



ORANGE HIGH SCHOOL

ASSESSMENT TASK NOTIFICATION

Subject	Science – Assessment 2 Design Thinking
Topic	Physical World
Class Teachers	G Loud, M Nicholson, M Williams, J Mansur, E Ruwona, M Boardman
Head Teacher	Miss J Huggett
Year	8
Date Given	Week 5A Term 3
Date Due	Week 7A Term 3
Weighting	30%

Assessment Outline

Design Thinking Challenge - Rube Goldberg Machine

This task requires you to demonstrate your skills in design thinking and communicating scientifically. It will involve you creating a solution to an identified problem and presenting it to an audience.

To complete your scientific presentation, you will need to:

- Use the design thinking model to develop and solve your identified problem
- Actively participate in the construction of your Rube Goldberg machine
- Present the task in video format with a commentary

You will need to submit the following:

- Document (digital or physical), explaining your design-thinking process. This includes your explanations, diagrams, evaluations of your machine, and references
- The final video presentation with your commentary.

Non-completion of Task:

If you know you are going to be away on the day that the task is due, you must make alternative arrangements with your teacher beforehand. If you are suddenly away on the day that the task is due, you must contact your teacher or Head Teacher on your return to school. Documentation will be required in both cases.

Plagiarism:

Plagiarism, the using of the work of others without acknowledgement will incur serious penalties and may result in zero award. Any cheating will also incur penalties.

Failure to follow the above procedures may result in a zero award.

The policies and procedures that are outlined on the ROSA booklet will be followed regarding the non-completion of assessment tasks.

Outcomes Assessed

SC4-4WS Identifies questions and problems that can be tested or researched and makes predictions based on scientific knowledge

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

SC4-PW3 Energy appears in different forms including movement (kinetic energy), heat and potential energy, and causes change within systems

Design Thinking Task

RUBE GOLDBERG

Engineer and cartoonist Rube Goldberg is famous for his crazy machines that accomplish everyday tasks in complicated ways.

What you need to do!

1. Your teacher will take some time with you to look at some simple Rube Goldberg machines on the internet. Some are crazy and complicated (and fun!), some are simple and good at solving problems. This will help you start to get ideas on how to set up a machine at home.
2. You are to design and build your own Rube Goldberg machine that performs a simple task for a person that you identify (Step 1 and 2)
 - Use no less than 5 steps and no more than 7 steps
 - Use simple household items to build your machine (e.g. marbles, paper cups, toilet paper rolls, string, paper clips, rubber bands, coat hangers, books, lego, toys, etc.).
3. You will need to draw a labelled diagram of your Rube Goldberg machine (Step 4).
4. Write a brief report explaining each step of your machine. You also need to actively participate in the construction of your machine. (Step 4).
5. You will be working individually to build your machine at home.
6. You will make a video of your machine at home (Step 5). This video is in two parts
 - First, explain your Rube Goldberg Machine setup. Explain each of the steps of your machine.
 - Second, record your machine operating at home. Add a commentary (voice-over) to explain if any steps failed and why, as well as any possible improvements that could be made. (Tip - add the commentary at the time of recording or use video editing software to add the commentary later)
7. You will need to upload your video onto your Google classroom.
- 8.. You will then need to complete and submit all of the written components of the task by the due date. This will either be digitally or physically - your classroom teacher will tell you.

Teacher sign-off:_____

Date:_____

DESIGN THINKING



Stage 1: Empathy

Describe the task that your Rube Goldberg machine will complete.

Describe the needs of the person that will benefit from this machine.

Stage 2: Define

Write a problem statement to guide your task.

E.g. I want to {GOAL OF MACHINE} for {PERSON IDENTIFIED} so that {NEED THE PERSON HAS}.

Teacher sign-off: _____

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Stage 3: BrainStorm (Ideate)

List a minimum of 10 solutions to your problem. No ideas are bad ideas. Get a range, small to big impact to low impact, cheap to expensive

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Arrange your ideas in the matrix

	Low Cost	High Cost
High Impact		
Low Impact		

Teacher sign-off: _____

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Stage 4: Prototype (Build your Rube Goldberg machine)

Diagram:

On this page you are to draw and label your Rube Goldberg machine (IN PENCIL).

You are to draw your machine from the side and from above (looking down). Label all the components used to make your machine. Label each of the "steps" of your machine. Make sure your drawing is big and detailed.

