

MANILLA CENTRAL SCHOOL - ASSESSMENT TASK NOTIFICATION 2023

Stage 4 Science



Task Number: 3

Notification Date: Term 3, Week 3 - Wednesday 02/08/2023

Weight: 30%

Due Date: Term 3, Week 6 - Friday 25/08/2023, to class teacher by 3:20pm

Student Research Project

WORKING SCIENTIFICALLY: SKILLS OUTCOMES ASSESSED

SC4-4WS	identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge.
SC4-5WS	collaboratively and individually produces a plan to investigate questions and problems.
SC4-6WS	follows a sequence of instructions to safely undertake a range of investigation types, collaboratively and individually.
SC4-7WS	processes and analyses data from a first-hand investigation and secondary sources to identify trends, patterns and relationships, and draw conclusions.
SC4-8WS	selects and uses appropriate strategies, understanding and skills to produce creative and plausible solutions to identified problems.
SC4-9WS	presents science ideas, findings and information to a given audience using appropriate scientific language, text types and representations

KNOWLEDGE AND UNDERSTANDING: CONTENT OUTCOMES ASSESSED

SC4-11PW	discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations
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TASK DESCRIPTION

Students will:

- Develop a Rube Goldberg Machine that demonstrates multiple energy transformations by completing a simple task (putting rubbish in a bin, wiping your face with a napkin, turning on a speaker from a distance etc).
- Present background research DURING 3 PERIODS OF CLASS TIME on the initial Energy type you have chosen and outline how your device will cause 3 transformations in the energy.
- Develop a 3D model to demonstrate 3 energy transformations.
- Report on the research and experimental report findings, using the subheadings and descriptions within the marking criteria supplied.

TASK MARK	TASK RANK	CUMULATIVE RANK

Teacher's signature: _____

Mrs Rebecca Cowell

Head Teacher's signature: _____

Miss A Nott

Deputy Principal's Signature: _____

Mrs A Lawrence

Student Research Project

'Science is simply the word we use to describe a method of organizing our curiosity'

~ Tim Minchin

Name:

**RUBE
GOLDBERG
MACHINE**



Stage 4 Science 2023

Student Research Project

Introduction: Your IRP

The Process:

Not all investigations can be defined as open-ended investigations. In conducting the IRP, you will need to develop your own investigation relating to the topic of Motion.

The 5 basic steps will involve:

- Developing problem that is to be solved
- Listing equipment/resources needed to undertake an investigation
- Planning a procedure for the investigation
- Gathering your results and presenting possible answers to the posed problem
- Concluding with the most common answer given to the posed problem.

General Information:-

At the end of your SRP, you will need to present both your logbook and your typed scientific report, including:

- ☐ Planning and recording all your work in your logbook
- ☐ Developing a timeline for your research (see scaffold)
- ☐ Submitting your equipment order and risk assessment
- ☐ Completing a self-evaluation of your progress
- ☐ Conducting your experiment
- ☐ Processing your data into a typed report
- ☐ Submitting a draft for teacher feedback
- ☐ Finalising and presenting your IRP report with your logbook by the due date

Typing Your Report: A Checklist

Your Report Must Include a:-

1. Title: ***My Project***
A short name that describes what your project is about.
2. Aim: ***A statement on what you are trying to achieve***
Eg. To determine the effect of ----- on -----.

You will need to rephrase the following question:

How can energy be transformed from a rolling marble to complete a simple task?

In testing this question we will be designing a Rube Goldberg Machine that presents 3 energy transformations (4 energy types).

3. Background: ***Research- related to your experiment***

Rube Goldberg Machines:

- ☐ Investigate and list some of the materials/products used in Rube Goldberg Machines
- ☐ Suggest and explain your choice of 3 simple tasks that may be appropriate for a Rube Goldberg Machine to complete

Types of Energy:

Research FIVE energy types that may be used within a Rube Goldberg Machine.

