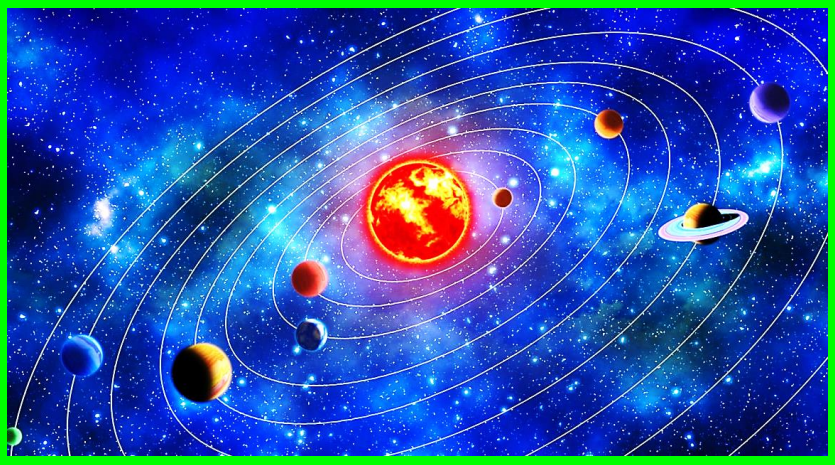
PHYSICS

WORKBOOK

AND

ACTIVITIES OF INTEGRATION

SENIOR TWO



LOWER SECONDARY

NEW CURRICULUM

1ST EDITION

1st /01/ 2023

NEXT GENERATION LEARNER

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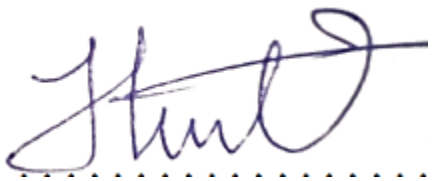
Preface

This Learner's workbook has been written in line with the revised Physics syllabus for the new lower secondary curriculum. The revision questions, worksheets and activities of integration have been incorporated into this workbook. Through those activities of integration provided at the end of each chapter the learner is able to produce new knowledge, values and skills are required in the 21st century.

This has been done by providing a range of activities of integration which will enable the learner to research more through the internet in order to understand the applicability of knowledge learned at his or her respective school.

The learner is expected to be able to work as an individual, in pairs and groups according to the nature of the activities in order to be able to share learning experiences with their colleagues.

This Learner's workbook is one of the materials which are to be used to support the teaching and learning process of the new lower secondary curriculum.



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Acknowledgements

I would like to express a sincere appreciation to all those who worked tirelessly towards the production of this Learner's workbook.

First and foremost, I would like to thank my family and friends for supporting all my initiatives both financially and spiritually. my parents Mr. Omwandi Philemon, and Mrs. Akoth Rose Mary, my siblings Atosa Jonathan and Omwandi Philemon Junior, Adikini Esther lucy and Akoth Georgina. My friends Ashraf, Ntambi and Genza.

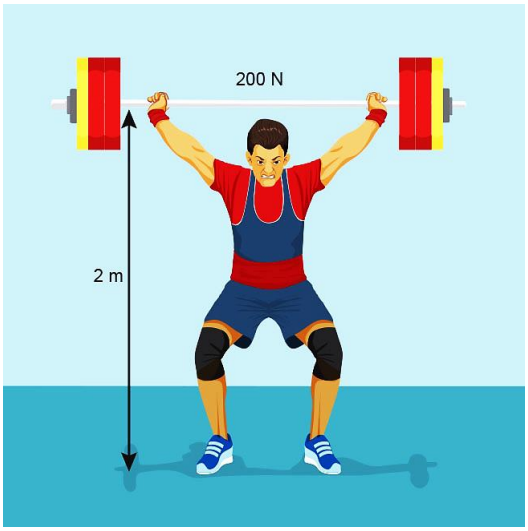
My gratitude also goes to the various institutions which provided staff who natured and supported me to become the physics teacher I am today. My thanks go to Kakungulu memorial school Kibuli which provided the best environment to work from, best reference books and best experienced colleagues like Mr. Hassan, Mr. Mukiibi, Mr. Abiib, Tr Gilbert, Mr. Kintu.

Last but not least, I would like to acknowledge Greenhill Academy Kibuli for the good environment that enabled me to get used to the next generation teachers like Mr. Bemba, Mr. Amayo, Mr. Guma, Tr. Moses.

I welcome any suggestions for improvement to continue making my service delivery better. Please get to me through kennethonderi@gmail.com or contact **0705476300** or **0771940855**

Chapter 1

Work, energy and power



Key learning outcomes

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

- ✓ Know that the sun is our major source of energy and the different forms of energy.
- ✓ Know that energy can be changed from one form to another and understand the law of conservation of energy.
- ✓ Understand the positive and negative effects of solar energy.
- ✓ Understand the difference between renewable and non-renewable energy sources with respect to Uganda.
- ✓ Know and use the relationship work done, force and distance moved and time taken.
- ✓ Understand that an object may have energy due to its motion or its position and change between kinetic and positional potential energy.
- ✓ Know the mathematical relationship between positional potential energy and kinetic energy and use it in calculations.
- ✓ Understand the meaning of machines and explain how simple machines simplify work.
- ✓ Understand the principles behind the operation of simple machines.

Introduction

As we all know that without energy life would not exist on earth, the sun's energy for example is the sole reason why green plants can still exist together. The heat from the sun is the reason we have liquid water; animals wouldn't exist without plants as well. Other energy sources include wind, wood fuel, water, nuclear etc. we also shall cover work, power and simple machines.

Worksheet (Short Answer Questions)

ENERGY

This is the ability to do work. The SI unit of energy is joule (J).

Renewable and non-renewable energy

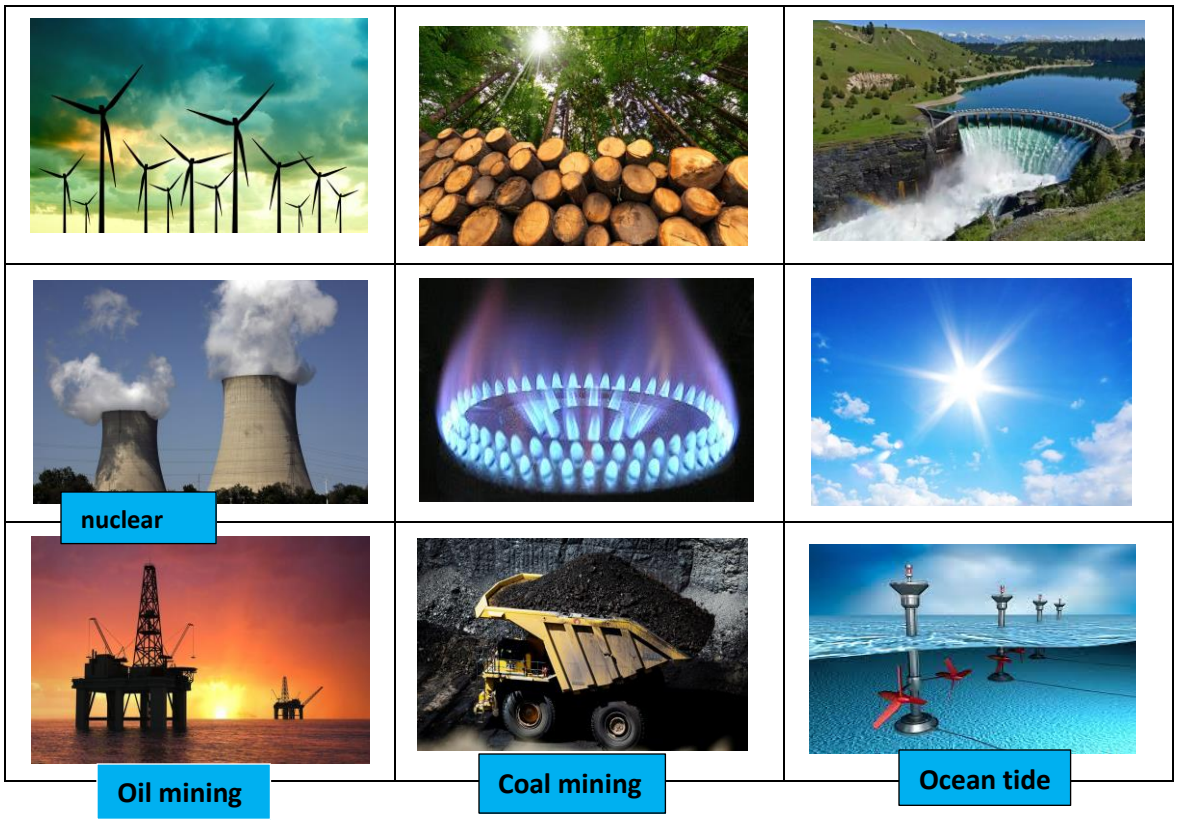
Renewable (Non-Exhaustible) sources of energy:

These are sources of energy which can be re-used to produce energy. They can be utilized repeatedly without and do not get used up.

