a pulley**



### **Function of each part of a pulley**

#### **1. Rope**

- It is where the load is attached
- It is where the effort is applied

#### **2. Grooved rim**

- It prevents the rope from slipping

#### **3. Wheel**

- It supports movement

- It redirects applied force

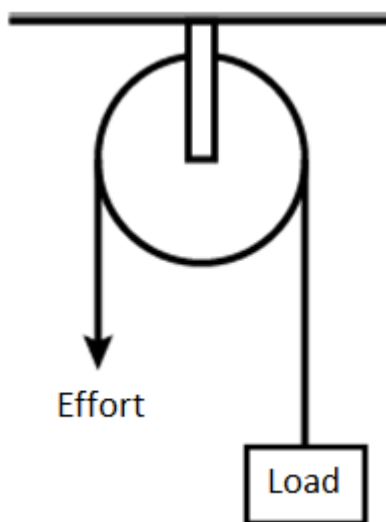
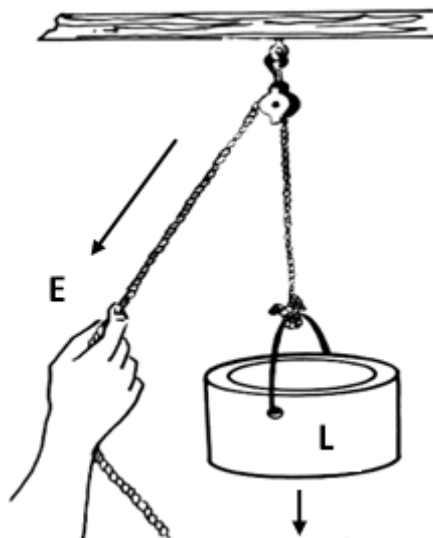
#### **4. Block**

- It's a frame on which the pulley is supported

#### **Types of pulleys**

- Single fixed pulley
- Single movable pulley
- Block and tackle system

#### **1. Single fixed pulley**



#### **Characteristics of single fixed pulley**

- It changes direction of force.
- The effort applied is equal to the load to be overcome.
- It is only one pulley which does not move.

#### **Advantage of using single fixed pulley**

- Work is done faster since the load moves at the same speed with effort.
- It makes work convenient by changing direction of force.

#### **Calculations on a single fixed pulley**

##### **Example 1**

A load of 50kgf was lifted using an effort of 50kgf on a single fixed pulley. Calculate the mechanical advantage of the pulley.

$$M.A = \frac{\text{Load}}{\text{Effort}}$$

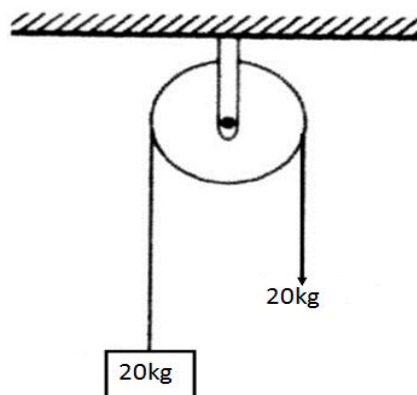
$$M.A = \frac{50\text{kgf}}{50\text{kgf}}$$

$$M.A = \frac{50^1}{50}$$

$$\underline{M.A = 1}$$

### **Examples 2:**

Calculate the MA of the pulley illustrated below.



$$M.A = \frac{\text{Load}}{\text{Effort}}$$

$$M.A = \frac{20\text{kgf}}{20\text{kgf}}$$

$$M.A = \frac{20^1}{20}$$

$$\underline{M.A = 1}$$

**Note:** The mechanical advantage of a single fixed pulley is always 1 since the effort applied is equal to the load.

### **Applications of single fixed pulleys in daily life**

- Raising a flag on a flag post
- Lifting objects from a lower level to a higher level.

### **Activity**

1. What is a pulley?

---



---

2. Mention any two types of pulleys.

- i) \_\_\_\_\_
- ii) \_\_\_\_\_

3. How is a single fixed pulley important in schools?

---



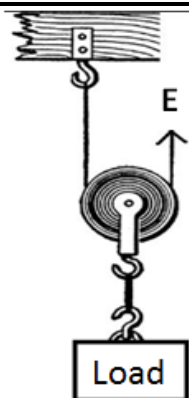
4. State any one advantage of using a single fixed pulley.  
\_\_\_\_\_
5. Give a reason why the mechanical advantage of a single fixed pulley is always 1.  
\_\_\_\_\_
6. Calculate the effort required to raise a load of 40N using a single fixed pulley.  
\_\_\_\_\_

### **Read and spell**

- rim
- wheel
- block
- load

**Lesson 14**

### **Single movable pulley**



### **Characteristics of single movable pulley**

- It is one pulley which moves with the load.
- Both load and effort move in the same direction.
- The effort applied is half the load.
- It is supported on two ropes. Each of the ropes share a half of the effort needed. The rope moves twice as far as the load.

