SCIENCE

NAME: _____

Year 9

Conceptual Model

Assessment booklet

Outcome: How has our understanding of energy transformations contributed to renewable energy technologies?

Students will **individually** complete the activities in this booklet to develop a plan and produce a Solar Oven.

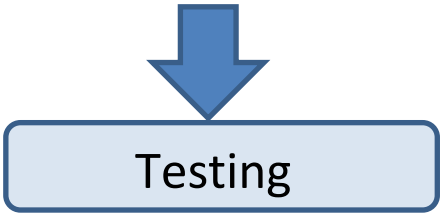
Due: Period 1 (in your Science class) on **Thursday 30th May 2024**.

This **booklet** will be submitted along with the students' Solar **Oven Model** to your class teacher. The booklet can also be accessed from Google classroom.

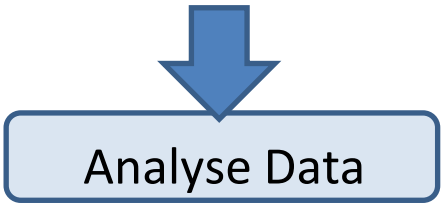
Contents

What to do when designing.

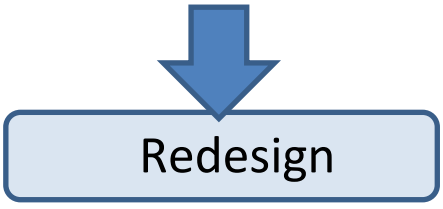
• Gather materials, and, utilizing your blueprint and research, begin constructing a model solar oven design.



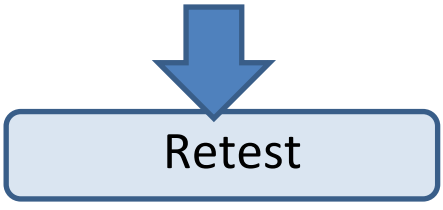
• Test your model to make sure that it can heat the internal area of the oven.
• Record observations and collect data.



• Analyse your data to determine if you need to redesign your model and retest so that your solar oven effectively meets the requirements.

