

# PHYSICS PROJECT

## WORK BOOK

( SIMPLIFIED )

**SENIOR ONE TO SENIOR TWO**  
**“2023”**

BASED ON THE NEW LOWER SECONDARY CURRICULUM

by

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**1<sup>st</sup> Edition**

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# Preface

This learner's project workbook has been written in line with the revised physics syllabus for the new lower secondary curriculum.

Scenario community problem situations have been incorporated into this workbook.

A learner is supposed to design a project using environmental resources to solve the scenario community problem situations designed in this work book.

Through those scenario community problem situations provided, the learner is able to produce new knowledge, values and skills required in the 21<sup>st</sup> century.

This has been done by providing a range of scenario community problem situations 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 situation community problem in order to be able to share learning experiences with their colleagues.

The learners are supposed to write only in the spaces provided in the carbonated portfolio which the facilitator (teacher) has to tear out together with the mark allocation of the project work after marking and then keep them as proof of the learner's procedures (work) and marks.

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 .

**I feel confident that this Book will be of immense value to both the learners and the teachers.**

Any suggestions for improvement of this book are most welcomed, thanks.

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# Acknowledgement

I would like to express my sincere appreciation to all those who worked tirelessly towards the production of this learner's project 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. William Lwanga** and **Mrs. Harriet Lwanga**, my brother; Mr. Nsubuga Grace.

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 goes to Broadway high school and Mita college kawempe which provided the best environment to work from and best reference books.

I thank God for the wisdom he has given me to produce this volume of work.

May the Almighty God bless all the students that will use this book with knowledge to encounter all physics scenario problem situations.....**AMEN.**

I welcome any suggestions for improvement to continue making my service delivery better.

## Introduction to projects

### **Projects:**

These are assignments given to the learners to be done over a period of time. They are done either individually or in groups depending on the nature of the project. The teacher should monitor the progress of the learners. Learners should document the developmental stages of their projects and present this record to the teacher at every stage for guidance, and as evidence of the work done. At the end of the specified time, the learners are required to present a product or an output and evidence of the progress. The evidence should be presented in a portfolio. A **portfolio** is a collection of learner's evidences of achievement on an implemented project. It is therefore important to note that;

1. Learners should be in the know of the parameters to be used to evaluate the project. The parameter/ checklist will guide learners during the development stages of the project.
2. At every stage of the project, learners will present their progress to the teacher for guidance. For group projects, the teacher should assess individual learners for their participation and contribution towards the project.

### **NOTE:**

- i) For group projects, all group members do not earn the same score since marks for each learner's report in that group differs. This implies that all group members earn the same score except on the report.
- ii) Recording in the portfolio will corroborate(confirm) the evidence with details on dates, challenges, what was achieved on each date and how. This will help those who will moderate the assessment to verify the scores.

### **Types of Projects**

There are various types of projects as listed below:

- a. Simple and routine (an innovation which is simple and has **direct process line** and requires limited resources) for example writing a story book for languages, developing a brochure with historical timeline of events of a given country.
- b. Simple and non-routine (an innovation with creativity which has a **direct process line** though **extraordinary** in nature but requires limited resources) for example,

observing and recording weather of an area, recording data of cases of common illnesses among learners.

- c. Complex and routine (an innovation which is **unique**, achievable but does not have a direct process line, changes form, requires continuous research, and demands more resources) and highlights creativity.
- d. Complex and non-routine (an innovation which is **unique**, cannot be easily achieved due to uncertainties, being interdisciplinary, is creative in nature and involving multiple teams and requires heavy resource investment to execute)

At the LSC level, projects should be limited to (a) and (b). This is because it is such projects that can lead to achievement of the desired LOS, while at the same time they are affordable in terms of time and materials required.

### **Features of a Project**

The projects in the LSC are meant to develop learner's Innovativeness, creativity, critical thinking, research and communication so as to address societal challenges. This will help them to appreciate the acquired competences for personal and national development. The under listed features may slightly differ from the conventionally known characteristic project features. Therefore, for purposes of this curriculum, the features of the project are limited to:

- i) **Uniqueness:** No two projects are exactly similar even if they are exactly identical or are merely duplicated. The location, the infra-structure, the agencies and the people make each project unique. The project should depict creativity.
- ii) **Life cycle:** A project has a life cycle reflected by growth, maturity and decay. It has naturally a learning component.
- iii) **Efficiency:** Project efficiency can be measured by the volume of outputs obtained per the inputs utilized. Some factors influencing a project's efficiency include:
  - Technologies used in the working processes (the better the technology used, the more economical its rate of efficiency is).
  - Quality of planning (the more qualified and deliberated project planning applied, the easier it is to forecast and keep proper efficiency level).
  - Quality of operational management (how effectively the resources are managed when they are immediately in utilization or operation).