Non-Renewable (Exhaustible) source of energy:

These are sources of energy which cannot be re-used to produce energy. They cannot be utilized repeatedly. They can get used up entirely.

1. The figure below contains various energy sources commonly used around the world to help people do work. Study it carefully and answer the questions that follow



1. Identify the energy source and classify them as either renewable or non-renewable.

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Forms of energy

1. You are provided with the forms of energy and their meaning and you are required to match them accordingly.

FORMS OF ENERGY	MEANING
Heat	This is the form of energy produced by hot bodies and enables us to see
Sound	*This is form of energy produced when unstable nucleus splits through nuclear fission or two light nuclei fuse together through nuclear fusion.*
Light	This is a form of energy which is transferred from one point to another without causing any permanent displacement of medium itself. This form of energy causes a disturbance through the medium
Electrical	*This is the form of energy that is transferred from region of high temperature to region of low temperature.*
Chemical	This is a form of energy produced when particles in the medium are set into vibrations. This form of energy is heard by the ear
Nuclear	*This is a form of energy due to the flow of charges.*
wave	This is a form of energy that can be converted to heat by burning.

2. Study the picture in the table below and identify the form of energy, its real-life applications, and dangers it possesses to man and environment.

Picture	Form of Energy	Applications	Dangers
			
			
			
			
			
			
			
			

3. In the last decade oil and gas deposits were discovered in the Albertine region in western Uganda. During the world climate summit held in Egypt this year, the European union were against Uganda's plan to exploit the oil reserves. They believed that all new oil drilling should be stopped for the purposes of environmental preservation. They also claim the world should stop using fossil fuels and resort to cleaner energy sources which don't harm the environment.

   (a) What form of energy is oil and gas.

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   (b) As a physics student discuss the benefits this mineral discovery can bring to Uganda's economy.

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   (c) What dangers does this discovery pose to our natural environment?

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   (d) What possible solutions would you recommend the oil drilling company to enforce to preserve and protect the regional natural environment like water bodies, air, land, and vegetation

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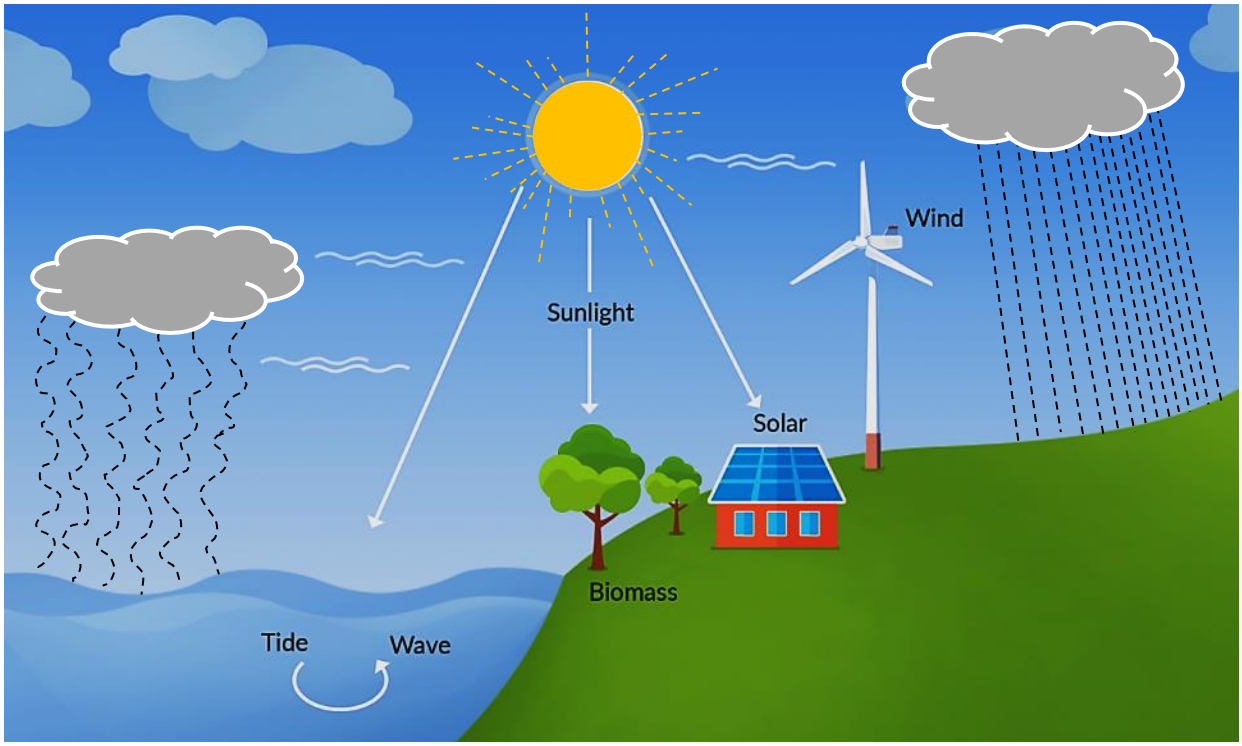
Solar energy

1. The figure below illustrates how the sun is the major source of energy on planet earth. Study it carefully and use it to help you explain and prove that the sun's energy is the main reason there is life on earth.



a) Explain how the sun is the major source of energy on earth with the help of the above illustrations.

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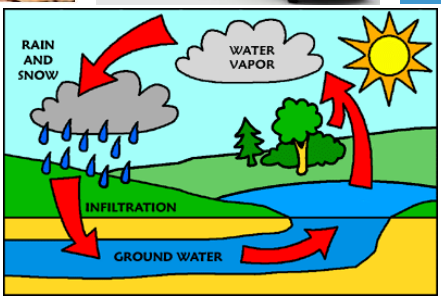
2. The pictures below show some positive and negative effects of solar energy.







a) List down the advantages of solar energy to man and the environment

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b) Explain the dangers of solar energy to man and the environment

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c) Suggest the possible ways of minimizing the dangers caused by solar energy to man and environment

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d) List down atleast four devices or technology that use solar energy to operate.

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Mechanical energy

This is divided into two forms of energy namely

i) Kinetic energy.
ii) Potential energy.

kinetic energy

This is the energy possessed by a body due to its motion. It depends on the speed of the body.

$$K.E = \frac{1}{2}mv^2$$

where: **K.E** is kinetic energy, **m** is mass of a body and **v** is velocity of a body

kinetic energy calculations

1. A body of mass **3kg** moves with a speed of **30ms^{-1}**. Find its kinetic energy
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2. An object of volume **100cm^3** and density **8gcm^{-3}** moves with a speed of **10ms^{-1}**. Find its kinetic energy
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positional Potential energy

This is the energy possessed by a body by virtue of its position in the gravitational field.

$$P.E = mgh$$

Where **P.E** is potential energy, **m** is mass, **g** is acceleration due to gravity, **h** is height above the ground level. where g is **10ms^{-2}** on planet earth

positional potential energy calculation

1. Find the potential energy of an object of mass 350g when it is 10m above the ground.
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2. A 5kg mass falls from a height of 20m. Calculate the potential energy lost
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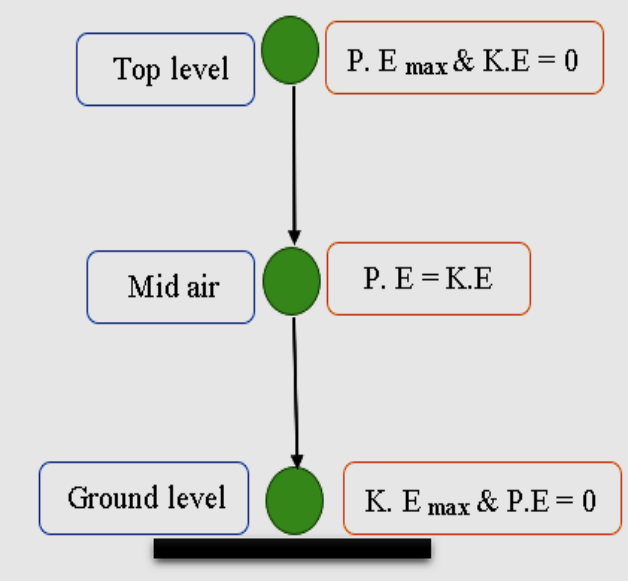
Relationship /Interchange between K.E and P.E

The transformation of energy between kinetic and potential energy can be seen in a body freely falling, a ball bouncing and can also be seen in a swinging pendulum.

Example and Illustration

- ✓ A mango on top of tree has maximum potential energy (P.E) because it is at maximum height. It has zero kinetic energy (K.E) because it is not moving
- ✓ When a mango starts to fall, its height above the ground level reduces so its potential energy also reduces since P. E=mgh. Its kinetic energy begins to increase because as the mango falls, its speed also increases.
- ✓ At midway its K. E=P.E
- ✓ Just As it is about to hit the ground its K.E is maximum because of maximum speed and P.E is zero because of zero height.