For each give:

- ☐ A definition of the energy type
- ☐ TWO Every day examples of where it appears

Law of Conservation of Energy:

- ☐ Research and state the law of conservation of energy
- ☐ Explain why there is a loss of energy at each transformation

CONCLUSION OF RESEARCH FINDINGS:

Summarise your research by compiling a Rube Goldberg Machine diagram/flowchart, including:

- ☐ a justified choice of task to complete
- ☐ A box for each step within the machine, including labelled energy type
- ☐ 3 energy transformations identified on arrows
- ☐ Sources of lost energy for each transformation

4. **Hypothesis:** *What I think may happen*

An educated guess based on your research, which predicts a solution to the aim of the experiment.

5. **Variables:** *How do I keep it fair?*

A list of all factors that could affect the comparison of time trials within the machine's design:-

- ☐ The factors you will keep the same (CONTROLLED VARIABLES)
- ☐ The one factor you will vary (INDEPENDENT VARIABLE)
- ☐ The one factor you will observe &/or measure (DEPENDENT VARIABLE)

6. **Equipment:** *What will I use?*

List all materials & equipment required, including amounts or sizes as appropriate.

Note: All groups will be given the same materials to create their model during class time

7. **Diagram:** *What does the method look like?*

- ☐ Include a labelled diagram and/or annotated photograph demonstrating your experimental method.

8. **Method:** *How do I carry out the experiment?*

- ☐ Step by step order of how you carry out the experiment.
- ☐ Use easy to read language.
- ☐ Repeat your measurements a minimum of three times & average results.

9. **Results:** *What Happened?*

- ☐ Record any problems and solutions as you go in the logbook. The log book is your rough copy.
- ☐ Record observations &/or measurements of the machine's time taken to complete task. Record this in your log book
- ☐ Any average calculations or analysis can be put in your results as well.

You could calculate the average time taken for the simple machine to complete its task, using multiple trials.

- ☐ Photographs of your observations can also be put into a table
- ☐ A neat copy of your results is then presented as a **table** in your experimental report
- ☐ Graph the class results by plotting the design trial number against the time taken – either by hand or using Excel.

10. Discussion: *Explains your results*

- ☐ Describe the results you obtained, identify evident trends and patterns in your results
- ☐ assess the accuracy of any measurements. How did you make sure your measurements were accurate.
- ☐ Discuss any problems you encountered and ways of improving your machine.
- ☐ Suggest ways of reducing errors.

11. Conclusion: *Did I achieve what I set out to do in the aim?*

- ☐ This should be a short statement that directly answers your aim.
- ☐ Statement about the energy conversion and loss in the machine

12. Bibliography: *Sources of information for Background research*

- ☐ You must include a Bibliography which lists all secondary sources
- ☐ See the attached information sheet (Harvard cheat sheet)

Presentation of Report:

- ☐ Cover page with student name, teacher name, relevant image and machine topic
- ☐ Report should be set out with the headings listed above.
- ☐ Students should use the marking criteria as a checklist when writing their report, to ensure that they haven't missed anything.
- ☐ *A log book needs to be submitted with your assignment.*

Stage 4 Student Research Project

Log Book

1. Every time you do any work on the SRP you must write about it in your Log book. Include any research you do for the background information
2. Make sure you indicate the date every time you write anything.
3. The Log book is for your rough notes. It doesn't have to be perfectly neat but it does need to be legible.
4. All observations and/or measurements must be recorded here, including any failures.
5. Also detail any references or people you consulted to assist with your investigation.

Your logbook is proof that you did the investigation and shows the time you spent on your project. It will be looked at as part of your assessment.

A simple set out would be:-

Date	What I did and what happened

Drafting Process

Your draft report will be able to be submitted to your class teacher for review and feedback up until Friday of Week 5.

- There are marks allocated to the submission of a draft, and to the corrections made from the feedback supplied.
- Students are encouraged to submit a draft to maximise their marks.