- External factors which are hard to forecast (disasters, emergent levels of key staff members, bankruptcy of stakeholders, etc.).
- iv) **Effectiveness:** A project must satisfy/meet or exceed the planned targets.
- v) **Environmental friendliness:** A project should not have negative impact on the environment. From the onset, learners should always be made conscious of the significance of the environment. Therefore, an Environmental Impact Assessment (EIA) should be addressed with great concern.
- vi) **Sustainability:** A project is expected to address the intended societal challenge and a simple write-up should be made and shared for the beneficiary's reference and future improvement.

### **Developing the Projects**

Projects shall be based on themes or LOS as shown in the subject syllabus. The project ideas shall be identified and developed by the learners in alignment with the themes under the guidance of the teacher.

### **Materials to be used for Projects**

Schools are advised to guide the learners to identify projects which can be done using materials which are locally available and affordable. Schools are encouraged to use materials which are in line with "Buy Uganda Build Uganda" (BUBU). In so doing the project work will be promoting industrialization for employment, inclusive growth and wealth creation.

### **Assessing Projects**

Projects shall be assessed using a general (standard) checklist. UNEB will use the records provided in the checklist to capture the learner's scores.

### **NOTE:**

- i) Scores for each parameter will be determined by the teacher. The total score for the project will be scaled to 10%. This will be added to the score from the AOI to account for the 20% score of the end of cycle summative assessment.
- ii) A learner who has not been assessed at school level does not qualify to be assessed at the end of cycle national examinations.

## Teacher's role:

In project based learning and assessment, the teacher is expected to:

- Make observations
- Hold conversations
- Provide guidance and support the learner
- Keep records
- Receive a product and report

Formative Assessment

This is continuous throughout the project lifetime.

**NB:** For generic skills, a teacher should use those which fit the project.

### HOW MANY PROJECTS SHOULD A LEARNER TAKE IN A YEAR?

- A learner will have a maximum of two projects every term provided that by the time the learner sits for final UNEB examinations, a project in each of the subjects registered for has been completed and submitted for assessment.

For example, if a student sits for eight subject examinations, that student will have completed at least one project in every subject.

### AWARDING SCORES IN A PROJECT.

**3** = The characteristic is strongly reflective in the performance

**2** = The characteristic is somewhat reflected in the performance

**1** = The characteristic is not YET reflected in the performance task

### 1) HOW TO DESIGN RUBRICS IN PROJECTS.

#### ▪ *Meaning of Rubric:*

➤ A rubric is a scoring guide used to evaluate performance, a product, or a project.

It has three parts namely;

- i. Performance criteria.
- ii. Rating scale.
- iii. Indicators.



**Sample project**

**Sample Project:**

**Project title: MAKING TOMATO SAUCE.**

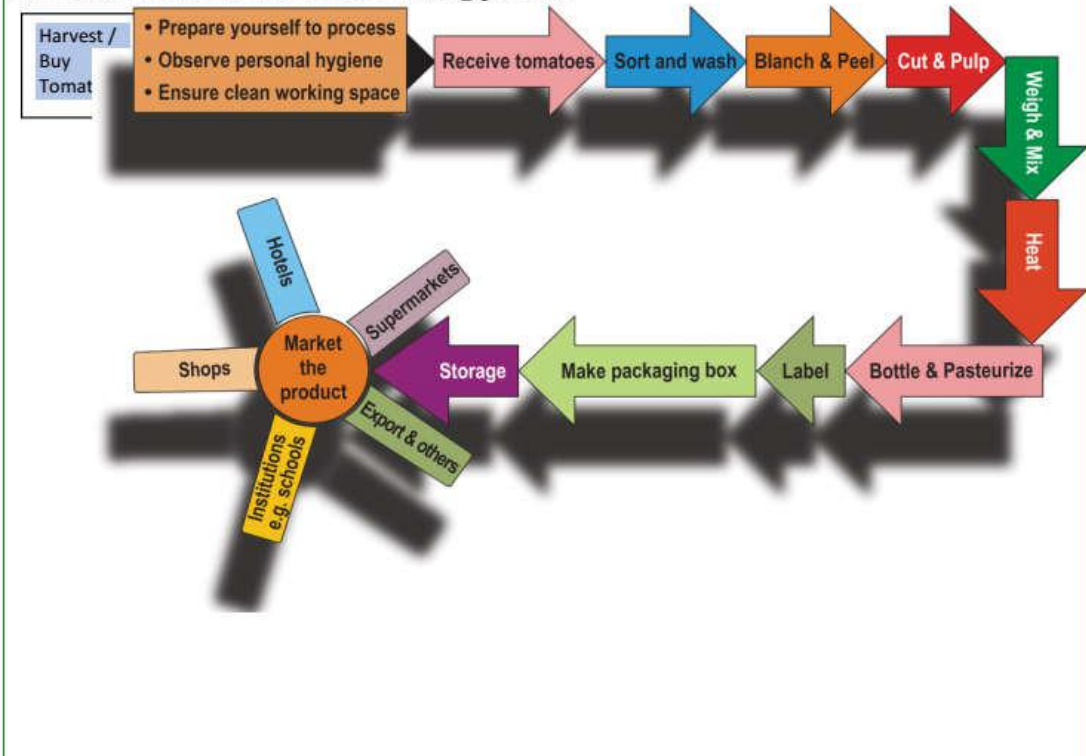
The cycle will follow all the steps:  
 Sourcing raw materials and equipment → Processing → preserving → packing → marketing  
 In this way, learners will appreciate the fundamental thrust of the subject. This is the full integration of everyday life concerns into schoolwork. The Nutrition and Food Technology involves projects which encourage the use of local raw materials.