Therefore; **Gain in K. E = Loss in P. E.**

$$\frac{1}{2}mv^2 = mgh$$

The above illustration shows that energy is conserved. Mechanical energy is continually transformed between kinetic and potential energy

Calculations of P.E and K.E

1. A block of mass **2 kg** falls freely from rest through a distance of **3m.**

i) Find the K.E of the block. (Ans: =60J)

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ii) Potential energy (Ans: =60J)

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iii) The velocity with which the body hits the ground.

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2. A body of mass **5kg falls** freely through **3m**. Calculate the velocity with which it hits the ground.

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3. A stone of **150g** is dropped from a height of **80m**. Calculate the;

(i) Kinetic energy when it is 50m above the ground.

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(ii) Its velocity when its 50m above the ground.

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4. A **200g** body falls from a height of **0.2m**. Find the kinetic energy just before it hits the ground

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5. A ball has a mass of **5 kg** and is placed on the edge of a table **1 m** tall. What is its gravitational potential energy? If the ball is pushed over the edge what would the kinetic energy of the ball be **one-third** of the way to the ground?

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6. During working hours, every man would want to hire a highly efficient machine to complete a task at hand.
   a) Machine **A** performs **900 J** of work when supplied with **1000 J** of energy. Machine **B** performs **800 J** of work when supplied with **900 J** of energy.
   b) Which machine wastes less energy?
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   c) In part (a) above machine **A** performs the work in **one** hour and machine **B** performs working **45** minutes. Which machine gives the greater power output?
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   d) Why is it important to determine the efficiency of a machine?
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   e) Why is there no machine 100% efficient in the whole world?
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   f) How would you improve on the efficiency of a machine?
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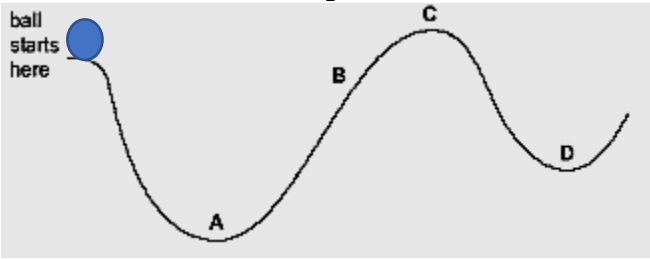
7. A ball is released from rest and rolls down a track from the position shown. What is the furthest position the ball could reach and why?



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Energy transformations and law of conservation of energy

It states that energy can neither be created nor destroyed but changes from one form to another

As energy is changed from one form or state to another, an energy converter (Device) is required to ease the conversion. Examples of such devices are shown in the table below.

The devices listed in second table carry out the energy transformations like

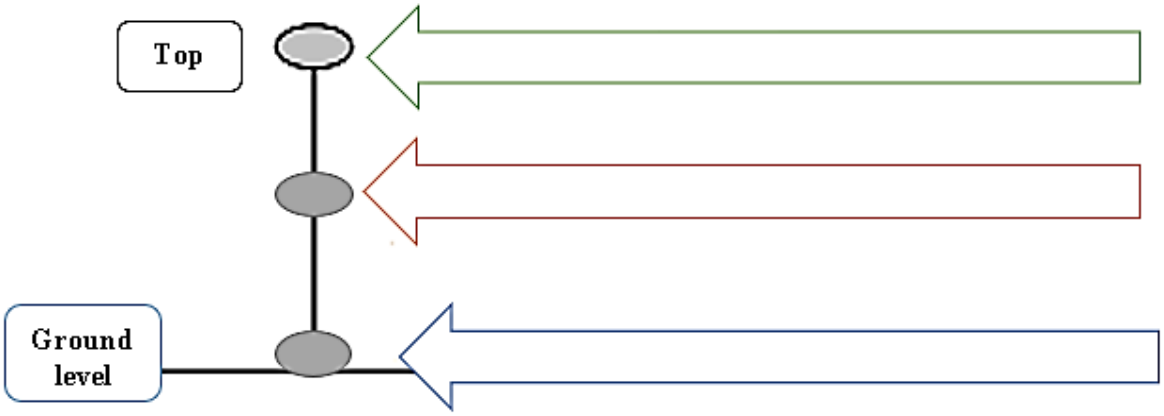
Chemical to electrical	Light to electrical	Electrical to light
Sound to electrical	Kinetic to electrical	Electrical to heat
Electrical to sound	Electrical to kinetic	Heat to electrical

In each case you are required to identify the energy changes that occurs in each device shown below. (Use the table above to aid you answer the table below

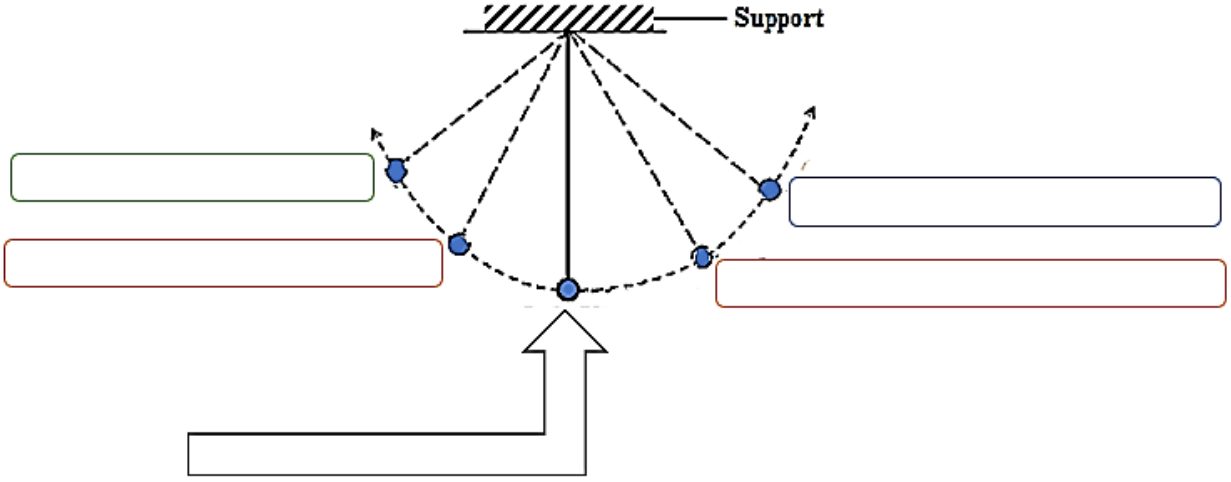
		
		
		

State the energy transformations for;

a) For a body falling freely.



b) For a freely swinging pendulum



c) When lighting a match box

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d) When a boy compresses the spring

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e) When lighting a lamp connected to a battery

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f) Catapult pulled by a person to propel a stone

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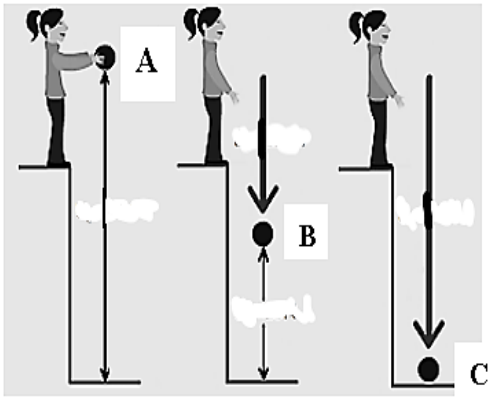
g) In the following diagram, suppose that the girl drops a ball with a mass of 2 kg from a height of 6 m.



State and explain the energy changes the ball goes through in positions;

A.....
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B.....
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C.....
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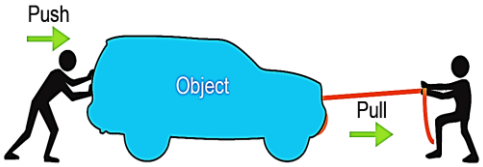
WORK



This is the product of force and distance moved in the direction of force.

OR work is done when the point of application of force moves in the direction of force. The SI unit of work is a **joule** (J).

A **joule** is the work done when a force of 1N moves a body through a distance of 1m in the direction of force.

$$workdone = force \times distance\ moved\ in\ the\ direction\ of\ force$$

If the body is projected vertically the force acting is the weight of the body
$Force = Weight = mg$

$workdone = F \times d$= mgd

Calculations of work done

1. An object is pulled through a distance of **2 m** by a force of **55 N** on the first day. The same object is again pulled through a distance of **20 cm** by a force of **1500 N** on the second day. Calculate the work done on;
   (i) First day
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   (ii) Second day
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(iii) On which day was much work done? And why do you think so?

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(iv) Explain the factors that determine the amount of work done on any given day from the results obtained above

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2. Sometimes work is not done even if there is an applied force. Describe some situations when this is so.

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3. A crane is used to raise **20 tonnes** of concrete to the top floor of a building **30m** high. Calculate the total work done by the crane.

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4. A man of mass **70 kg** runs up a staircase of **20 stairs**, each of vertical height **50 cm**. Find the work done against gravity.

