

MANILLA CENTRAL SCHOOL - ASSESSMENT TASK NOTIFICATION 2022

Stage 4 Science Mrs Cowell

Task Number: 3

Notification Date: Monday 09/08/2022

Weight: 30%

Due Date: In Class Friday 26/08/2022 Week 6 Term 3



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

SC4-10PW	describes the action of unbalanced forces in everyday situations.
SC4-11PW	discusses how scientific understanding and technological developments have contributed to finding solutions to problems involving energy transfers and transformations

TASK DESCRIPTION

Students will:

- Develop a Rube Goldberg Machine that demonstrates multiple examples of different forces by completing a simple task (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 types of forces you have chosen and outline how your device will demonstrate these forces.
- Develop a 3D model DURING 2 PERIODS OF CLASS TIME to demonstrate applied examples of 3 different forces
- Report on the research and experimental report findings, using the subheadings and descriptions within the marking criteria supplied.

Marking Guidelines

- Marks will be allocated to individual questions as indicated on the rubric.

Task Mark:	Task Rank:	Accumulative Rank:

Teacher's signature: _____

Mrs R Cowell

Head Teacher's signature: _____

Miss Eagles

Deputy Principal's Signature: _____

Mrs A Lawrence

Student Research Project

KEY DATES:

- ☐ **Equipment Order and Risk Assessment** by 3.20pm
Monday 15/08/2021 Week 4 Term 3
- ☐ **Self-Evaluation** during Week 5
Term 3 during class time
- ☐ **Draft Submission for Feedback** - 3.20pm Friday
19/08/2022 Week 5 Term 3
- ☐ **Final Copy** – In Class Friday
26/8/22 Week 8 Term 3

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

~ Tim Minchin

Name:

**RUBE
GOLDBERG
MACHINE**



Stage 4 Science 2022

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 Forces.

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
- ☐ 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 Force 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 applications of different forces identified with 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 forces used and energy 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 logbook 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 Citation Format

If you're interested only in one chapter of some book, you should cite it separately instead of referencing the entire source. Just add "Ch. 4" (or a number you need) at the very end.

Capitalize the document's title (unless it's an article).

Author, A. A., Year of publication. Title of Document. [medium] Name of Organization/Publisher. Available at: <link> [Accessed Day Month Year].

For many authors, list all authors in the order they're mentioned in the source itself. Put 'and' before the final name.

For journal articles, you're going to need volume and issue numbers. Remember that journals' and magazines' titles must be in italics while titles of articles shouldn't be formatted.

Example in Bibliography:

Loms Group Ltd., 2017. Use of Ethical Practices. [online] Loms Group Ltd. Available at: <<http://www.loms.com/111>> [Accessed 8 April 2019].

Example in Text:

According to Kostins (2009), it is crucial to research rare sea species.

Examples

Here are some basic examples of CDU Harvard author-date style. More detailed examples are included throughout this guide, but where no exact example is provided then these general principles should be followed.

Book and eBook:

Author(s) date book title edition (if applicable) publisher
Samuelson, W & Marks, SG 2015, *Managerial economics*, 9th edn., John Wiley & Sons, Inc.

Journal article:

Author(s) date 'Journal article title' Journal Title vol. no. pages
Chuah, S, Hoffmann, R & Lerner, J 2014, 'Chinese values and negotiation behaviour: A bargaining experiment', *International Business Review*, vol. 23, no. 6, pp. 1203-1211.

Web page or individual document from a website:

Author(s) date Web page title web page URL
Australian Human Rights Commission 2008, *Corporate social responsibility & human rights*, <https://www.humanrights.gov.au/publications/corporate-social-responsibility-human-rights>.

Equipment Order: Due _____

[illegible]

Prepared: _____

Date: _____

Risk Assessment: Due _____

<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: _____

Marking Criteria

	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				
SC4-10PW & SC4-11PW	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 force type & 2 examples		2				
		2. definition of the force type & 2 examples		2				
		3. definition of the force type & 2 examples		2				
		4. definition of the force type & 2 examples		2				
		5. definition of the force 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 force type		8				
		3 applications of forces identified with arrows		3				
		Sources of lost energy for each transformation		3				
		SC4-4WS	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		
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				
		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				
SC4-7WS	Discussion	Discuss TWO problems you encountered and ways of improving your machine.		4				
		Suggest TWO ways of reducing errors.		2				
		Provides an answer to the aim		1				
		Statement about the forces features and energy loss in the machine		2				
	Conclusion	Provides a coversheet with title, student name and teacher		2				
		Provides a bibliography with several references lists by APA		3				
SC4-9WS	Presentation	Complexity of design ideas		4				
		Originality of design		4				
		Rube Goldberg machine executed in class		8				
	Drafting process	Submitted Draft by Tuesday Week 7 (24/08/2020)		2				
		Applied teacher feedback to make multiple corrections to final presentation		2				
Task Mark			Task Rank			Accumulative Rank		