**Questions for discussion**

- What are the various ways of using a ripe tomato fruit?
- How are ripe tomato fruits prepared for cooking?
- What is the importance of processing and preserving tomatoes?

The Tomato Sauce project illustrates the steps of the project cycle.  
 A flow chart is a good way to represent the project cycle.  
 Here is the flow chart for the Tomato Sauce project. It presents the work sequence of making tomato sauce. It helps to make the work flow in an organized way.

**Flowchart of the Tomato Sauce making process**



Study the steps in the sequence. This gives you an overview of what you will be doing.

- Comment on the sequence for making tomato sauce.
- What equipment would you need to do this work?

**Ingredients**

To make Tomato Sauce, you need the following ingredients:

Ingredient	Quantity notes
Tomatoes	Main raw material
Onions	Flavouring
Sugar	sweetener
Salt	Seasoning
Cinnamon	Seasoning / flavouring
Cardamom	Seasoning / flavouring
Cumin	Seasoning / flavouring
Mace	Seasoning / flavouring
Black pepper	Seasoning
White pepper	Seasoning
Ginger	Flavouring
Vinegar	Flavouring and preservative
Sodium Benzoate	Preservative

*Note: Sodium Benzoate can be procured from shops selling chemicals.*

**Equipment and tools needed to process tomato sauce:**

- Bowl and buckets
- Draining racks
- Protective wear (latex gloves; hair nets)
- Cooking pans
- Knives,
- Heat source- a stove, Electric or Gas cooker.
- Chopping board/ surface
- Bottling capper and filler (optional)
- Muslin cloth or bag
- Stirrer or mingling stick
- Gloves
- Cleaning towels/mops
- Glass Bottles,
- Apron

**Mark Allocation of the project work**

	No	ASPECT TO BE EXAMINED	ALLOCATED MARKS.	STUDENT'S MARKS
<b>PLANNING</b>	1	Title	2	
	2	Alignment to theme	2	
	3	Justification of the project	2	
	4	Methodology	14	
	5	Identification of materials and budget making	2	
<b>IMPLEMENTATION</b>	6	Organization.(was the project work organized? )	1	
	7	Use of resources(how were the resources utilized? )	1	
	8	Expression of Critical thinking and problem-solving skills	5	
	9	Expression of Creativity and innovation skills	5	
	10	Expression of Communication skills	5	
	11	Expression of Co-operation and learning skills	5	
	12	Expression of Calculation and ICT skills	5	
	13	Demonstration of Values in the project work.	6	
<b>PRODUCT</b>	14	Originality of the product.	5	
	15	Creativity of making the product	5	
	16	Innovation of the project	5	
	17	Accuracy / precision of the product .	5	
	18	Testing of the product	5	
	19	Effectiveness and efficiency of the learner's product in solving the problem identified by the learner	1	
<b>REPORT</b>	20	Relevance of the report content	3	
	21	Accuracy of the report's content	3	
	22	Coherence of the reports content	3	
	23	Relevance of the report's format	3	
	24	Accuracy of the report's format	3	
	25	Coherence of the report's format	3	
	26	Excellence of the whole report	1	
<b>Overall total marks</b>			100	