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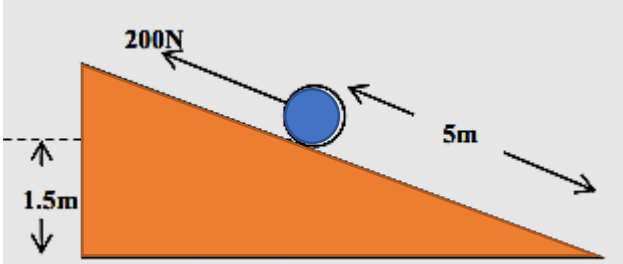
5. The figure bellow shows a **50kg** bale of hay being pulled up an inclined plane with a force of **200N.**



(i) Calculate the work done by the force If the bale moves **down** the incline a distance of **5m**.

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(ii) If the bale moves **up** the incline a distance of **5m**, Calculate the work done by the force

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(iii) Explain your answer.

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POWER

Power is the rate of doing work. Or

Power is the rate of transfer of energy.

Note: Work done is the same as energy transferred

$$power = \frac{work\ done}{time\ taken} = \frac{force \times distance}{time\ taken} = \frac{energy\ transfered}{time\ taken}$$

$$power = force \times \frac{distance}{time} = force \times velocity = F.V$$

The S.I unit of power is **watt** (W).

Other units of power include

kilowatt (kW) and megawatt (MW).

1kW = 1,000W

1MW = 1,000,000W

$1W=1Js^{-1}$ where Js^{-1} stands for joule per second

A **watt** is the rate of transfer of energy of one joule per

Or it is the rate of doing work of 1joule in one second.

Calculations of power

1. An engine raises **20kg** of water through a height of **50m** in **10** seconds. Calculate the power of the engine.

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2. An electric bulb is rated **100W**. How much electrical energy does the bulb consume in **2hours.**

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3. A man uses an electric motor whose power output is **3000W** for **1hour**. If the motor consumes **1.44×10^7 J** of electricity in that time, find the efficiency of the motor.
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4. What is the power of the crane which can lift a box of mass **1000kg** vertically through a height of **15m** in **40** seconds?
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5. A boy whose mass is **60kg** can run up a flight of **28 steps** each **25 cm** high in **56 seconds**. Calculate the power developed by the boy.
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6. A pump raises **100kg** of water through a height of **30m** in **10s**. What is the power developed by the pump
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7. A **50kg** girl runs up a staircase of **50 steps** each step is **15cm** in height in **5s**. Find
   i. Work done against gravity by the girl
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   ii. Power, she used to run
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8. How much power is required to accelerate a **1000kg** car from rest to **26.7m/s** in **8s**?
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9. A crane lifts **4** bricks per **minute** through a height of **150cm**. Find the power that is expended if each brick weighs **100N.**

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MACHINES





A machine is a device on which a force applied at one point, is used to overcome a force at another point. **OR**

A machine is a device, which simplifies works by magnifying the effort.

Principle of machines:

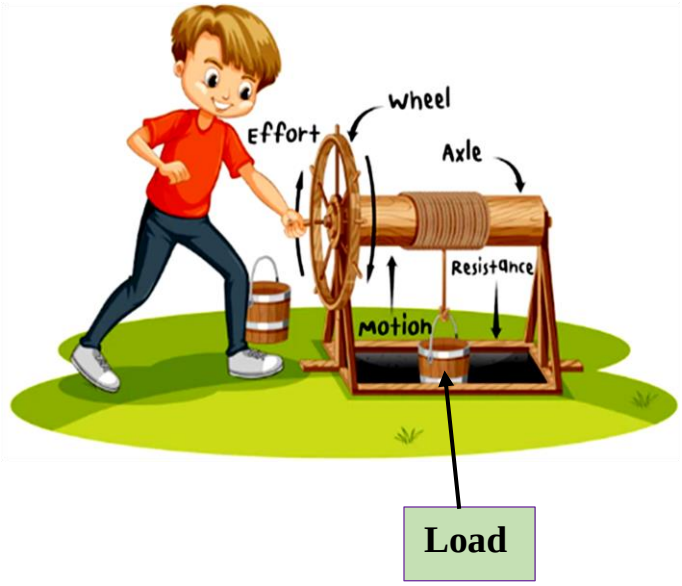
It states that a small force (effort) moves over a large distance to produce a bigger force that moves the load over a small distance.

Terms used in simple machines

The table below represents terms commonly used in machines and their meanings. Match the term used to its respective meaning

Term	Meaning
Machine	This is the ratio of the load to the effort.
Effort	*It is defined as the ratio of the distance moved by the effort to the distance moved by the load in the same time*
Load	This is the ratio of the useful work output to the work input expressed as a percentage.
Mechanical advantage	*is a device on which a force applied at one point, is used to overcome a force at another point*
Velocity ratio	Is the force applied at one point of a machine to overcome the load.
Efficiency	*Is the force, which is overcome by the machine using the effort.*

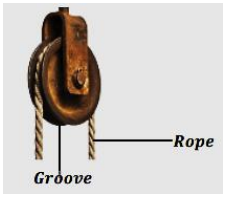
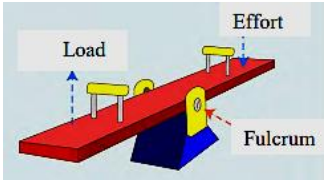
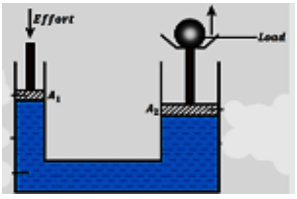
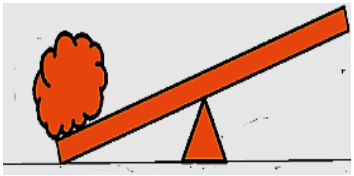
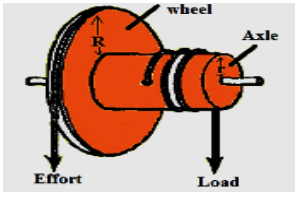
Formulars used



- ✓ **Work in put = Effort × Effort distance**
- ✓ **Work out put = Load × Load distance**
- ✓ $Efficiency = \frac{work\ out\ put}{work\ in\ put} \times 100\%$
- ✓ $Mechanical\ advantage\ (M.A) = \frac{Load}{Effort}$
- ✓ $velocity\ ratio\ (V.R) = \frac{distance\ moved\ by\ effort}{distance\ moved\ by\ load}$
- ✓ $Efficiency = \frac{M.A}{V.R} \times 100\%$

Types of simple machines

The figure below shows the commonly used simple machines. Identify, write the name and use of each machine shown below.

		
Name	Name	Name
use	Use	Use
		
Name	Name	Name
Use	Use	Use
		
Name	Name	Name
use	Use	Use

Levers

A lever is a rigid body is free to turn about a fixed point. The fixed point at which the lever turns is called the pivot or fulcrum

Classes of levers and examples

There are three classes of levers namely;

- First class lever.
- Second class lever.
- Third class lever

1st class	2nd class	3rd class
Pivot is between load and effort	Load is between pivot and effort	Effort is between load and pivot

1. What is the difference between 1st class, 2nd class and 3rd class levers
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2. Using a well labeled diagram draw an illustration of a lever

3. From your illustration above explain briefly the meaning of a simple machine called lever
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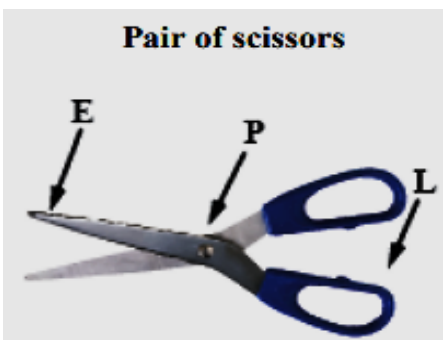
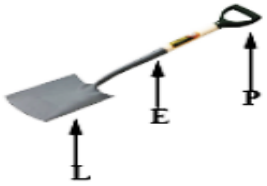
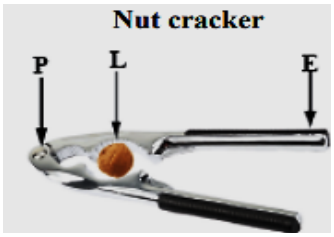
4. The table below contains real life images of machines that fall under levers. Where **P**, **L**, and **E** represent points of application of pivot, load and effort respectively. You are required to classify the levers according to their respective classes, 1st, 2nd, and 3rd.