View from side



View from above



Teacher sign-off: _____

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Report

On these pages you are to write an explanation of how each step in your machine worked. For each step, you need to: list the equipment used, describe the function of the step (i.e. why it is there, what it does), describe how the energy is transformed at the step (i.e. from potential to kinetic)

Step 1:

Equipment used:

Function of Step 1:

Energy transformation at Step 1:

Step 2:

Equipment used:

Function of Step 2:

Energy transformation at Step 2:

Step 3:

Equipment used:

Function of Step 3:

Teacher sign-off: _____

Date: _____

Energy transformation at Step 3:

Step 4:

Equipment used:

Function of Step 4:

Energy transformation at Step 4:

Step 5:

Equipment used:

Function of Step 5:

Energy transformation at Step 5:

Step 6:

Equipment used:

Function of Step 6:

Energy transformation at Step 6:

Teacher sign-off: _____

Date: _____

Step 7:

Equipment used:

Function of Step 7:

Energy transformation at Step 7:

Teacher sign-off: _____

Date: _____

Stage 5: Test

Once your machine has been constructed you will need to film the machine running to see if it completed the desired task. You will need to explain in the video if your machine worked, which steps if any didn't work and why, as well as any possible improvements that you could make to your machine in the future. A suggested video format is as follows:

1. Tour of your machine before it has run - Must detail each step from your planning and identify what the energy transformation is.
2. Show your machine operating - even if it fails
3. Talk to the camera about what worked/didn't work and why.
4. Suggest possible improvements to your machine.

Other things your video should include:

- say the problem you are addressing
- talk about the person that the problem affects
- what your solution to the problem is

What can I use to make my video?

iPhone (iOS):

iMovie: iMovie is a powerful video editing app by Apple. It allows you to trim, crop, add text, music, and even special effects to your videos.

Splice: Splice is a user-friendly video editing app that offers a range of features, including trimming, adding transitions, text, filters, and music.

InShot: InShot is a video editor that's popular for its simplicity and effectiveness. It lets you cut, trim, add music, voice-overs, and adjust volume levels easily.

Android:

FilmoraGo: FilmoraGo is an editing app available for Android devices. It offers various editing tools, filters, effects, and voice-overs to enhance your video.

PowerDirector: PowerDirector is a video editing app that's also user-friendly. You can adjust audio levels, add music, and use its audio enhancement tools.

KineMaster: KineMaster is a popular video editing app with multiple tracks, allowing you to layer videos, images, and audio. You can easily adjust audio levels, add background music, and apply various effects.

References

Fill out the following scaffold to show where you got information and inspiration from.

BOOKS					
Author(s) <u>Example:</u> Keay, J.	Date of publication in brackets (2000).	Title of book in italics <i>The Great Arc.</i>	Name of publisher Harper Collins.		
WEBSITES					
Author <u>Example:</u> Landsberger, J.	Date published if available If no date available write (n.d.) (n.d.)	Title of Article Citing Websites.	Title of website in italics <i>In Study Guides and Strategies.</i>	From URL http://www.studygs.net/citation.htm	Date accessed (Accessed: 28 July 2022)
MAGAZINES					
Author <u>Example:</u> Tumulty, K	Date (2006, April).	Title of Article Should they stay or should they go?	Name of Magazine <i>Time</i>	Volume, issue, pages 167(15), 3-40.	
PERSONAL CONVERSATIONS AND EMAILS					
Person's name <u>Example:</u> Mr B. Rock	Date 12/7/16	How you know them Geologist and uncle	Nature of communication email		
Producer and writer / director or for youtube the person who uploaded video <u>Example:</u> Fothergill, A. (producer), Attenborough, D. (narrator).	Date (2005)	Title and type of resource The Blue Planet – Coral Seas [DVD]	Country and company producing video / or the URL UK, BBC.		