	PHASE	INDICATORS	MAX SCORE
1	Identification, planning, design	Title, alignment to theme, justification of the project, methodology, identification of materials	22
2	Project Implementation	Organization, Use of resources, focus on generic skills and values	33
3	Product	Originality, creativity and innovation, accuracy	26
4	Project report	Relevancy, Accuracy, coherence	19
	<b>Total</b>		100

**N.B :** This page will appear on the front page of the learner's report for marks awarding.

**Marking Guide for project work**

**PHASE .1 PROBLEM IDENTIFICATION, PROJECT PLANNING AND DESIGN (22 marks)**

<b>ACTION</b>	<b>SCORE</b>
If the learner’s answer is correct and exhausts all point(s) / content required. <b>OR</b> when point(s) given is/ are <b>more than half</b> of content required.	2 marks
If the learner’s answer is correct but does not exhaust all point(s) or when point(s) given is/are below half of the point(s) needed by the question.	1 mark
If the learner’s answer is wrong. or when a learner did not completely answer the question	0 mark

No		<b>ASPECT TO BE MARKED</b>	<b>ALLOCATED MARKS.</b>
A	1	<b>TITLE</b> Did the learner write an <b>appropriate project</b> TITLE after identifying a community a problem?	2
B	2	<b>ALIGNMENT TO THEME</b> Was the learner’s problem aligned to any theme in the subject?	2
C	3	<b>JUSTIFICATION OF THE PROJECT</b> Did the learner write the objectives and benefits their project?	2
D		<b>METHODOLOGY</b>	
	4	Did the learner State an appropriate TANGIBLE PRODUCT to make.	2
	5	Did the learner explain how his/her product will work?	2
	6	Did the learner think to draw or describe a plan /design of their product?	2
	7	Did the learner use Google/internet, book or skilled people, to research on how his product is made.	2
	8	Did the learner explain in details the step by step procedures of making his or her product?	2
	9	Did the learner explain how he/she will experiment to test the effectiveness of their product? Were challenges and solutions predicted?	2
	10	Did the learner make a simple project work plan / schedule to follow?	2
E		<b>IDENTIFICATION OF MATERIALS</b>	
	11	Did the learner identify materials to use and made a budget for the project materials?	2
<b>Total marks ( for phase 1)</b>			<b>22</b>

**PHASE 2 PROJECT IMPLEMENTATION ( 33 marks )**

<b>ACTION ( mark distribution )</b>	<b>SCORE</b>
If the learner's project work met the desired generic skills or values expected.	1 mark
If the learner's project work did not meet the desired generic skills or values expected.	0 mark

No		<b>ASPECT TO BE MARKED</b>	<b>ALLOCATED MARKS.</b>
F	12	<b>ORGANIZATION.</b> (was the learners project work organized? )	1
G	13	<b>USE OF RESOURCES</b> (Did the learner utilize the resources properly? )	1
H		<b>GENERIC SKILLS</b>	
		<b>CRITICAL THINKING AND PROBLEM-SOLVING</b>	
	14	Was the learner able to Plan and carry out investigations.	1
	15	Was the learner able to Sort and analyze information	1
	16	Was the learner able to Identify problems and ways forward	1
	17	Was the learner able to predict outcomes and make reasoned decisions	1
	18	Was the learner able to Evaluate different solutions	1
		<b>CREATIVITY AND INNOVATION</b>	
	19	Was the learner able to Use imaginations to explore possibilities	1
	20	Was the learner able to Work with others to generate ideas	1
	21	Was the learner able to Suggest and develop new solutions	1
	22	Was the learner able to Try out innovative alternatives	1
	23	Was the learner able to Look for patterns and make generalizations	1
		<b>COMMUNICATION</b>	
	24	Was the learner able to Listen attentively and with comprehension	1
	25	Was the learner able to Talk confidently and explain things clearly	1
	26	Was the learner able to read accurately and fluently to others.	1
	27	Was the learner able to Write and present coherently	1
	28	Did the learner use a range of media to communicate idea	1
		<b>CO-OPERATION AND LEARNING</b>	
	29	Was the learner able to Work effectively in diverse teams	1
	30	Was the learner able to Interact effectively with others	1
	31	Was the learner able to Take responsibility for own learning	1
	32	Was the learner able to Work independently with persistence	1
	33	Was the learner able to Manage goals and time	1
		<b>CALCULATION AND ICT</b>	
	34	Was the learner able to use numbers and measurements accurately	1
	35	Was the learner able to Interpret and interrogate mathematical data	1
	36	Was the learner able to use mathematics to justify and support decisions	1
	37	Was technology used to create, manipulate and process information	1
	38	Was technology used to collaborate, communicate and refine their work	1
I		<b>VALUES</b>	
	39	Was the learner able to illustrate Peace and harmony in his/her project.	1
	40	Was the learner able to express Integrity and honesty	1
	41	Was the learner able to exhibit Patriotism in his/her project	1
	42	Was the learner able to show a positive attitude towards work	1
	43	Was the learner able to respect human rights	1
	44	Was the learner able to demonstrate Self-Control in the project	1
<b>Total marks for phase - 2</b>			<b>33</b>