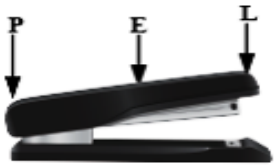
Spade



Nut cracker

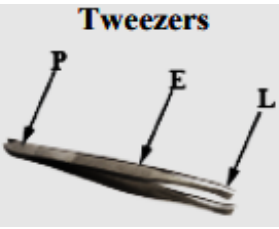


Stapling machine



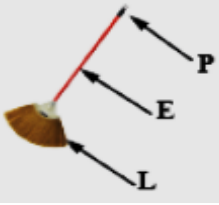
Claw hammer

Tweezers

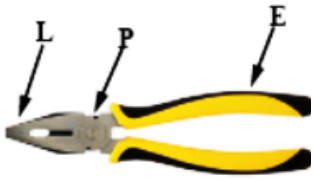


Bottle opener

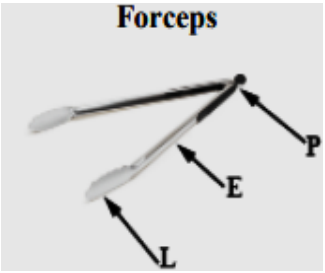
Broom

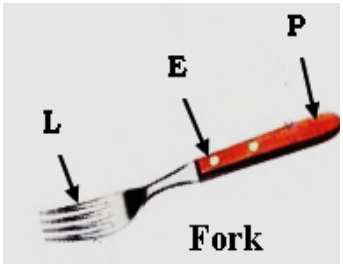


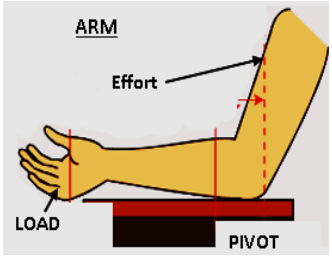
Pair of pliers

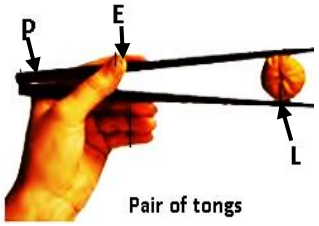


Forceps

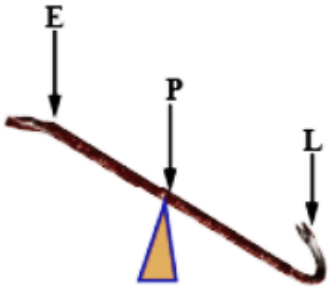


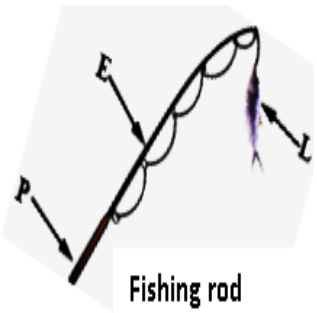




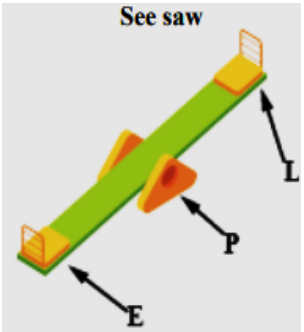


Crow bar



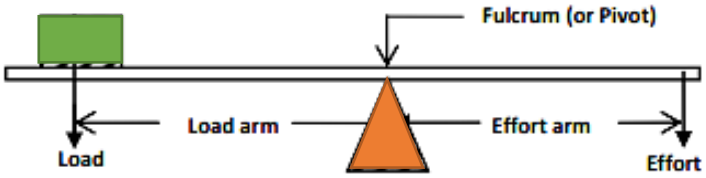


See saw



NOTE:

- Load arm is the distance of the load from pivot.
- Effort arm is the distance of effort from pivot.



- $\mathbf{M.A = V.R = \frac{Load}{Effort} = \frac{Effort\ arm}{Load\ arm}}$
- Hence, a lever system is more efficient compared to other machines.

5. A lever was used to overcome a load of **500N** by applying an effort of **100N**. Find the **M.A** of the lever

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6. A lever is used to overcome a load of 2000N. If the M.A 2. Calculate the effort applied

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7. A machine of V.R 5 is used to raise load of weight 200N using an effort of 50N;

   a) Calculate the M.A
   b) The efficiency of the machine

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8. A machine which is **75%** efficient uses an effort of **100N** to lift a load of **300N**. Find the velocity ratio of the machine

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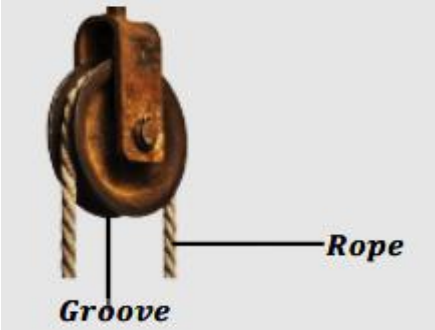
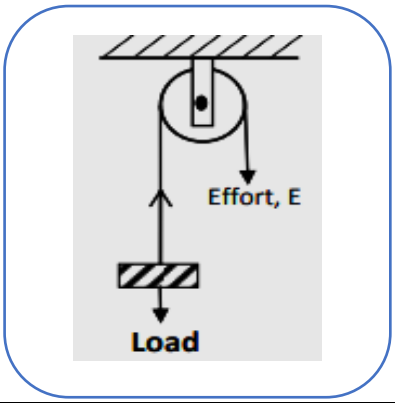
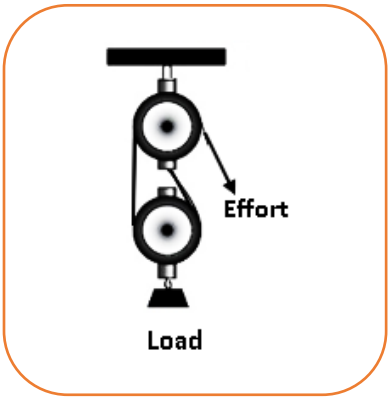
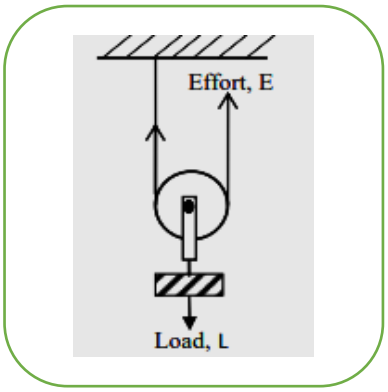
Pulleys



A Pulley is a wheel with a grooved rim on which a rope passes. There are three types of pulley systems and these are;

(i) Single fixed pulley
(ii) Single movable pulley
(iii) Block and tackle pulley

1. You are provided with three types of below shown in the figure below. You are required to **name** each type of pulley shown below.

b) Which of the three pulley types shown do you think is the most efficient for;
(i) Raising a flag……
(ii) For raising heavy loads in lifts……
(iii) For Lifting building materials during construction……
(iv) For raising heavy loads in cranes……...
(v) For lifting wrecked vehicles off the road using breakdown vehicles.
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c) For a single fixed pulley $\mathbf{M.A} = \frac{\mathbf{Load}}{\mathbf{Effort}} = \mathbf{1} \quad since \ \ load = effort$

$$\mathbf{V.R} = \frac{\text{effort distance}}{\text{load distance}} = 1 \quad \text{because load distance} = \text{effort distance}$$

However, in practice the mechanical advantage and Velocity ratio of a single fixed pulley is less than one. State any two reasons why.
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d) Explain why a construction worker would prefer to use block and tackle pulley while lifting blocks on the fifth floor of the building?

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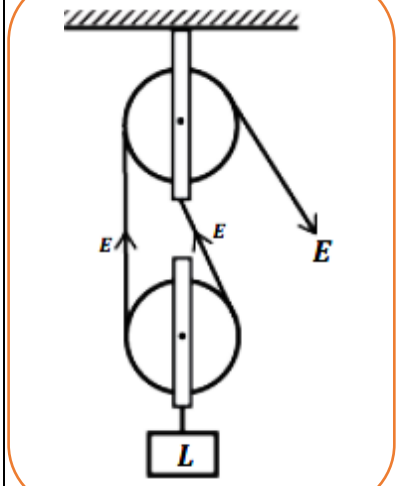
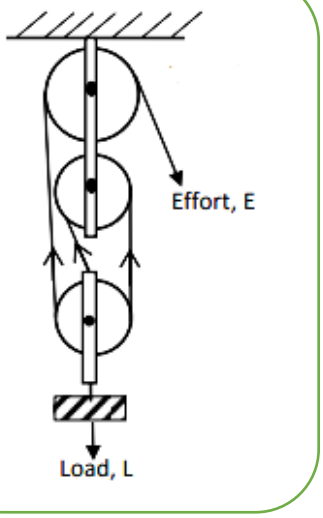
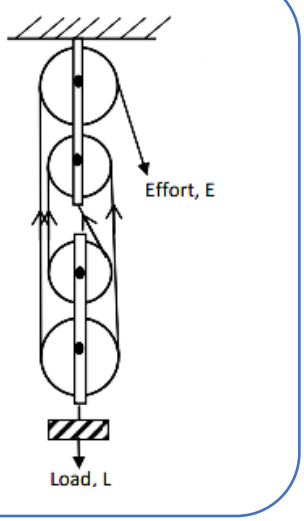
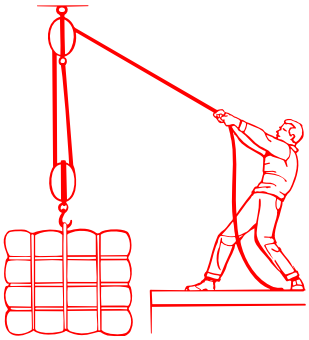
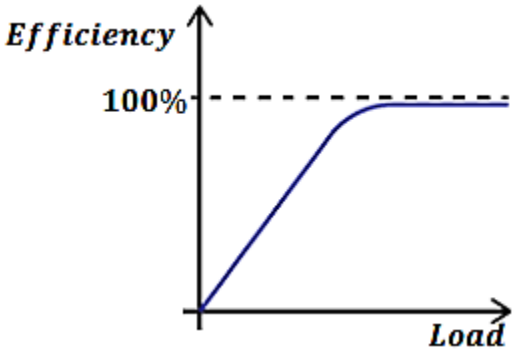
2. The table below shows some examples of block and tackle pulley systems and their respective velocity ratio, (V.R), Effort (E), and Load (L). **COMPLETE** the table below.

