Science **8** – **G**RADE **P**ROJECT

BC CURRICULUM **C**ONNECTIONS

COMPETENCIES

Questioning and Predicting

- Demonstrate a sustained intellectual curiosity about a scientific topic or problem of interest
- Formulate hypotheses and make predictions about the findings of their inquiry.

Planning and conducting

- Measure and control variables through fair tests
- Observe, measure, and record data

Processing and analyzing data and information

- Construct and use a range of methods to represent patterns or relationships in data
- Seek patterns and connections in data from their own investigations and secondary sources.
- Use scientific understandings to identify relationships and draw conclusions

Evaluating

- Reflect on their investigation methods and the quality of data collected and identify possible sources of error and suggest improvements.

Applying and Innovating

- Co-operatively design projects
- Transfer and apply learning to new situations

Communicating

- Communicate ideas, findings and solutions.

CONTENT

Behaviours of light

- Reflection, refraction, absorption, transmission, scattering.
- Images formed by lenses and mirrors.
- Effects of translucent, transparent, and opaque objects.

Science **8** – **G**RADE **P**ROJECT

PROJECT: The Solar Oven

GOAL: Build a solar oven that heats a cup of water to boiling point (100°C, 212°F)

BIG QUESTIONS:
1. What are the properties and behaviors of light?
2. How can energy be transferred?

DATES, DETAILS & RESPONSIBILITES

DATE: _____

[GROUP] Initial Research and sketches due. Each group should submit:

- Research at least 3 solar oven designs. In your search, you must include: (1) the link(s) where you found the design (2) a picture of the design, and (3) a written paragraph explaining what elements of the design you like.
- Provide a sketch of the solar oven you plan on constructing. You must (1) have at least 2 views, (2) include all important features, (3) make it neat, and (4) label your sketch. This sketch will serve as a blueprint for your first solar oven.
- A 1 page report explaining the advantages of the features you've included in your design.

DATE: _____

[GROUP] Solar Oven Test #1

DATE: _____

[INDIVIDUAL] Post-Lab report due. Post-lab guidelines are as follows:

- Each student must **submit their own** 1-2 page post-lab report.
- Include at least 5 Pictures from different views of your solar oven
- Provide a list of materials for the solar oven you constructed. Also, write 1-2 paragraphs re: what you made (include key features), what improvements you made since last time (if applicable), and some possible sources of error during this test that affected the performance of your solar oven.
- Provide qualitative and quantitative observations from your test. Include a data table with initial and final temperatures of both your prototype and the control.
- A paragraph written in CER format explaining what you will do next time to improve your result. Include a hypothesis.

DATE: _____

[GROUP] Solar Oven Test 2.

DATE: _____

[INDVIDUAL] Post-Lab report due. Follow previous guidelines.

DATE: _____

[GROUP] Solar Oven Final.

DATE: _____

[INDIVIDUAL] Post-lab report due. Follow previous guidelines.

MARK DISTRIBUTION

[20 marks]	Initial Research and Sketches
[10 marks] x 3	Post lab reports
[5 marks] x 2	Solar Oven Test 1 and 2.
[5 mark]	Bonus Performance mark – dependent on Solar Oven Final results
[60 marks]	Total Marks Possible

SUBMISSION PROCEDURE

Initial Research and Sketches will be submitted to the teacher as a **physical copy**

Post lab reports will be submitted to the teacher **digitally**. This will be done on **Freshgrade.com**.

SOLAR **O**VEN – **D**ESIGN **I**NSTRUCTIONS

GOAL: To build a solar oven that heats a cup of water to boiling point (100°C, 212°F)

RULES & RESTRICTIONS

- Must be homemade. It cannot be a solar oven that has been store bought.
- All building materials must be biodegradable, reusable, or recyclable.
- With the exception of adhesive tape, duct tape, and masking tape, only reusable or recyclable plastics can be used (ie. No Styrofoam).
- Oven must be large enough to hold a vessel of water containing 200 mL of water.
- You must provide your own vessel to hold the water. Water is not allowed to be poured directly on the oven.
- Solar oven must work without any supervision (ie. It must be "hands free"). Students will not be allowed to hold, manipulate, or move the oven or parts of the oven when it is being tested.
- Solar oven cannot be powered by anything else except by the sun (ex. You cannot use solar power to light a fire and then have the fire heat the water).
- Solar oven cannot destroy the vessel, the oven, or its environment.

ONLINE RESOURCES

http://www.solarcooking.org/plans/

Website with a variety of different types of solar ovens. Click on individual solar oven designs for instructions on how it's made.

http://www.re-energy.ca/solar-oven

Website with basic solar oven construction plan

VIDEO: https://youtu.be/jrje73EyKag

A video produced by The King of Random titled "Burning Stuff with 2000°F Solar Power!!" This video shows how a solar oven doesn't just have to be made of mirrors. According to the description, "*Melt a stack of pennies, burst a glass bottle, damage various food items, and incinerate wood using the power of the Sun! This 4 foot magnifying lens will melt concrete, and nearly anything else that gets in its way.*"

VIDEO: https://youtu.be/XFw7U7V1Hok

A video produced by The King of Random titled "How to get 2000°F Solar Power". This video shows how simple it is to get the materials to make a solar scorcher. According to the description, *"Convert a junk TV into a 2000ºF solar cooker. Here's a technique for hacking a 4 foot mega magnifying lens out of your old TV, and some of the things you can do with it!"*

MARKING **C**RITERIA – **C**URRICULAR **C**OMPETENCIES

Science competencies will be evaluated on a Pass/Fail basis.

Questioning and Predicting		
Demonstrate a sustained intellectual curiosity about a scientific topic or problem of interest	F	P
Formulate alternative hypotheses based on their questions	F	P
Make predictions about the findings of their inquiry	F	P
Planning and Conducting		
Measure and control variables (dependent and independent) through fair tests	F	P
Observe, measure, and record data (qualitative and quantitative) using equipment with accuracy and precision	F	P
Ensure safety and ethical guidelines are followed in their investigations	F	P
Processing and analyzing data and information		
Construct and use a range of methods to represent patterns or relationships in data, including tables, graphs, keys, models, and digital technologies as appropriate	F	P
Seek patterns and connections in data from their own investigations and secondary sources	F	P
Use scientific understandings to identify relationships and draw conclusions	F	P
Evaluating		
Reflect on their investigation methods, including the adequacy of controls on variables (dependent and independent) and the quality of the data collected	F	P
Identify possible sources of error and suggest improvements to their investigation methods	F	P
Demonstrate an awareness of assumptions and bias in their own work and secondary sources	F	P
Demonstrate an understanding and appreciation of evidence (qualitative and quantitative)	F	P
Applying and innovating		
Co-operatively design projects	F	P
Transfer and apply learning to new situations	F	P
Generate and introduce new or refined ideas when problem solving	F	P
Communicating		
Communicate ideas, findings, and solutions to problems, using scientific language, representations, and digital technologies as appropriate.	F	P