**PHASE 3 PRODUCT ( 26 marks)**

<b>ACTION</b>	<b>SCORE</b>
If the aspect examined in the learner’s product is expressed <b>excellently</b> .	5 marks
If the aspect examined in the learner’s product is <b>good</b> but not very excellent	4 marks
If the aspect examined in the learner’s product is just <b>quite good</b>	3 marks
If the aspect examined in the learner’s product is present but to an <b>average</b> extent	2 marks
If the aspect examined in the learner’s product is present but to a <b>very small</b> extent	1 mark
If the aspect examined in the learner’s product is <b>completely absent</b> / lacking	0 mark

No		<b>ASPECT EXAMINED</b>	<b>SCORE</b>
J	45	<b>ORIGINALITY.</b> Was the product <b>honestly made</b> by the learner him/herself? And is there any uniqueness in the product presented.	5
K	46	<b>CREATIVITY</b> Did the learner use any imagination or original ideas to create the product presented, was there any inventiveness to make a new and valuable product?	5
L	47	<b>INNOVATION.</b> Does the product show that there will be practical implementation of ideas that result in the introduction / improvement of new goods or services to solve man’s problems?	5
M	48	<b>ACCURACY.</b> Did the learners product possess <b>high precision</b> in solving the problem he or she identified? Does the product possess the quality or state of being correct or precise? Is there <b>no fault</b> in the product.?	5
N	49	<b>TESTING</b> Was <b>the experiment</b> designed to test the product prototypes authentic? Did the test yield proper results about the working of the product?	5
		<b>Total marks for phase -3</b>	25

<b>TEACHER’S FINAL JUDGMENT OF THE PRODUCT</b>			
O		<b>ASPECT EXAMINED</b>	<b>SCORE</b>
	50	<b>EFFECTIVENESS AND EFFICIENCY OF THE PRODUCT.</b>  According to you as the teacher, did the product actually solve the problem that the learner stated in reality based of the experimental results after testing the product. If you compare the money, time and other resources invested in making the product, was there value for those resources. Was there effectiveness.	Score <b>1</b> mark if present.  Score <b>0</b> mark if it is not absent

## PHASE 4 PROJECT REPORT ( 19 marks )

BASIS OF EVALUATION	Criteria 1 RELEVANCE	Criteria 2 ACCURACY	Criteria 3 COHERENCE
<b>REPORT CONTENT</b>	SCORE 3 If <b>ALL</b> the content written in the student's report is connected, correct and suitable for solving the problem that the student identified.	SCORE 3 If <b>ALL</b> the report's content conforms to the <b>facts and real truth</b> known about the solutions, research literature and the student's product	SCORE 3 If <b>ALL</b> content presented in the report connect to each other smoothly, logically, in choice of words and in a way that give meaning to solving the student's problem and product
	SCORE 2 If <b>half or three quarters</b> of the content written in the student's report is connected, correct and suitable for solving the problem that the student identified.	SCORE 2 If <b>half or three quarters</b> of the report's content conforms to the <b>facts and real truth</b> known about the solutions, research literature and the student's product	SCORE 2 If $\frac{1}{2}$ or $\frac{3}{4}$ of the ideas presented in the report <b>connect</b> to each other <b>smoothly, logically</b> , in choice of words and in a way that give meaning to the student's problem and product
	SCORE 1 If <b>less than half</b> of the content written in the student's report is connected, correct and suitable for solving the problem that the student identified.	SCORE 1 If <b>less than half</b> of the report's content conforms to the <b>facts and real truth</b> known about the solutions, research literature and the student's product	SCORE 1 If <b>less than half</b> ideas presented in the report <b>connect</b> to each other <b>smoothly, logically</b> , in choice of words and in a way that give meaning to the student's problem and product
	SCORE 0 If <b>all</b> the content written in the student's report is <b>NOT</b> connected, correct and <b>not</b> suitable for solving the problem that the student identified.	SCORE 0 If <b>NONE</b> of student's project report <b>content</b> conforms to the facts and real truth known about the solutions, research literature and product he/she is suggesting to bring forth.	SCORE 0 If <b>NONE</b> of the ideas presented in the report connects to each other smoothly, logically, in choice of words and in away that give meaning to the student's problem and product