V.R=2	V.R=3	V.R=4
		
V.R=5	**V.R=6**	**V.R=7**

3. Below are some applications of pulley systems in your community. Identify and State any four real life common applications of pulleys in your community

4. In an experiment to show the variation of mechanical advantage or efficiency of pulley system with the load the graph shown below is plotted



a) Explain the shape of the graph

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b) State the reasons why the efficiency of a pulley system is always less than 100%

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5. In a construction site, an effort of **50N** is required to raise a load of **200N** using a pulley system of velocity ratio **5**.

a) Draw a diagram to show the pulley system.

b) Find the efficiency of the system.

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b) Calculate the work wasted when the load is raised through **120cm**.

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c) Give two reasons why the efficiency of the above pulley is less than 100%.

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d) State three ways how you can possibly increase on the efficiency of the above pulley system?

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6. An effort of **125N** is used to lift a load of **500N** through a height of **2.5m** using a pulley system. If the distance moved by the effort is **15m**, calculate;
   a) the work done on the load.
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   ……
   b) the work done by the effort.
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   c) Efficiency of the pulley system.
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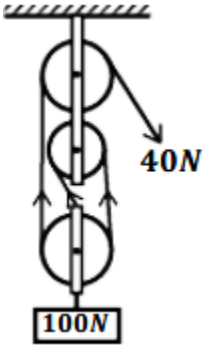
7. The effort required to raise a load of **100N** is **40N** as shown below.



Calculate;

a) Mechanical advantage.

b) Efficiency

*c) Work done on the load if it is raised through a distance of **6m**.*

8. A block and tackle pulley system with a velocity ratio of **5** and **60**% efficiency is used to a lift blocks of mass **60kg** through a vertical height of **2m** in a certain construction site in jinja municipality. What effort must be exerted?
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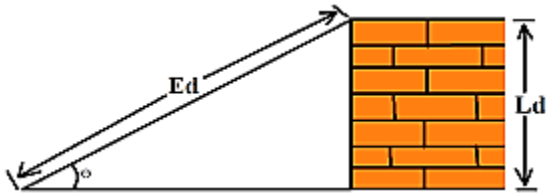
Inclined plane

An inclined plane is a smooth flat rigid surface slanted at an angle to the horizontal. Also, it's called **ramp**

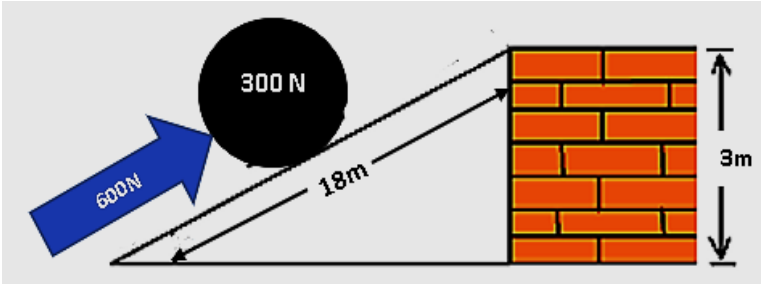


Where;

- Distance moved by load= vertical height =**Ld**
- Distance moved by Effort =slanted height=**Ed**

$$\text{M.A} = \frac{\text{LOAD}}{\text{EFFORT}} = \frac{\text{L}}{\text{E}} \qquad \text{V.R} = \frac{\text{EFFORT DISTANCE}}{\text{LOAD DISTANCE}} = \frac{\text{Ed}}{\text{Ld}}$$

1. A force of **600 N** is used to move a load of **3000 N** up an inclined plane. Given that the slanted height and vertical height of the plane are **18 m** and **3m** respectively.
   Find
   a) Velocity ratio of the plane
   b) Mechanical advantage
   c) Efficiency of the plane



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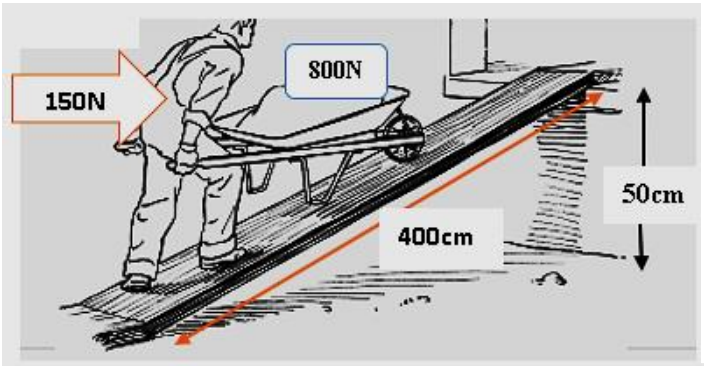
2. A loaded wheelbarrow weighting **800 N** is pushed up an inclined plane by a force of **150 N** parallel to the plane, if the plane rises **50 cm** for every **400 cm** length of the plane. Find the velocity ratio, mechanical advantage and efficiency



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3. Identify and name any four places where inclined planes are commonly used in real life
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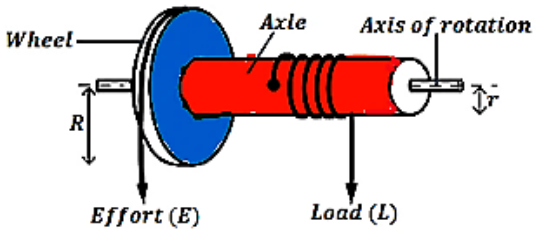
Wheel and axle

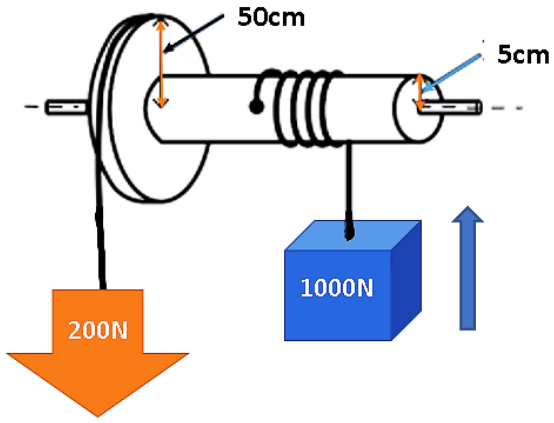


It consists of two wheels of different radii on the same axis.

The effort is applied to the wheel and a string attached to the axle raises the load

$$\mathbf{V.R} = \frac{\textbf{effort distance}}{\textbf{load distance}} = \frac{\mathbf{2\pi R}}{\mathbf{2\pi r}} = \frac{\mathbf{R}}{\mathbf{r}} = \frac{\textbf{Radius of the wheel}}{\textbf{Radius of the axle}}$$

1. The figure below shows a wheel land axle system, which uses an effort of **200N** to raise a load of **1000N** using an axle of radius **5cm** and a wheel of radius **50cm**.
Calculate the;
(i) velocity ratio
(ii) Efficiency of the system



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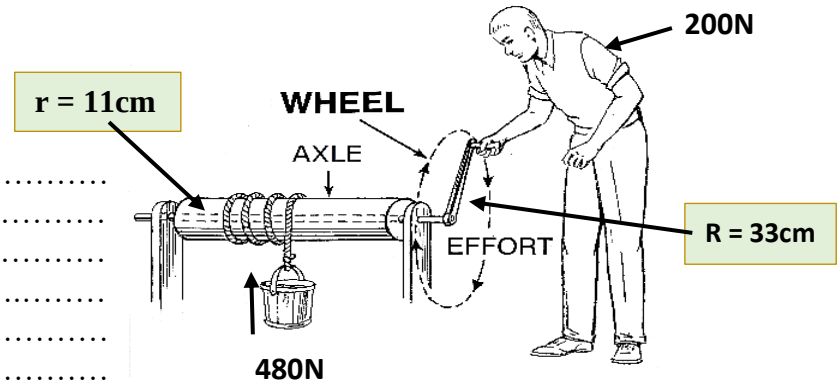
2. A common windlass is used to raise a load of **480N** by an application of an effort **200N** at right angles to the handle. If the handle has a radius of **33cm** from the axis and the radius of the axle is **11cm**,
   calculate;
   (i) Velocity ratio.
   (ii) Efficiency of the windlass.



