THE NEW LOWER SECONDARY SCHOOL CURRICULUM

S.1 PHYSICS LEARNER'S WORK BOOK

First edition

TOPIC 1: INTRODUCTION TO PHYSICS

Competency: The learner should be able to understand the importance of physics and safe laboratory practice.

LEARNING OUTCOMES

(a) Understand the meaning of physics, its branches and why it is important to study physics.

(b) Understand why it is important to follow the laboratory rules and regulations.






Activity 1

Physics as one of the science subjects comes from the general science that was covered in primary. In your group, research and discuss the meaning of physics, matter, energy, importance of physics and branches of physics;

(i) Meaning of physics

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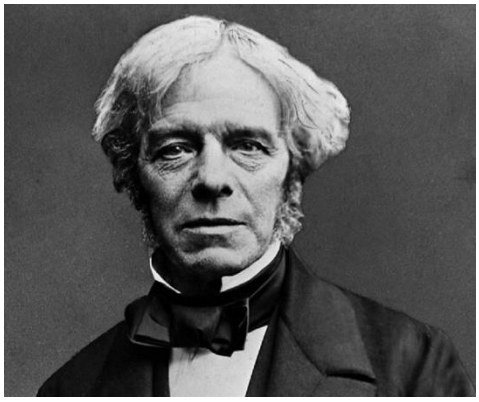
(ii) Michael Faraday



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(iii) Isaac Newton

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Activity 3

Many people in the world today are using the knowledge of physics in their careers. In pairs, identify careers after studying physics in the figures below and discuss more careers.

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SAMPLE ACTIVITY OF INTEGRATION

TOPIC: INTRODUCTION TO PHYSICS

Competency: The learner should be able to understand the importance of physics and safe laboratory practice.

Scenario

You have been elected as the chairperson physics club in your school.

The S.I class is about to report for first term. Many of the students have never heard about a physics laboratory.

Support

Task

Prepare a document about the laboratory for the new S.I students.

(iii) Breadth of a glass block

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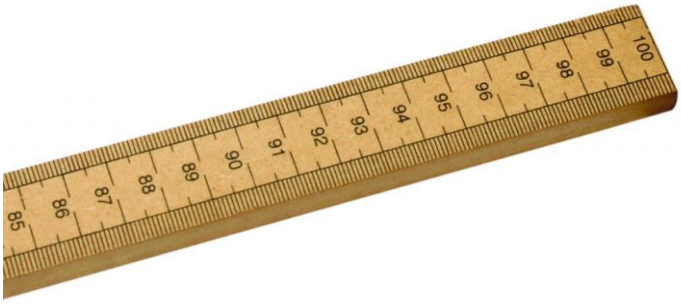
(iv) Thickness of a metre rule



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(v) Diameter of a bicycle spoke

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(ii) Choose the appropriate instrument, measure and report width of a football pitch and length of your class room.

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(iii) Estimate the length of this book and hence use appropriate instrument to measure it.

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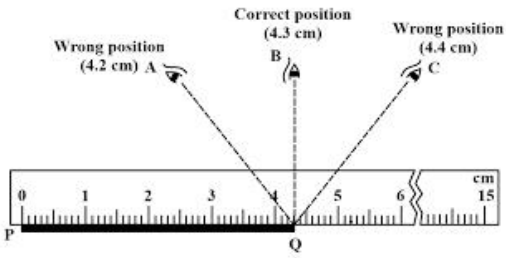
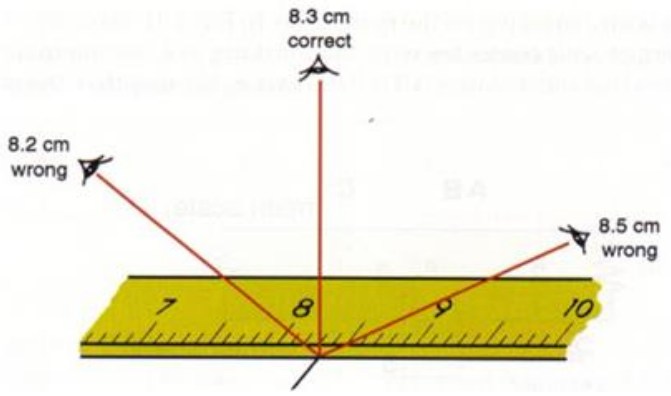
Activity 3





In measurements, different errors are always made. In your group, discuss and report the;

(i) general errors in measurements

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(ii) Parallax error in measuring length when reading values from a metre rule and how to minimise it.