Bibliography

REFERENCING STYLE: Harvard

When listing your references, at a minimum, you will need to supply:

- The date
- The author's name
- The URL

HARVARD STYLE REFERENCING

In-text citation:

(Author surname, year)

e.g. (Dickens, 1861)

Reference List:

Author surname, initial. (Year). Source Name. Place:
Publisher.

e.g. Dickens, C. (1861). Great Expectations. United
Kingdom: Chapman & Hall.

Equipment Order:

Due Week 4, Friday 11/8/23

Item	Quantity

Prepared: _____

Date: _____

Risk Assessment:

<div>Risk</div> <div>What could go wrong?</div>	<div>Precaution</div> <div>How can I prevent it?</div>

Teacher Comments:

Teacher Signoff: _____ Date: _____

Self-Evaluation: How am I going?

My SRP is due on _____.

I have now had my SRP for _____ days/weeks.

I have spent _____ hours on my SRP.

1. What is my SRP about? (Use point form.)

2. Have I followed my plan? What changes have I had to make to my plan? Why were the changes needed?

3. What I have done so far in my SRP is:

4. How do I feel about the work I've done so far?

5. What do I still have to do to complete my SRP? (Outline of my plan, which includes dates and what I will do each day/week.)

6. Action Plan:

3 actions for now...	What needs to be done?	When will I do it by?
Most Important		
Next important		
Next important		

I have _____ days/weeks until my SRP is due.

Teacher's comment:

Signature: _____ Date: _____

	Subheading	Description	Your Marks	Mark	Grade
SC4-8WS	Log Book	Detailed notes around planning experiment		2	
		Several sequential dates that reflect the method of the experiment		2	
		Raw data, notes, measurements, sketches etc		2	
		Evidence of first-hand investigation eg: pictures/photos of you conducting it		2	
SC4-4WS	Background Research	Rube Goldberg Machines			
		Investigate and list some of the materials/products used in Rube Goldberg Machines		3	
		Suggest and explain your choice of 3 simple tasks that may be appropriate for a Rube Goldberg Machine to complete		6	
		Types of Energy			
		1. definition of the energy type & 2 examples		2	
		2. definition of the energy type & 2 examples		2	
		3. definition of the energy type & 2 examples		2	
		4. definition of the energy type & 2 examples		2	
		5. definition of the energy type & 2 examples		2	
		Law of Conservation of Energy			
		State the law of conservation of energy in common language		2	
		Explain why there is a loss of energy at each transformation		2	
		CONCLUSION OF RESEARCH FINDINGS			
		a justified choice of task to complete		2	
		A box for each step (min 4) within the machine, including labelled energy type		8	
		3 energy transformations identified on arrows		3	
Sources of lost energy for each transformation		3			
SC4-5WS	Aim	Appropriate aim for investigation linking independent and dependent variables		2	
	Hypothesis	Provides a justified and educated prediction of the outcome of the experiment, supported by their background research		2	
	Materials	All equipment required for method is listed		2	
	Method	Lists all steps in an impersonal, concise and logical manner		2	
		Includes a labelled diagram		2	
SC4-6WS	Results	Tabulated record of appropriate measurements taken during the experiment showing headings and units		2	
		Includes 3 sets of repetitions		3	
		Includes calculation (showing working) of average time for machine to complete set task		2	
		Experimental results displayed in an appropriate graph		4	
SC4-7WS	Discussion	Describes results in words and identifies trends in data		2	
		Assess the accuracy of the timed trials. How do you know your times are accurate?		2	
		Discuss TWO problems you encountered and ways of improving your machine.		4	
		Suggest TWO ways of reducing errors.		2	
	Conclusion	Provides an answer to the aim		1	
		Statement about the energy conversion and loss in the machine		2	
SC4-9WS	Presentation	Provides a coversheet with title, student name and teacher		2	
		Provides a bibliography with several references lists by APA		3	
		Complexity of design ideas		4	
		Originality of design		4	
		Supplied draft feedback version with final presentation		2	
	Drafting process	Submitted Draft by Tuesday Week 7 (24/08/2020)		2	
		Applied teacher feedback to make multiple corrections to final presentation		2	
	Feedback:		TOTAL	100	GRADE
	Signature:				