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3. State any three common applications of a wheel and axle machine
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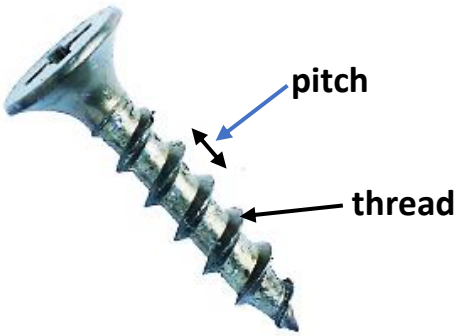
Screws

A screw is a nail or bolt with threadlike windings. It is like a spiral stair case. The screw is used for the purpose of holding things together.



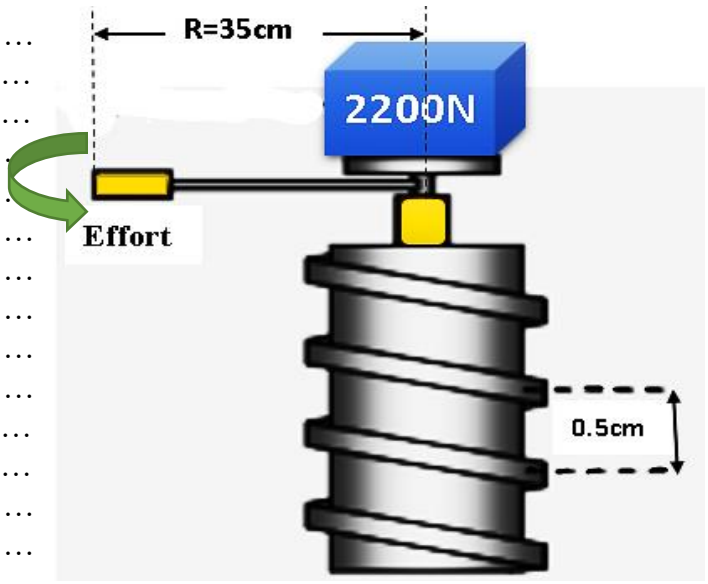
Pitch: This is the distance between any two successive threads of a screw.

NOTE

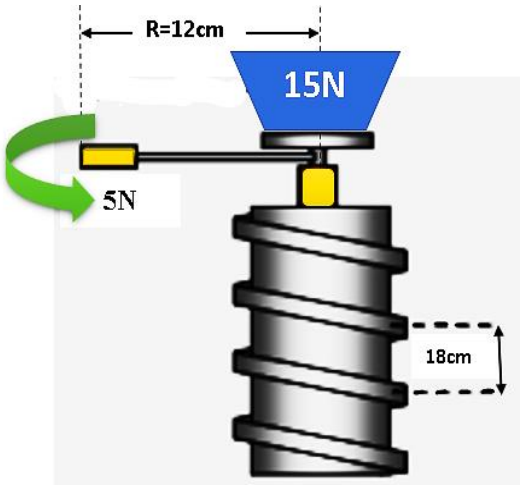
In order to use a screw, a screw driver or brace or screw jack is used to drive screws in and out of the material.

$$\mathbf{V.R} = \frac{\textbf{Effort distance}}{\textbf{Load distance}} = \frac{\textbf{circumference of the handle}}{\textbf{pitch}} = \frac{2\pi R}{\textbf{pitch}}$$

1. The handle of the screw jack is **35 cm** long and the pitch of the screw is **0.5 cm**. what force must be applied to the end of the handle when lifting a load of **2200 N**, when efficiency of the jack is **40%.**



2. The handle of a screw jack is **12cm** long. The screw jack is used to drive a screw of pitch **18cm**. if an effort of **5N** is applied on the jack to move a screw of **15N**,
   Calculate;
   (i) Velocity ratio.
   (ii) Mechanical advantage.
   (iii) Efficiency



3. Identify and name any three real life applications of the knowledge of screws.
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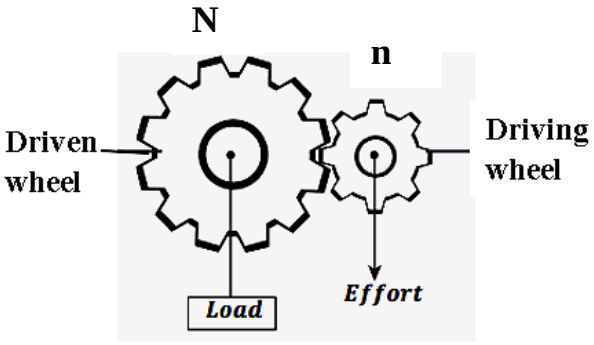
Gear systems

A gear is a device consisting of a set of **toothed wheels** that control the movement (speed) of a machine.

- If the effort is applied on a small gear, it drives a large gear which has a load attached on it.
- A large **V.R** is obtained only when the **effort** is applied on a **small gear** so that it drives the large gear.



$$\mathbf{V.R} = \frac{\textbf{Number of teeth in driven wheel}}{\textbf{Number of teeth in driving wheel}} = \frac{\mathbf{N}}{\mathbf{n}}$$

1. In a gear system, the number of teeth on the driving wheel is **10** and the teeth on the driven wheel are **40**. If the system is able to lift a load of **300N** with an effort of **100N**.
   Find;
   (i) V.R ……
   (ii) M.A ……
   (iii) Efficiency ……
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2. A bicycle has a chain wheel with **32** teeth, and the driven wheel has **80** teeth. If the efficiency is **88%,**
   find the;
   (i) Velocity ratio.
   (ii) Mechanical advantage.

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3. Identify any four machines where gears are commonly applied in your community.
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4. Briefly explain what would happen to the speed of the racing bicycle when;
   (i) The number of teeth on the chain of the driven wheel is increased
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   (ii) The number of teeth on the chain of the driving wheel is increased
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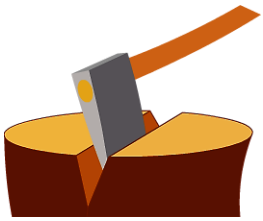
Wedges



Is a machine that is sharp on one end and blunt on the opposite end. a wedge is often attached to a handle to make it easier to use.

1. Briefly explain why a sharp axe is easier to use to chop wood compared to a blunt one.
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2. Peter used an axe with a long handle to chop firewood whereas Mohammed opted for a short handle axe instead.
   (i) Which of the two people used the best understanding of simple machines?.....
   (ii) Briefly explain your answer in 2(i) above
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3. Name any other three examples of wedges commonly used in your community besides an axe
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ACTIVITY OF INTEGRATION

SCENARIO

In the last decade oil and gas deposits were discovered in the Albertine region in western Uganda. The Ugandan government together the French company TOTAL energy signed a contract for the oil drilling and processing

However, during the world climate summit held this year in Egypt, the European union were against Uganda's plan to exploit the oil reserves. They believed that all new oil drilling should be stopped for the purposes of environmental preservation. They also claim the world should stop using fossil fuels and resort to cleaner energy sources which don't harm the environment. This proposal irritated the government of Uganda to the extent that the president said that if TOTAL energy company doesn't work with them then they will find someone else to work with and achieve their objective by 2025

SUPPORT MATERIAL

TASK

a) As a physics student discuss what form of energy is oil and gas are and what are the benefits this mineral can bring to Uganda's economy?

b) What dangers does this discovery pose to our natural environment

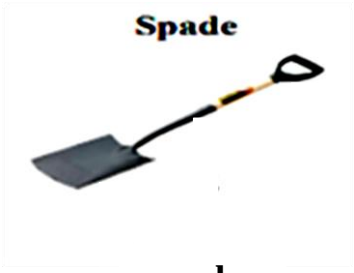
c) What possible solutions would you recommend the oil drilling company to enforce to preserve and protect the regional natural environment like water bodies, air, land, and vegetation

ACTIVITY OF INTEGRATION

SCENARIO

One day Ainebyona happen to have no transport fare to go home but as he was walking along the highway, a truck driver who happens to be a good Samaritan stopped and offered him a lift. Ainebyona was so happy, however the happiness was short lived when they reached a point where rain had damaged the road creating a small raise on the road surface that the vehicle engine was not powerful enough to climb. They stopped for a moment and wondered how they were going to solve this problem. On their truck were strong long pieces of wood, a spade and hard-core stones.

SUPPORT MATERIAL



wood

stones

TASK

As you passed by you found them still struggling to pass over the raised road surface, explain to them what simple machine they need to design to help them solve this problem. (Include the steps taken to make the machine and how the machine works. Include a well labelled illustration)

ACTIVITY OF INTEGRATION

SCENARIO

In the last decade oil and gas deposits were discovered in the Albertine region in western Uganda. The Ugandan government together the French company TOTAL energy signed a contract for the oil drilling and processing

However, during the world climate summit held this year in Egypt, the European union were against Uganda's plan to exploit the oil reserves. They believed that all new oil drilling should be stopped for the purposes of environmental preservation. They also claim the world should stop using fossil fuels and resort to cleaner energy sources which don't harm the environment. Though oil and gas are the main factors contributing to environmental degradation, there are also other sources of energy which can cause long term harm to our environment.