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(v) You have been provided with a leaf. In your group, discuss how you can measure its area.

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In your group, estimate the area occupied by objects in the following diagrams

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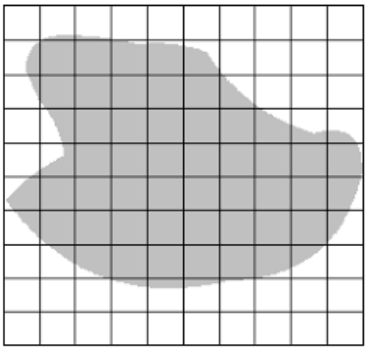
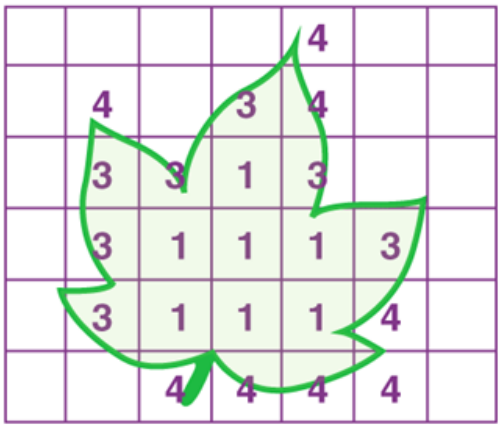
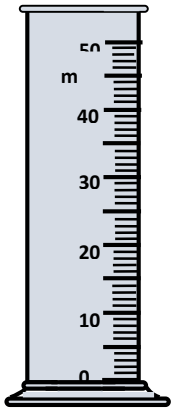


B



MEASUREMENT AND ESTIMATION OF VOLUME



Activity 4

In pairs, discuss the meaning of volume, units of volume, S.I unit of volume and instruments used to measure volume of liquids.

(i) Meaning of volume,

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(ii) Units of volume,

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(iii) S.I unit of volume,

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(iv) In your village, people measure the volume of liquids using only a jerry can. In your group discuss about which Instruments are used to measure volume of liquids.

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(iii) 3 identical cylindrical vessels of diameter 42 cm and length 200 cm.

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MEASUREMENT AND ESTMATION OF TIME

Activity 7

Many teachers have been heard saying that time is money. In pairs, research and discuss the meaning of time, the units of time, S.I unit of time and instruments in physics lab that can be used to measure time.

(i) Meaning of time

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Rules for data manipulation

(a) Addition and subtraction.

When adding or subtracting two or more variables, decimal places are counted and the answer is recorded to the least number of decimal places. Maintain the least number of decimal places for example

In your group, work out the following

(i) 3.012 + 0.11 = ...

(ii) 2.12 - 0.6 = ...

(iii) 10.5 – 9.384+ 2.32 = ...

(b) Multiplication and division

When two or more quantities are multiplied or divided, significant figures of each variable are counted and the final answer is recorded to the least number of significant figures. Maintain the least number of significant figures

In your group, work out the following

(i) $2.38 \times 1.9 =$ .....

(ii) $1.896 \times 1.98 =$.....

(iii) $\frac{4.987}{3.46} =$ .....

(iv) $\frac{5.9 \times 0.96}{3.124} =$ .....

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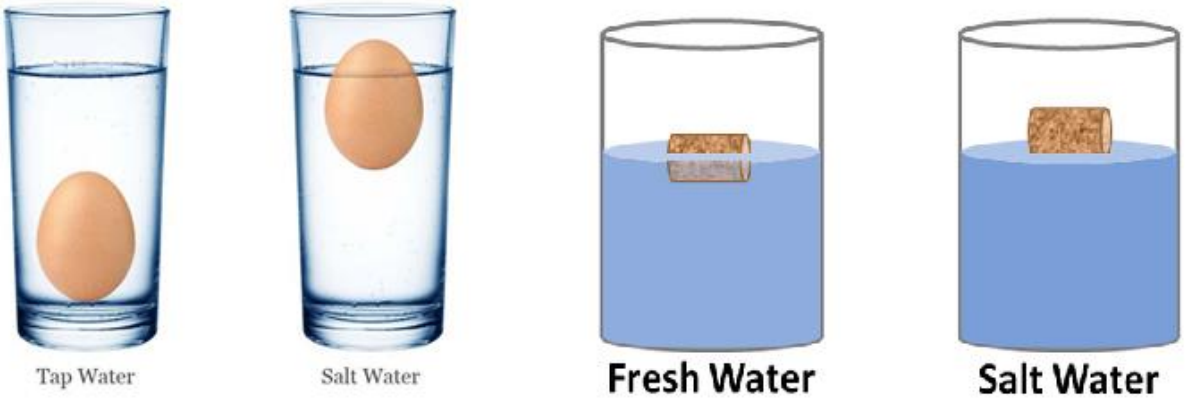
Activity 18