Teacher sign-off: _____

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Marking Rubric: NAME: _____

Criteria:	Outcome	Outstanding (A)	High (B)	Sound (C)	Basic (D)	Limited (E)
Stage 1. Empathy	SC4-4WS /5	<ul style="list-style-type: none"> Outstanding description of the task that the machine will complete Detailed description of the need(s) of the identified person Machine and needs clearly linked <p>5 marks</p>	<ul style="list-style-type: none"> Thorough description of a task that the machine will complete Thorough description of the need(s) of the identified person Machine and needs linked <p>4 marks</p>	<ul style="list-style-type: none"> Sound description of a task that the machine will complete Sound description of a need for the identified person <p>3 marks</p>	<ul style="list-style-type: none"> Identifies a task that the machine will complete Identifies a need for a person <p>2 marks</p>	<ul style="list-style-type: none"> Identifies a task that the machine will complete or the need of the person that will benefit <p>1 marks</p>
Stage 2. Define	SC4-4WS /5	<ul style="list-style-type: none"> Complete description of goal of machine and person and need(s) <p>5 marks</p>	<ul style="list-style-type: none"> Thorough description of goal of machine and person and need(s) <p>4 marks</p>	<ul style="list-style-type: none"> Sound description of 2 components of problem statement (goal of machine and/or person and/or needs) <p>3 marks</p>	<ul style="list-style-type: none"> Basic description of 1 component of problem statement (goal of machine and/or person and/or needs) <p>2 marks</p>	<ul style="list-style-type: none"> Attempt identification of component/s of problem <p>1 marks</p>
Stage 3. Brainstorm (Ideate)	SC4-8WS /5	<ul style="list-style-type: none"> Brainstorm at least 10 ideas Ideas are relevant and appropriate for the goal of machine <p>5 marks</p>	<ul style="list-style-type: none"> Brainstorm 8-10 ideas Ideas link to the goal of machine <p>4 marks</p>	<ul style="list-style-type: none"> Brainstorm 5-8 ideas Some ideas link to the goal of machine <p>3 marks</p>	<ul style="list-style-type: none"> Brainstorm 3-4 ideas <p>2 marks</p>	<ul style="list-style-type: none"> Brainstorm 1-2 ideas <p>1 mark</p>
Stage 3. Evaluate using matrix	SC4-8WS /3		<ul style="list-style-type: none"> Appropriately arranges ideas in all areas of matrix <p>3 marks</p>	<ul style="list-style-type: none"> Arranges ideas in the areas of matrix <p>2 marks</p>	<ul style="list-style-type: none"> Attempts to place some ideas in the matrix <p>1 mark</p>	
Stage 4. Prototype Diagrams View from above	SC4-9WS /5	Scientific diagram is <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>5 marks</p>	Scientific diagram has 4 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>4 marks</p>	Scientific diagram has 3 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>3 marks</p>	Scientific diagram has 2 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>2 marks</p>	Scientific diagram has 1 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>1 mark</p>
Stage 4. Prototype Diagrams View from side	SC4-9WS /5	Scientific diagram is <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>5 marks</p>	Scientific diagram has 4 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>4 marks</p>	Scientific diagram has 3 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>3 marks</p>	Scientific diagram has 2 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>2 marks</p>	Scientific diagram has 1 of 5 features listed below <ul style="list-style-type: none"> neat, in pencil, labeled (no arrow heads), straight lines, correct perspective (from above) <p>1 mark</p>
Stage 4. Prototype Report	SC4- PW3 /5	<ul style="list-style-type: none"> Outstanding explanation of the function of 7 steps of the machine Equipment for each step identified with quantities included Outstanding explanation of the energy transformation that is occurring at each step, using scientific language 	<ul style="list-style-type: none"> Clear explanation of the function of 7 steps of the machine Equipment for each step identified with quantities included Clear and correct explanation of the energy transformation that is occurring at each step, using scientific language 	<ul style="list-style-type: none"> Explanation of the function of less than 7 steps of the machine Equipment for each step identified with quantities included Explanation of the energy transformation that is occurring at each step, using scientific language 	<ul style="list-style-type: none"> Attempts explanation of the function of less than 7 steps of the machine Equipment for each step identified with quantities included Attempts explanation of the energy transformation that is occurring at each step, using everyday language 	<ul style="list-style-type: none"> Attempts explanation of the function of less than 7 steps of the machine or Some equipment for each step identified with quantities included or Attempts explanation of an energy transformation

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		5 marks	4 marks	3 marks	2 marks	1 mark
Stage 5. Test Tour of machine	SC4-PW3 /5	<ul style="list-style-type: none"> Extensive description of each step of machine and the energy transformation taking place Scientific language used to an outstanding level 5 marks	<ul style="list-style-type: none"> Thorough description of each step of machine and the energy transformation taking place Scientific language used to a thorough level 4 marks	<ul style="list-style-type: none"> Sound description of each step of machine and the energy transformation taking place Scientific language used to a sound level 3 marks	<ul style="list-style-type: none"> Attempts description of each step of machine and the energy transformation taking place Some scientific language used to a basic level 2 marks	<ul style="list-style-type: none"> Attempts description of each step of machine and the energy transformation taking place or Some scientific language used to a basic level 1 mark
Stage 5. Test Suggestion for improvements	SC4-8WS /5	<ul style="list-style-type: none"> Outstanding self reflection on the machine's benefits and limitations. Suggests multiple scientifically appropriate improvements that to the machine and extensively explains any new energy transformations that would occur 5 marks	<ul style="list-style-type: none"> Thorough self reflection on the machine's benefits and limitations. Suggests multiple improvements to the machine and explains any new energy transformations that would occur 4 marks	<ul style="list-style-type: none"> Identifies benefits and limitations of the machine Suggests improvements that could be made to the machine 3 marks	<ul style="list-style-type: none"> Lists a positive and negative of the machine 2 marks	<ul style="list-style-type: none"> Lists a positive or negative of the machine 1 mark
Stage 5. Test Engaging & clear	SC4-9WS /2			<ul style="list-style-type: none"> Engages and informs audience Clear and steady video footage of the machine set up and it operating 2 marks		<ul style="list-style-type: none"> Video footage of the machine set up and it operating 1 mark

Outcome	SC4-4WS	SC4-8WS	SC4-9WS	SC4-PW3	TOTAL
	Stage 1. Empathy Stage 2. Define	Stage 3. Ideate. Brainstorm Stage 3. Ideate. Matrix Stage 5. Suggestion for improvements	Stage 4. Prototype. Diagrams Stage 5. Test. Engaging & clear	Stage 4. Prototype. Report Stage 5. Test. Tour of machine	
Mark	/10	/12	/13	/10	/45

Total Mark: ____/45

Teacher Feedback:

Teacher sign-off: _____

Date: _____