### **Advantages of using single movable pulleys**

- Less effort is used to overcome the load.
- Work is done more easily since it is a force multiplier.
- Both load and effort move in the same direction.

### **Calculating M.A single movable pulley.**

#### **Example 1**

If a load of 100kgf is raised using an effort of 50kgf on a single movable pulley, calculate the mechanical advantage of the machine.

Given: load = 100kgf

Effort = 50kgf

MA = ?

From;  $MA = \frac{L}{E}$

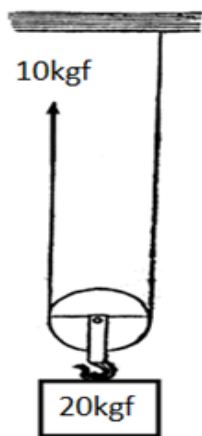
$$MA = \frac{100\text{kgf}}{50\text{kgf}}$$

$$MA = \frac{100^2}{50}$$

$$MA = 2$$

### **Example 2:**

Calculate the mechanical advantage of the pulley illustrated below.



**Given;**

Load = 20kgf

Effort = 10kgf

M.A = ?

From;  $MA = \frac{L}{E}$

$$MA = \frac{20\text{kgf}}{10\text{kgf}}$$

$$MA = \frac{20^2}{10}$$

$$MA = 2$$

**Note:** The mechanical advantage of a single movable pulley is always two since the effort applied is a half to the load.

### **Activity**

1. Why is a single movable pulley regarded as a force multiplier?

\_\_\_\_\_

2. State one advantage of using a single movable pulley over using a single fixed pulley.

\_\_\_\_\_

3. Mention any two differences that exist between a single fixed pulley and a single movable pulley.

i) \_\_\_\_\_

\_\_\_\_\_

ii) \_\_\_\_\_

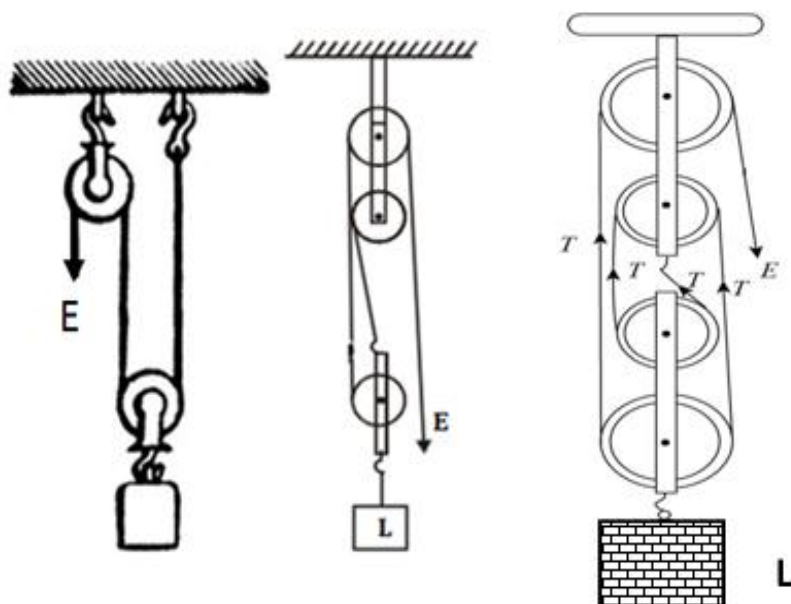
4. A single movable pulley requires an effort of 100N to lift a load of 200N. Calculate its mechanical advantage.

### **Read and spell**

**Lesson 15**

- direction
- multiplier
- mechanical advantage
- towing

### **Block and tackle system**



### **Characteristics of a block and tackle system**

- Its M.A is determined by the number of pulleys.
- It is a combination of both fixed and movable pulleys.
- It changes direction of force.

### **Advantages of using block and tackle system.**

- Work is done more easily than in other types of pulleys.
- It reduces the effort needed.