In your group,

(i) Discuss why an object can sink in flesh water but floats in sea water.



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(ii) Carryout an investigation and discuss the effect of salinity on density of water in the sea.

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(iii) What happens when the smoke cell is placed on ice blocks

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(iv) What happens the temperature of the smoke cell is increased

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DIFFUSION

Activity 6

One student uses a body spray (perfume) that has a great scent that disorganises the class and some students are wondering how it spreads to the entire class yet she sits in the behind corner. In your group research and

(a) discuss;

(i) the meaning of diffusion

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TOPIC 4: EFFECTS OF FORCES

Competency: The learner should be able to explore the nature and types of force and describe how forces move or change the shape of objects, and understand some common applications of forces.

LEARNING OUTCOMES

(a) Know that a force is a push or pull and that the unit of force is the newton
(b) Know the effects of balanced and balanced forces on objects.
(c) Understand the existence of the force of gravity and distinguish between mass and weight.
(d) Appreciate that the weight of a body depends on the size of the force of gravity acting upon it.
(e) Understand the concept of friction in everyday life contexts.
(f) Understand the meaning of adhesion and cohesion as molecular forces.
(g) Explain surface tension and capillarity in terms of cohesion and adhesion and other application.

Activity 1

In pairs, research, discuss;

(i) And explain the meaning of force.

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(ii) Why acceleration due to gravity varies from place to place on earth

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(iii) Why astronauts are heavier on earth than on the moon.

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(iv) Applications of force of gravity in everyday life.

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(v) Differences between mass and weight.

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TOPIC 5: TEMPERATURE MEASUREMENTS

Competency: Appreciate the temperature change is a result of heat effects in the body and that daily temperature changes have an effect on our lives.

LEARNING OUT COMES

(a) Understand the difference between heat and temperature
(b) Understand how temperature scales are established.
(c) Calibrate a thermometer and use it to measure temperature.
(d) Compare the qualities of thermometric liquid.
(e) Describe the causes and effects of the daily variations in atmospheric temperature.



Activity 1

In pairs, research and discuss

(i) the difference between heat and temperature

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(ii) the effect of heat on substances

of sick students. The nurse first measures the temperature of sick students before treating them. Unfortunately, this only thermometer she has breaks yet she has to first wait for the head teacher who is out of the country and he is to return in two weeks. She is confused. Now that you are the President Physics club, save the school and make an improvised thermometer which the nurse can use as she waits for the Head teacher's return.

In the Physics Laboratory there are many thermometers but their calibrations faded because of time.

The school has canteens where pure ice can be got from and the Physics laboratory has Bunsen burners where heating can be done.

Bunsen burner

TASK: Now that you are the President Physics club, prepare a document showing how you would save the school and make an improvised thermometer which the nurse can use as she waits for the Head teacher's return.

TOPIC 5: HEAT TRANSFER

Competency: The learner should be able to explain the modes of heat transfer and their applications to daily life.