SUPPORT MATERIAL

TASK

As a physics student, write a short, brief and clear proposal to the international body of environmental protection on the best possible energy sources you think will help the world heal from human encroachment and greed.

Before you conclude your proposal also briefly explain the energy sources that you feel should be phased out or banned for the better future of our planet.

ACTIVITY OF INTEGRATION

SCENARIO

This year just like it has happened in the past, Karamoja region suffered from hunger as a result of prolonged sunny season which hindered crop production in Uganda overall. This time round many people lost their lives due to the hunger and poverty in this semi desert region of Uganda. This prolonged sunny season has also contributed to increased prices of food stuff most especially matooke and posho flour which has become a big problem to many schools which mainly rely on posho as the main food served in Ugandan schools.

We may pray to God and curse the sun but we should also remember that Uganda is still blessed with the largest lake in Africa, the longest river in the world and many other water bodies. The question that bothers me is whether we should still keep on blaming the sun's energy as the cause of problems or we should embrace new better ways of solving existing problem with the available solutions at hand.

SUPPORT MATERIAL

TASK

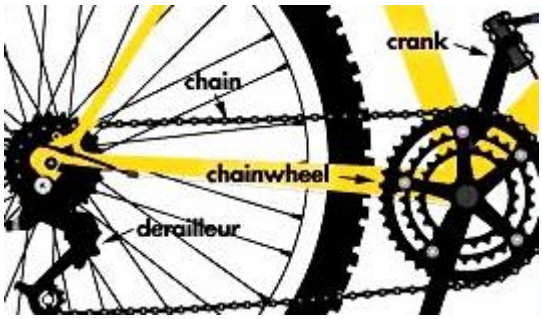
As a concerned, patriotic Ugandan, write a proposal to the ministry of disaster preparedness of Uganda on how best we can solve this problem of prolonged drought using the available resources Uganda is blessed with, including the sun's energy itself as part of this solution.

ACTIVITY OF INTEGRATION

SCENARIO

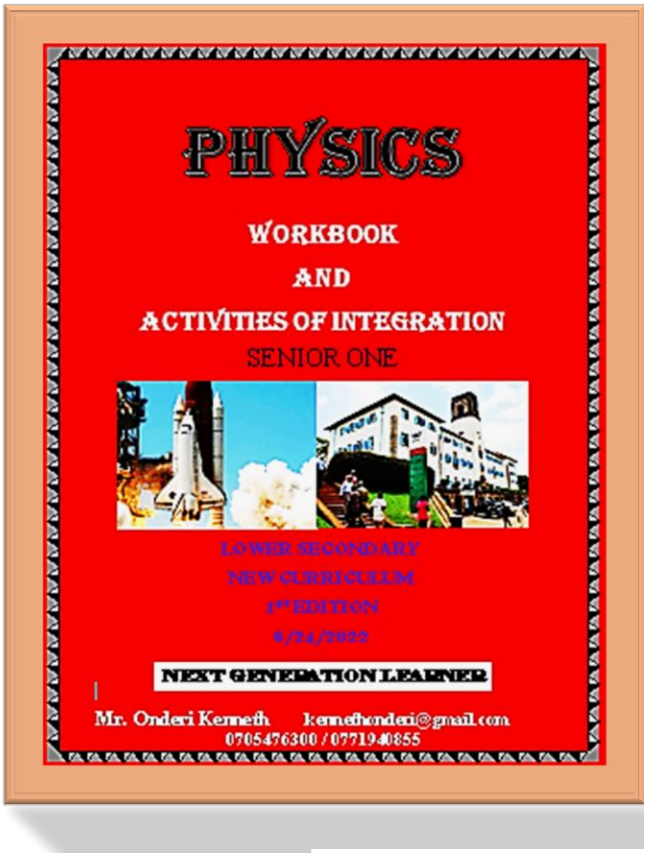
Bicycles have been used in Uganda over the years for activities such as transportation, physical exercise, leisure and cross-country games. Bicycle cross-country racing is a common game in Uganda and the world overall. The games are not only for fun but it is also a money-making business across the world. The winners always go home with not just a trophy but money as well.to win in these cycling races the best made and serviced bicycles always determines the winners besides other factors at play. This year your friend is going to participate in the race and he needs your help to help to win the race.

SUPPORT MATERIAL



TASK

a) Using knowledge of simple machines explain the scientific facts about how a bicycle operates and name some parts of the bicycle that can determine the efficiency of the bicycle.
b) Explain the adjustments you need to make on his bicycle in order to increase on his chances of winning the competition.
c) What other recommendations would you offer to your friend to enable him win the racing competition?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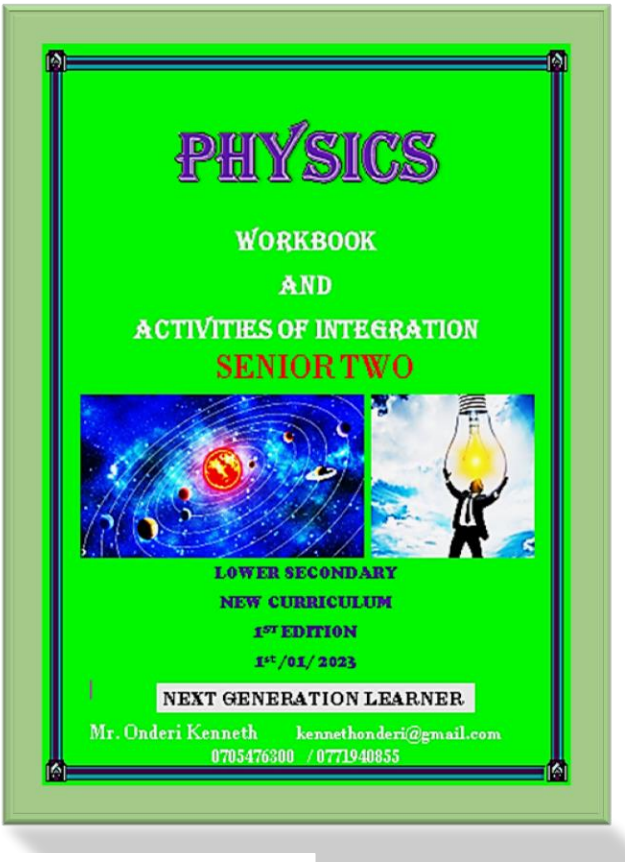
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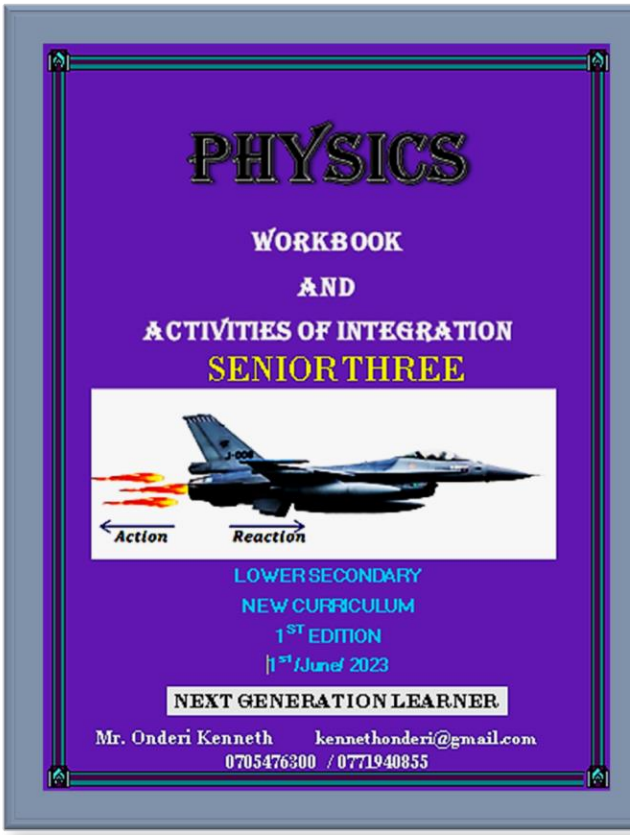
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- For full version of the book contact the Author to get book 1,2 and 3
- This book will ease your work as a teacher following competence-based curriculum.
- This will ease the student's work since all types of questions have been included which require knowledge application and research where necessary
- The questions have been made as simple as possible to enable students easily understand (very many examples, pictures and illustrations)
- The various Activities of integration have also been included at the end of each topic to enable students apply the knowledge attained from the already learnt topic.
- The worksheet is to help students practice as many questions as possible. The space provided is just enough for each question asked.
- The books provide a brief introduction, short answer questions in the right sequence as it is recommended by other text books available in the market.

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