Year 8 Science

Task 5: Student Research Project- Measuring Forces

Due Date: Thursday, 12th September by 3:00pm (Week 8)

Task Distributed: 25/07/23

Unit: Forces

Task Type: Student Research Project

Task Weighting: 20%

Outcomes: SC5-4WS, SC5-5WS, SC5-6WS, SC5-7WS, SC5-8WS and SC5-9WS

Task Description

The work of scientists involves planning and carrying out investigations, making and testing hypotheses or devices, and then communicating their findings and conclusion.

WHAT DO I NEED TO DO FOR THIS ASSESSMENT

- Design and construct a force measuring device, calibrate and test it and
- Give an account of the steps in your process, justifying your choices, as well as some background research on your topic.

WHAT DO I NEED TO SUBMIT FOR THIS ASSESSMENT

In this assessment you will need to:

1. **Research** scientists that have designed and developed devices that have been used to measure forces. Assess their designs and provide a description of each device.

2. **Design**
   - a device that can be used to measure forces between 0 and 3 Newtons (0 and about 300 grams), higher marks will be awarded to devices that can measure both a pull force AND a push force.
   - Gather equipment and build your design (hint: it'll probably need springs or rubber bands as part of it)
   - Calibrate your device and provide a scale for it to measure in both grams and Newtons!

3. **Create and submit a report with the following:**
   - Title
   - Background Research - research how forces can be measured and how we use forces in our everyday lives. To score higher marks, you will need to refer to scientific papers or experiments conducted by other scientists.
   - Equipment - List the equipment that you will be using and the quantities
   - Risk Assessment - Table form; Outline the risks involved and how you will prevent them
   - Draw a labelled diagram - explain how you are expecting it to work in push/pull situations and how you will be able to read the amount of force it is measuring.

- Submit pictures of you using it, showing it registering a force are sufficient, but include at least one close-up of the device itself, and a closeup of the reading on your scale when it is measuring the weight of one chicken egg- **YOU DO NOT NEED TO SUBMIT YOUR PHYSICAL DEVICE**
- Calibration (explain how you made sure it is accurate – hint: a lightweight plastic bag is useful if you remember 1 mL of water weighs one gram and 200 mL weighs 200 grams etc, you will need to research the relationship between force and weight to construct a force scale in Newtons)
- Discussion:
  - Issues (what kind of things proved difficult, or went wrong, and required you to re-think your design or approach? How did you adjust your design or process to fix the issue?)
  - Suggested Improvements (how could it have been made better, or more accurate, or more useful? Make sure you justify how each suggestion would improve it!)

4. **Create a logbook**, and keep it updated with what you did each day you worked on the project.

   - It can be an A4 sheet with all dates from the start of your project to the end. Your logbook needs to show the process of how you researched, planned, and carried out your project, as well as any changes you needed to make along the way.

5. **Bibliography** - Following Harvard Referencing format – see info below for assistance with this, a URL alone is not sufficient.

TIPS

Make sure you **refer to the supplied marking criteria** to ensure you have included everything needed, and in sufficient depth to score well.

Avoid using large sections of text from websites without putting the information into your own words, and don't share your report with others. This is an individual assignment, not a group effort. We often find submissions where several students have identical responses, and we will be checking for this.

Harvard referencing is a citation style used by students, writers, and researchers to legally incorporate other people's quotes, findings and ideas into their own work to validate their conclusions. It includes formatting rules for in-text citations and listing different types of sources in a reference list. The web addresses below will help generate your references in the correct format.

https://www.citethisforme.com/citation-generator/harvard
https://www.mybib.com/tools/harvard-referencing-generator

NESA Glossary of Key Words

Understand the verb associated with the task. These verbs will provide an understanding of the detail needed to successfully answer the question.

- ☐ DISCUSS: Identify issues and provide points for and/or against
- ☐ EXPLAIN: Relate cause and effect; make the relationships between things evident; provide why and/or how.
- ☐ INVESTIGATE: Plan, inquire into and draw conclusions about

- ☐ https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/hsc/hsc-student-guide/glossary-keywords

Details of Submission

You must submit **BOTH** your **logbook** (Diary Entry Booklet / A4 pages) as well as your **FINAL REPORT**. They can be part of the same document.

Your final report should be submitted as a **Google Doc**, approximately **4** to **6 pages** (including ***diagrams and images***). If it is shorter, you should check very carefully that the required depth is there to score well.