### **Applications of block and tackle system**

- It is used in cranes for lifting building materials.
- It is applied in towing vehicles
- They help to move window curtains.

### **Calculations on using block and tackle system**

### **Example 1**

A block and tackle system needs a force of 20kgf to raise a load of 100kgf. Calculate its mechanical advantage.

**Given;**

Load = 100kgf

Effort = 20kgf

M.A = ?

$$\text{From; } MA = \frac{L}{E}$$

$$MA = \frac{100\text{kgf}}{20\text{kgf}}$$

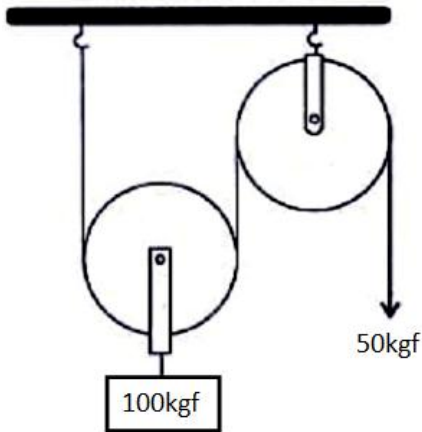
$$MA = \frac{100^5}{20}$$

$$MA = 5$$

### **Activity**

1. Mention any one machine that uses the block and tackle system.

2. Calculate the M.A of the pulley system illustrated below.



3. Mention any two uses of pulleys in our daily life.

i) \_\_\_\_\_

ii) \_\_\_\_\_

4. A block and tackle system needs 40N to raise a load of 120N

(a) Calculate its M.A

(b) How many pulleys does the pulley system have?

## Read and spell

### Lesson 16

- axle
- egg beater
- windlass
- pedal wheels

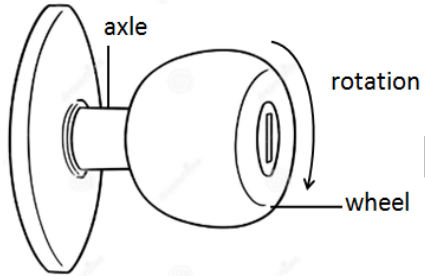
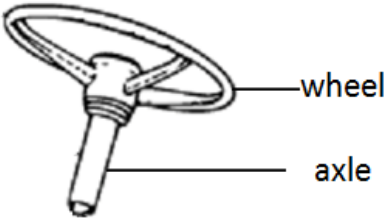
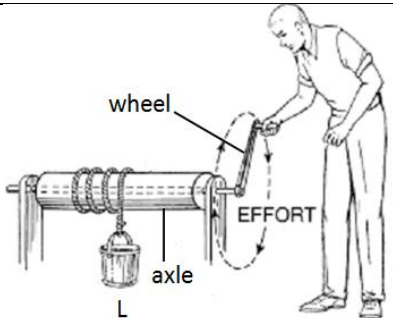

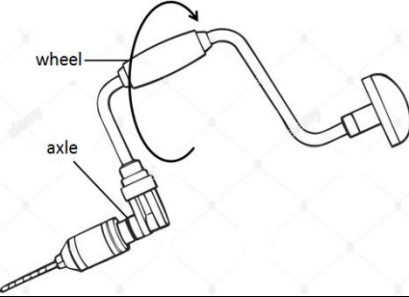
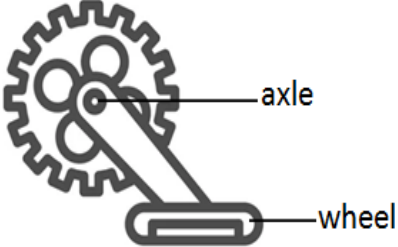
## Wheels and Axle

- This is a simple machine with two wheels of different radii fixed on the same axis

## Characteristics of wheel and axle

- The axle is passed through a wheel.
- The wheel rotates on the axle.
- The effort is applied to the wheel
- A string attached to axle raises the load

## Examples of wheels and axle

		
door knobs	steering wheel	windlass
		
egg beater	brace	pedal wheels

### **How wheels and axle work**

- For a complete rotation, the effort moves through a distance equal to the circumference of the wheel while the load moves a distance equal to the circumference of the axle

### **Advantages of using wheels and axle**

- They simplify work
- It makes the effort move further than the load.