<b>FORMAT OF THE REPORT</b>	<p>SCORE 3 if the following 5 or 6 aspects are present in structure of a report.</p> <p>1. An <b>INTRODUCTION</b> that: - Introduces the writer the Problem statement the product to be made and The project objectives,                  2. A <b>BODY</b> that includes:- Procedure and materials for implementation.                  3. A <b>CONCLUSION</b> that shows Testing the product’s efficiency and effectiveness                  4. <b>ANALYSIS</b> of the project work based on out puts.                  5. <b>Punctuated statements</b>                  6. <b>paragraphed work.</b></p> <p>( each point takes <math>\frac{1}{2}</math> mk)</p>	<p>SCORE 3 if the what is written in the following 5 or 6 aspects are the real facts and truth known about what: -</p> <p>1. An <b>INTRODUCTION</b>                  2. A <b>BODY</b>,                  3. <b>CONCLUSION</b>,                  4. and a project <b>ANALYSIS</b>                  Should contain.</p> <p>5. If proper Punctuations in the work are rightly used within statements of the report.                  6. If paragraphs are correctly introduced with correct word spellings and grammar / phrasing of statements in the report.</p> <p>(each point takes <math>\frac{1}{2}</math> mk)</p>	<p>SCORE 3 if the what is written in the following 5 or 6 components e.g.:-</p> <p>1. <b>INTRODUCTION</b>                  2. Action plan and budget                  3. Product making procedure                  4. Product testing experiment                  5. <b>CONCLUSION</b>                  6. <b>ANALYSIS</b> in the report connect to each other smoothly, logically, in choice of words and in a way that is clearly understandable in line with a true <b>report format order.</b></p> <p><b>NB.</b> Emphasis is on the flow and clarity of the 6 In the way they are supposed to be structured in a report.</p>
	SCORE 2 if 3 or 4 aspects from the 6 of the above are present	SCORE 2 if 3 or 4 aspects from the 6 of the above are accurate /true	SCORE 2 if 3 or 4 aspects from the 6 of the above are logical
	SCORE 1 if 1 or 2 aspects from the first 4 above are present	SCORE 1 if 1 or 2 aspects from the first 4 above are accurate/true	SCORE 1 if 1 or 2 aspects from the first 4 above are logical
	SCORE 0 if <b>NO</b> aspects from the first 4 above are present	SCORE 0 if <b>NO</b> aspects from the first 4 above are accurate/true	SCORE 0 if <b>NO</b> aspects from the first 4 above are logical
	<p><b>Criteria 4 : EXCELLENCE</b></p> <p>SCORE 1 if there is an exceptional response unsolicited in the process of writing the report</p>		
<p><b>Total marks for phase 4 (maximum score)</b></p>		<p><b>19</b></p>	



**Summary of the project work marking guide**

No	ASPECT TO BE MARKED	ALLOCATED MARKS.	STUDENT'S MARKS
1	Did the learner write an <b>appropriate project TITLE</b> from a problem	2	
2	Was the learner's problem aligned to any theme in the subject?	2	
3	Did the learner write the objectives and benefits their project?	2	
4	Did the learner state an appropriate <b>TANGIBLE PRODUCT</b> to make.	2	
5	Did the learner explain how his/her product will work?	2	
6	Did the learner draw or describe a plan /design of their product?	2	
7	Did the learner use Google/people /book to research about their project	2	
8	Did the learner explain procedure of making his or her product?	2	
9	Did the learner explain how product's effectiveness will be tested.?	2	
10	Did the learner make a simple project work plan / schedule to follow?	2	
11	Did the learner identify materials to use or made budget for the project	2	
12	ORGANIZATION. (was the learners project work organized? )	1	
13	USE OF RESOURCES (Did the learner utilize the resources properly? )	1	
14	Was the learner able to Plan and carry out investigations.	1	
15	Was the learner able to Sort and analyze information	1	
16	Was the learner able to Identify problems and ways forward	1	
17	Was the learner able to predict outcomes and make reasoned decisions	1	
18	Was the learner able to Evaluate different solutions	1	
19	Was the learner able to Use imaginations to explore possibilities	1	
20	Was the learner able to Work with others to generate ideas	1	
21	Was the learner able to Suggest and develop new solutions	1	
22	Was the learner able to Try out innovative alternatives	1	