Submit it to the Google Classroom link to ensure we receive it on time. It will be marked and returned with annotated constructive feedback comments to assist you in understanding what was done well, and which areas need further development in future assessment tasks.

Teacher Feedback and Student Self-Reflection

- The task will typically be returned to students within 2 weeks of the due date, but this can extend if there are many detailed responses submitted
- At this time, feedback, including information on how to improve, will be provided through mechanisms such as marking criteria and/or written comments, directly on your Google Doc.
- Students can clarify or seek further feedback by speaking with their teacher, or the assessment task marker.
- You will also receive feedback on your literacy performance based on the criteria in the school's literacy marking rubric. The marks achieved for literacy will account for between 10% – 20% of the maximum task value.

Upon return of the task, students will also be expected to complete a self-reflection.

Students will be required to complete a self-reflection worksheet at the time students receive their assessment mark and teacher feedback. Self-reflection is an important part of the learning process as it provides an opportunity to reflect on the strength of our performance, as well as areas that have been identified to strengthen in future tasks.

How does this link to my learning?

Learning and integrating the basic science process skills together and gradually developing abilities to design fair tests is increasingly emphasised in successive grade levels and is an expectation of students in senior science subjects.

Assessment Procedures

All students should be fully aware of the School Assessment Procedures for their year group. These were provided at the beginning of the school year and are available on the school website under the Learning Tab for each year group.

Be aware that every student MUST submit an attempt, even if it is late. Marks are deducted at a rate of 10% per day late, including weekend days, but deductions stop at 5 days after due date, so a 6-day late assignment can still earn up to a score of 50%.

After an assignment becomes more than 5 days overdue, without the student arranging an extension with the Head Teacher (for reasonable causes, and accompanying explanatory note from parents!), contact will be made with the parent(s) to inform them of the lateness.

MARKING CRITERIA:

OUTCOME	*INDICATOR*	EXPERIENCING DIFFICULTY	DEVELOPING	COMPETENT	OUTSTANDING	MARK
SC5-4WS develops questions or hypotheses to be investigated scientifically **SC5-5WS** produces a plan to investigate identified questions, hypotheses or problems, individually and collaboratively	*Research*	No evidence of research on project topic	Very brief or simplistic account of researched material	Satisfactory depth of research presented.	>2 paragraphs dedicated to research findings with multiple points	
		0	*2*	*4*	*6*	
	Design	No evidence of this section being attempted	Very brief design description lacking detail, no images or drawings included	Suitable description of design OR a suitable drawing with labels	Suitable description of design elements AND a suitable drawing with labels	
		0	*2*	*4*	*6*	
	Description of how this device can measure different sized forces	No evidence of this section being attempted	Very briefly worded description of how this device will be capable of measuring a force, lacking detail	Suitable worded description of how this device will be capable of measuring a force	Detailed worded description of how this device will be capable of measuring a force	
		0	*1*	*2*	*3*	
	Device capabilities	Device is inoperable as a force measuring device	Device can measure either a push OR a pull, but not both	Device can measure BOTH a push AND a pull		
		0	*2*	*4*		
	Scale	Device lacks a scale	Device includes a scale showing grams OR newtons	Device includes a scale showing grams AND Newtons		
		0	*1*	*2*		
	Equipment	No equipment list	Equipment list incomplete	Imprecise list of appropriate materials.	Complete, detailed list of appropriate materials	
		0	*1*	*2*	*3*	
SC5-6WS undertake first-hand investigations independently with safety & competence	*Identifies and controls safety risks*	Safety concerns not addressed.	Includes only critical safety concerns or fails to list management strategies	Addresses most safety concerns and includes plans to minimise safety risks	Comprehensive assessment that includes all predictable risks and management strategies	
		0	*1*	*2*	*3*	
SC5-6WS gathers first-hand data accurately	*Calibration evidence*	No photo supplied of device in action	Photo of device in action but not the required can and minus student	Photo of device in action but lacking student OR required egg	Photo with specified mass and student clearly evident.	
		0	*1*	*2*	*3*	
	Calibration process description	Not addressed	Limited description of how calibration was achieved	Detailed and appropriate description of how calibration was achieved.		
		0	*1*	*2*		
SC5-7WS processes, analyses and evaluates data from first-hand investigations and secondary sources to develop evidence-	*Implementation of design issues identified*	No issues identified or discussed	Identifies an issue but solutions not explained	One issue identified and an outline of the solution provided	≥ 2 issues identified with explanation of each solution provided	
		0	*1*	*2*	*4*	