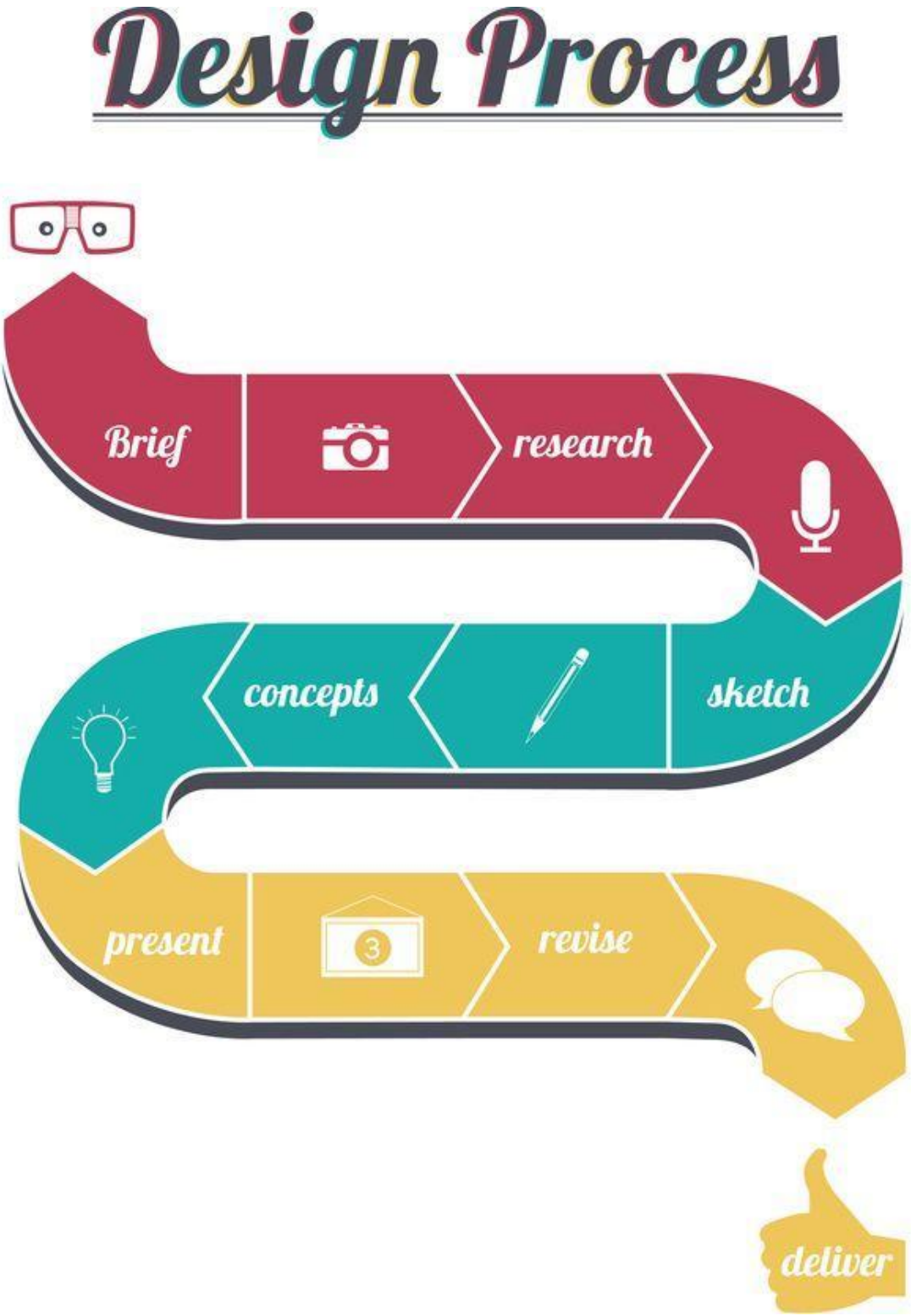


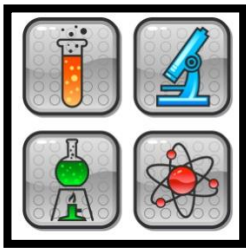
• If adjustments must be made to your design, make your modifications and document such changes.



• Test again to make sure that your model can increase their internal temperature by 100%.

How to approach your Solar Oven





Part A: (14 Marks)

Applying the design brief.

Physical World

Assessment Task 2

Year 9

CONCEPTUAL MODEL

Background Information: (Adapted from Geoscience Australia)

The Australian continent has the highest solar radiation per square metre of any continent and consequently some of the best solar energy resources in the world. The regions with the highest solar radiation are the desert regions in the northwest and centre of the continent.

Australia receives an average of 58 million PJ (Penta joules) of solar radiation per year, approximately 10 000 times larger than its total energy consumption.

However, Australia's current use of solar energy is low with solar energy accounting for only about 0.1 per cent of Australia's total primary energy consumption. The most common use of solar energy is solar thermal water heating. Solar PV (photovoltaic) systems play an important role in off-grid electricity generation in remote areas.

Electricity generation is increasing in response to government policies, notably the Renewable Energy Target, and as a consequence of the development of concentrating solar thermal technologies through substantial research and development programs. The Government's aim is to establish up to 1000 MW (Megawatts) of solar power generation capacity through committing $1.5 billion to support the construction and demonstration of up to four large-scale solar power plants in Australia.

1a) Describe the importance of renewable resources for today's society? ***SC5-4WS*** ***2 Marks***

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1b) Explain the difference between <u>design</u> and <u>function</u> of a model? ***SC5-4WS*** ***2 Marks***

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2. **Demonstrate *TWO*** (2) different designs you looked into. Label the required materials and explain how the model *would function* ***SC5-5WS***
   6 Marks

DESIGN 1.
DESIGN 2.

3. **Explain** the aspects of heat transfer that your solar oven is going to utilise? *You need to address aspects of **conduction**, **convection** and **radiation** of heat transfer and consider these when researching and designing your oven.* ***SC5-8WS*** ***4 Marks***

	Part B: (16 Marks) Assessing and testing your design.	*Physical World* *Assessment Task 2* **Year 9** *CONCEPTUAL MODEL*

This section is to be completed at school during class.

Solar Oven Test Results: ***SC5-5WS*** ***7 Marks***

- ***Weight***: _____ g
- ***Length*** _____ x ***Width***_____ x ***Height*** _____ = _____ m^3
- ***Start temperature***: _____ °C
- ***Final temperature*** (after 15 minutes of testing): _____ °C
- **Percentage Increase in Temperature**: _____%

Testing specification	**Mark**	**Check list**
• Solar oven weighs under 2kg.	**1**	
• Is made from at least **80 %** recycled /recyclable materials. • Is made from at least **50 %** recycled /recyclable materials.	**2** **1**	
• Final product within maximum volume of **0.027m²** **(L = 0.3m x W = 0.3 x H = 0.3m)**	**1**	
• A temperature increase of **at least 100% achieved** when tested outside in the sun for 15 minutes • A temperature increase of **50% -99% achieved** when tested outside in the sun for 15 minutes • A temperature increase of **10% - 49% achieved** when tested outside in the sun for 15 minutes	**3** **2** **1**	

Total /7

Evaluation of your Solar Oven construction process and testing performance.
SC5-8WS

1. **Describe** the trends/pattern displayed in your testing. ***3 Marks***

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2. **Identify TWO** (2) alterations you could make to your model to improve efficiency. **Explain** how each of these modifications would improve the performance of the solar oven.

4 Marks

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3. **Identify** a material not used in your solar oven that could be used to increase the temperature your solar oven can reach. **Explain** how the material would improve the overall temperature of your oven. ***2 Marks***

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