23	Was the learner able to Look for patterns and make generalizations	1	
24	Was the learner able to Listen attentively and with comprehension	1	
25	Was the learner able to Talk confidently and explain things clearly	1	
26	Was the learner able to read accurately and fluently to others.	1	
27	Was the learner able to Write and present coherently	1	
28	Did the learner use a range of media to communicate idea	1	
29	Was the learner able to Work effectively in diverse teams	1	
30	Was the learner able to Interact effectively with others	1	
31	Was the learner able to Take responsibility for own learning	1	
32	Was the learner able to Work independently with persistence	1	
33	Was the learner able to Manage goals and time	1	
34	Was the learner able to use numbers and measurements accurately	1	
35	Was the learner able to Interpret and interrogate mathematical data	1	
36	Was the learner able to use mathematics to justify decisions	1	
37	Was technology used to create, manipulate and process information	1	
38	Was technology used to collaborate, communicate and refine work	1	
39	Was the learner able to illustrate Peace and harmony in his/her project.	1	
40	Was the learner able to express Integrity and honesty	1	
41	Was the learner able to exhibit Patriotism in his/her project	1	
42	Was the learner able to show a positive attitude towards work	1	
43	Was the learner able to respect human rights	1	
44	Was the learner able to demonstrate Self-Control in the project	1	
<b>Total marks for phase – 1 and 2</b>		<b>55 marks</b>	

	ASPECT EXAMINED (in phase three and four)	SCORE	Student's marks
45	<b>ORIGINALITY.</b> Was the product <b>honestly made</b> by the learner him/herself? And is there any uniqueness in the product presented.	5	
46	<b>(CREATIVITY)</b> Did the learner use any imagination or original ideas to create the product presented, was there any inventiveness to make a new and valuable product?	5	
47	<b>INNOVATION.</b> Does the product show that there will be practical implementation of ideas that result in the introduction /improvement of new goods or services to solve man's problems?	5	
48	<b>ACCURACY.</b> Did the learners product possess <b>high precision</b> in solving the problem he or she identified? Is there <b>no fault</b> in a product.?	5	
49	<b>TESTING</b> Was the experiment designed to test the product prototypes authentic? Did the test yield proper results about the product?	5	
50	<b>EFFECTIVENESS AND EFFICIENCY OF THE PRODUCT.</b> According to you as the teacher, did the product actually solve the problem stated y the learner based on the experimental results.	1	
51	If <b>ALL</b> the content written in the student's report is connected, correct and suitable for solving the problem that the student identified.	3	
52	If <b>ALL</b> the report's content conforms to the <b>facts and real truth</b> known about the solutions, research literature and the student's product	3	
53	If <b>ALL</b> content presented in the report connect to each other smoothly, logically, in choice of words and in a way that give meaning to solving the student's problem and product	3	
54	If 5 or 6 aspects are present in the structure of a report. The 6 aspects are: - An introduction, a body, a conclusion, analysis of the project work, punctuated statements, paragraphed work.	3	
55	If 5 or 6 aspects written below possess the real facts and truth known. The 6 aspects are:-1.an introduction, 2. a body, 3.conclusion, and 4 project analysis. Also, there must be ... 5.proper Punctuations used rightly. 6... paragraphs are correctly introduced with correct grammar of statements in the report.	3	
56	If what is written in the following 5 or 6 components e.g.: introduction, action plan and budget, product making procedure, product testing experiment, conclusion and analysis in the report connect to each other smoothly, logically, in choice of words and in a way that is clearly understandable.	3	
57	As a point of <b>excellence</b> , if there is an exceptional response unsolicited in the process of writing the report	1	
<b>Total marks for phases 3 and 4</b>		45	
<b>Overall total marks</b>		100	

**COMMUNITY PROBLEM ONE**

Introduction/motivation; Due to its incredible chemical properties, water is often considered the “universal solvent”. It can mix with organic (natural) or synthetic (human-made) substances. Some of these products easily breakdown in water, while others breakdown very slowly, or perhaps even never. Water naturally cleans it self via filtration through the ground and evaporation via the water cycle.