### **Applications of wheel and axle.**

- For drawing water from underground tanks using windlass.
- Locking or unlocking doors using door knobs.
- Turning screws to fix things together.
- Preparing eggs for frying using egg beaters.

### **Activity**

1. How is a wheel and axle important to a carpenter?  
\_\_\_\_\_
2. Mention any one example of a wheel and axle.  
\_\_\_\_\_
3. State any one way how wheels and axle simplify work.  
\_\_\_\_\_
4. Identify any two applications of wheel and axle in our daily life.  
i) \_\_\_\_\_  
ii) \_\_\_\_\_
5. Which wheel and axle is important when preparing eggs for frying?  
\_\_\_\_\_

### **Spelling exercise**

- comparison
- chewing
- jaw
- incisor

### **Lesson 17**

### **Comparison of human body parts with simple machines.**

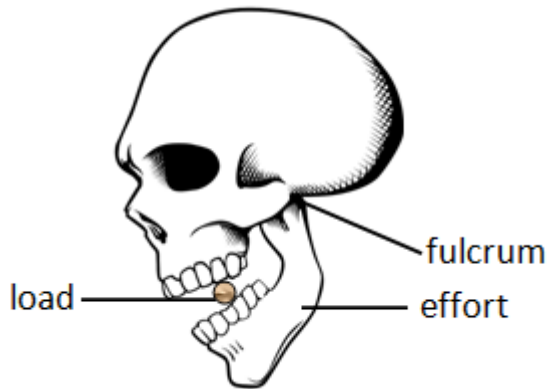
some of the human body parts listed below work exactly as some simple machines

#### **1. The incisor teeth**

- When biting food, the incisor work as wedges

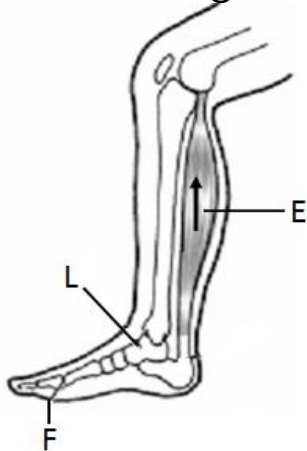
## 2. The jaw

- When chewing food, the jaw works as a third class lever



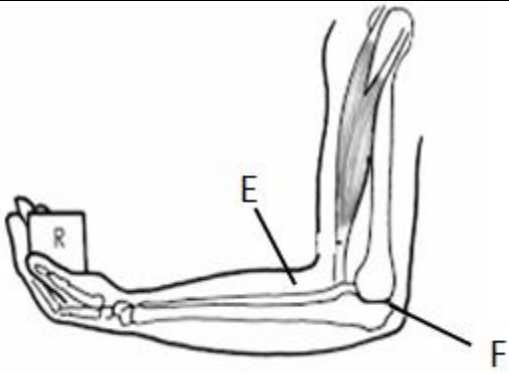
## 3. The human foot

- When walking, the human foot functions as the second class lever



## 4. The arm

- When lifting objects, the hands work as a third class lever machine



### **Activity**

1. How are incisor teeth similar to wedges in terms of function?  
\_\_\_\_\_
2. State a reason why a human arm is said to be a third class lever.  
\_\_\_\_\_
3. How is the fulcrum in first class lever machines different from that of third class machines?  
\_\_\_\_\_  
\_\_\_\_\_
4. In which one way are wheels and axle important to car drivers?  
\_\_\_\_\_
5. How does rotation of the effort in the wheel affect that of the axle in wheel and axle machines?  
\_\_\_\_\_  
\_\_\_\_\_



## **Answers to topical questions in NYKE Integrated Science Supplementary**

### **Book 7**

#### **Section A**

1. Friction
2. Due to static friction
3. Otim
4. Due to static friction between the bag and the surface.
5. Otim's bag will be torn at the bottom.
6. Pouring sand increases friction on the road surface
7. Complex machines require training in order to use them while simple machines do not require training in order to use them.
8. Wedges

#### **Section B**

- 9i) wedges  
ii) lever  
iii) inclined plane  
iv) screw
- 10a) i) wheel barrow  
ii) slope  
b) By increasing length of the slope  
c)  $M.A = L/E$   
 $M.A = 50N/20N$   
 $M.A = 2.5$
- 11a) Both change direction of force  
b) By reducing the effort applied to overcome a given load  
c(i) Pulleys are used in cranes to lift heavy loads  
(II) Pulleys are used for raising and lowering flags.

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S.B.M.