based arguments and conclusions.	*Suggested improvement(s)*	No evidence of suggested improvements	One suggested improvement without justification of why	One suggested improvement with justification of why		
		0	*1*	*2*		
	Justifies inferences (linking data to theory in discussion)	Inferences are not justified by the information gathered.	Justifies inferences through available information but inferences are very weak.	Supports and justifies inferences through specific data.		
		0	*1*	*2*		
	References	No references included	Incorrectly formatted references used	Correctly formatted references used		
		0	*1*	*2*		
	Logbook	No Logbook	Rudimentary attempt lacking dates or significant detail.	Several entries covering the length of the project.	Thorough and detailed entries covering all aspects of the research, design and construction.	
		0	*1*	*2*	*3*	
Literacy (refer to last page)						/5
	Punctuality	Assignment was handed in over 5 days late.	Assignment was not handed in on time.	Assignment was handed in on time.		
		Assignment must still be submitted, but notification to parents required. Maximum score is now 50%	*Minus 10% <u>per day</u> late for first 5 days beyond due date.*	*Full marks possible. (student may score up to 100% based on quality of report)*		**Total score** /50

Feedback Comments:

Note – the intention is to provide feedback within the Google Classroom, directly on the submitted document, but if only a printed version is supplied, or the format of the submitted document does not allow commenting within the Google Classroom Teacher Marking console, then comments will be provided in this space below.

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Literacy Outcomes	Elementary achievement You have:	Limited achievement You have:	Satisfactory achievement You have:	High achievement You have:	Outstanding achievement You have:
Vocabulary *Uses technical vocabulary to explain concepts and/or range of precise and appropriate words for effect*	Very limited response. Few content words used.	Only simple words are used.	Some precise and technical words are used.	Sustained use of precise and technical words.	Sustained, consistent and fluent use of precise and technical words.
	0	0.25	0.5	0.75	1
Punctuation *Use of correct and appropriate sentence and other punctuation for effect, and to aid in reading of the text*	No evidence of correct sentence punctuation.	Sentence punctuation is correctly used in at least one place - *one sentence is punctuated correctly.*	Some correct sentence level punctuation (at least 50%). May attempt other punctuation where it is required.	Mostly correct sentence level punctuation (80%) and at least two correct examples of other punctuation.	Writing contains accurate use of all applicable punctuation.
	0	0.25	0.5	0.75	1
Sentences & Cohesion *The intentional construction of a variety of sentences to match purpose and audience, and the control of multiple sentence threads across the whole text.*	No clear evidence of sentences: a list of words OR text fragments.	At least one sentence is used correctly. Some meaning can be construed from the text.	Some correct formation of sentences. Mainly uses simple and compound sentences but may attempt more complex structures.	Most sentences are correct. Range of sentence types and connectives are evident, but with varied effectiveness.	All sentences are correct, effective and controlled, and include a range of sentence types and connectives (complex sentences and other sophisticated structures)
	0	0.25	0.5	0.75	1
Paragraphs *Paragraphs are used to effectively structure information and partition events and ideas*	No correct use of paragraphing; may be a block of text or random breaks.	Ideas are separated; paragraphs may contain some unrelated ideas.	At least ONE paragraph is well structured and develops an idea	Writing is organised into paragraphs that assist the reader to digest chunks of the text but may not be linked or executed effectively.	All components of the paragraphs are evident, and paragraphing is consistent and well-developed across the whole text.
	0	0.25	0.5	0.75	1
Text Structure *Uses features of the appropriate text type*	No evidence of the structural features of the appropriate text type. *No attempt to write in the appropriate text type and/or response is off task.*	Minimal evidence of the structural features - *1 component evident* - of the appropriate text type.	Some evidence of the structural features - *2 components evident* - of the appropriate text type.	Substantial evidence of the structural features - *all components evident but there may be some lapses* - of the appropriate text type.	Coherent and controlled use of **all** the appropriate structural features of the text type.
	0	0.25	0.5	0.75	1
	Level of response is well below syllabus expectation	Level of response is below syllabus expectation	Level of response is equivalent to syllabus expectation	Level of response is above syllabus expectation	Level of response is well above syllabus expectation