- At one time, communities disposed off their waste and garbage directly into lakes , streams and oceans . Now, most countries (Uganda to say) require that unclear (contaminated , polluted) water be treated before it is permitted to be released into natural bodies of water like lakes, rivers and oceans.
- Generally, three different ways are used to treat raw sewage(waste) water before it is released. First, the liquid is given time to settle and then is exposed to oxygen by stirring or bubbling air through it (aeration). This helps many harmful organic pollutants react with oxygen and change into carbon-dioxide and water. Second, the liquid is filtered to remove the particulate matter. Third, it is treated chemically with chlorine or ozone to kill any remaining harmful components such as bacteria.
- Environmental, chemical and civil engineers work together to improve existing water treatment systems and design new ones to ensure that we have clean water both now and in the future. Today, let’s imagine that we are engineers working for the clean water Environmental Engineering Company. The company has asked you to design a suitable project system that can be used to solve the societal problem that a small community shown in the picture below faces using limited materials.



**Mark Allocation of the project work**

	No	ASPECT TO BE EXAMINED	ALLOCATED MARKS.	STUDENT'S MARKS
<b>PLANNING</b>	1	Title	2	
	2	Alignment to theme	2	
	3	Justification of the project	2	
	4	Methodology	14	
	5	Identification of materials and budget making	2	
<b>IMPLEMENTATION</b>	6	Organization.(was the project work organized? )	1	
	7	Use of resources(how were the resources utilized? )	1	
	8	Expression of Critical thinking and problem-solving skills	5	
	9	Expression of Creativity and innovation skills	5	
	10	Expression of Communication skills	5	
	11	Expression of Co-operation and learning skills	5	
	12	Expression of Calculation and ICT skills	5	
	13	Demonstration of Values in the project work.	6	
<b>PRODUCT</b>	14	Originality of the product.	5	
	15	Creativity of making the product	5	
	16	Innovation of the project	5	
	17	Accuracy / precision of the product .	5	
	18	Testing of the product	5	
	19	Effectiveness and efficiency of the learner's product in solving the problem identified by the learner	1	
<b>REPORT</b>	20	Relevance of the report content	3	
	21	Accuracy of the report's content	3	
	22	Coherence of the reports content	3	
	23	Relevance of the report's format	3	
	24	Accuracy of the report's format	3	
	25	Coherence of the report's format	3	
	26	Excellence of the whole report	1	
<b>Overall total marks</b>			100	

	PHASE	INDICATORS	MAX SCORE
1	Identification, planning, design	Title, alignment to theme, justification of the project, methodology, identification of materials	22
2	Project Implementation	Organization, Use of resources, focus on generic skills and values	33
3	Product	Originality, creativity and innovation, accuracy	26
4	Project report	Relevancy, Accuracy, coherence	19
	<b>Total</b>		100

**N.B :** This page will appear on the front page of the learner's report for marks awarding.

**WORK SHEET (Portfolio)**

1. Write a community problem statement.

.....

2. State the chapter/theme on which your project will focus.

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3. State the title of your project.

.....

4. Write the main aim, objectives and benefits of your project.

i) aim:

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ii) objectives:

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iii) benefits:

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5. State an approximate tangible product that you are going to make.

.....

6. Explain how your tangible product will work to solve the problem.

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7. Draw (if possible describe) a plan/ design/ blue print of how your product will look like.

Hint: draw using a pencil.



8. Using Google/internet, books or skilled people, research and write your procedures in details on how your product is to be made.

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9. Explain how your product's effectiveness will be tested to solve the problem stated.

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10. Make a simple project work plan/schedule to follow.

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11. Identify and list all materials you are to use to make your product.

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12. Make a budget for your project using the listed materials in(11) above.

13. Write a detailed report of your project.

**REPORT**

SUBJECT:.....

THEME:.....

TOPIC(S):.....

**TITLE OF THE PROJECT:** .....

.....

CLASS: ..... DATE: .....

S/N	PROJECT PARTNERS NAME(S)	POSITION
1		
2		
3		
4		
5		

**TEACHERS RESPONSIBLE:**

**Signature**

.....  
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**HYPOTHESIS/PROBLEM TO ADRESS**

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**JUSTIFICATION “why are you carrying out this project?”**

1) .....

2) .....

3) .....

**METHODS USED**

1) .....

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**PRODUCT**

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**A WELL LABELLED ILLUSTRATION OF THE FINAL PRODUCT**



**RESULTS/FINDINGS:**

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**CONCLUSSION, CHALLENGES AND RECOMENDATIONS**

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**COMMUNITY PROBLEM TWO**

Contact the author on +256750549201 or +256771803014 to get a complete copy for your self. You can also email on [lwangawilliam11@gmail.com](mailto:lwangawilliam11@gmail.com)

**NB:** The complete copy consists of seven scenario community problems which a learner has to solve, then the facilitator marks all of them. Therefore, the marks of the most performed project are the one to be considered as the project marks of the learner.