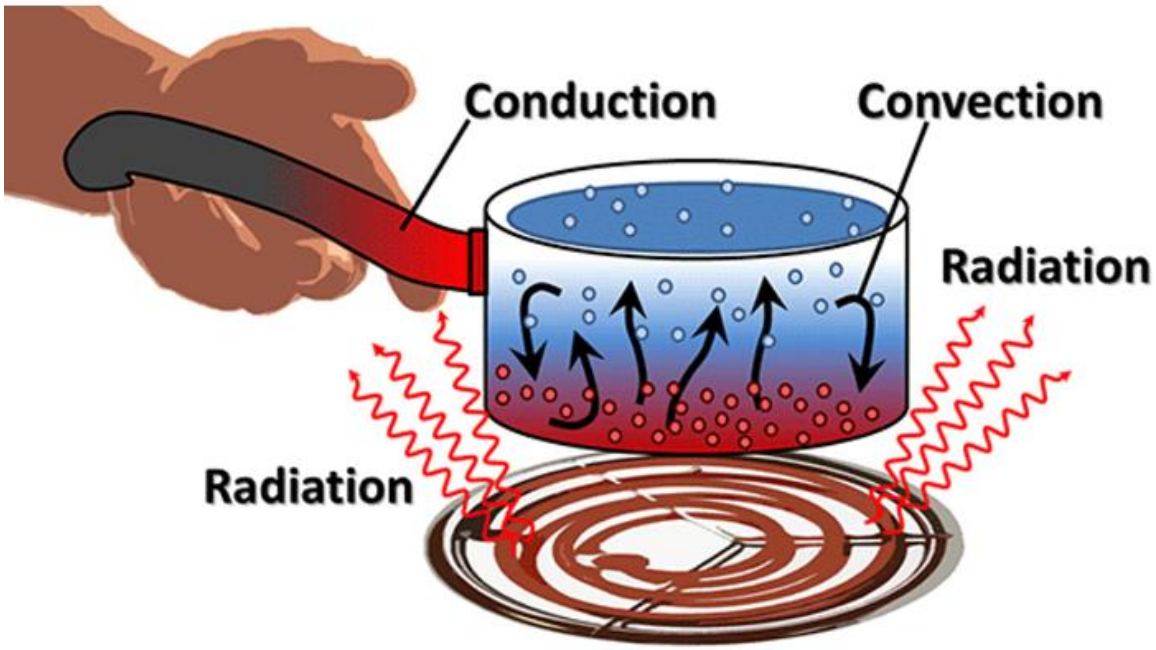
LEARNING OUTCOMES

The learner should be able to:

(a) Understand how heat energy is transferred and the rate at which transferred and the rate at which transfer takes place.

(b) Understand what is happening a particle level when conduction, convection, and radiation take place and their application.

(c) Understand that greenhouse effect and global warming area aspects related to heat transfer on the earth surface.



CONVECTION

Self-check

In which states of matter does convection occur?

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What do you understand by convection currents?

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Activity 5

Namata and Namazzi who are both in p.6 have an argument about convection. Namata is says that convection occurs in both liquids and gases while Namazzi disagrees with her. Both are not certain of their views. In your group, carryout a scientific investigation to settle their argument.

(i) For Liquids

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It is believed that a normal house should have ventilators and windows. In your group, discuss and explain the role of windows and ventilators in maintaining freshness inside the house.

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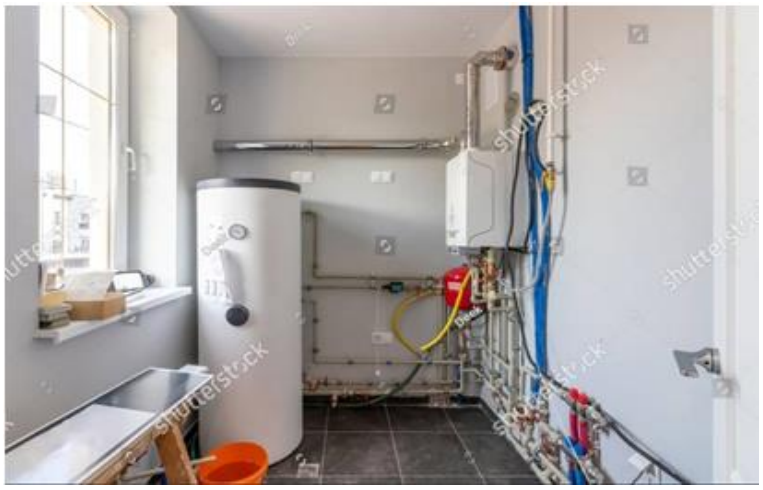
Self-check

Describe how convection currents occur in domestic hot water supply system.



(ii) houses in desert are painted white and roofed with shiny iron sheets.

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(iii) Shoes should be polished especially on a hot day

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(ii) How density of water varies with temperature in a range of temperature below $0^{o}C$, between $0^{o}C$ and $4^{0}C$, and above $4^{0}C$

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