



ORANGE HIGH SCHOOL

ASSESSMENT TASK

Subject	Earth and Environmental Science
Topic	Earth's Resources
Class Teacher	Ms J Mansur
Head Teacher	Mr A Routh
Year	11
Date Given	Thursday 7 th April 2022
Date Due	Friday 29 th April 2022 (Week 1, Term 2)
Weighting	30%

Assessment Outline

As part of the Preliminary Earth & Environmental Science course, students will be required to investigate how non-renewable geological resources are extracted.

The Task:

- 1) Undertake an investigation to model how geological resources are recovered and analyse the profitability of operating the mine and the restoration of damaged lands after mining operations cease.
- 2) Complete a depth study to describe the locations and extraction methods of mining copper with a focus on Cadia Mine.

Investigation: Cookie Mining

- Extraction of the 'ore'
- Calculating equipment used, total cost of mining and total profit
- Analyse why the reclamation of the mine should be considered when calculating the economic profitability of the mine

Depth study: Copper as an ore of economic importance

- a **description** of how copper is extracted including a labeled diagram
- a **flow chart** detailing the stages in processing the copper ore to copper metal
- **identify** locations where copper is extracted in Australia (including a labeled diagram)
- **provide detail** on the operations of Cadia mine
- an **assessment** of the environmental effects of the mining method

Your report will include the investigation and the depth study.

Your report should use multiple sources of information and all should be correctly cited using the APA style (got to: <https://www.citethisforme.com>).

The task is worth 30% of your course marks.

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 a 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 in the OHS Preliminary assessment booklet will be followed regarding the non-completion of assessment tasks.

Outcomes Assessed

This task will evaluate a student's ability in the following course outcomes.

- **EES11-8** - describes the key features of the Earth's systems, including the geosphere, atmosphere, hydrosphere and biosphere and how they are interrelated
- **WS 11.1 Questioning and predicting**
 - develop and evaluate inquiry questions and hypotheses to identify a concept that can be investigated scientifically, involving primary and secondary data
- **WS 11.2 Planning investigations**
 - assess risks, consider ethical issues and select appropriate materials and technologies when designing and planning an investigation
- **WS 11.4 Processing data and information**
 - apply quantitative processes where appropriate
- **WS 11.6 Problem solving**
 - solves scientific problems using primary and secondary data, critical thinking skills and scientific processes

	Extensive A	Thorough B	Sound C	Basic D	Elementary E
Calculations WS 11.4	All components are completed Calculations are correct		Some components are completed Some calculations are correct		Minimal components are completed Some calculations are attempted
	3		2		1
Diagram WS 11.4	Clearly presented diagrams which are accurately drawn and labelled 3 completed diagrams		Some diagrams are accurately drawn 2 or less diagrams included		Simple diagrams included
	3		2		1
Conducting the investigation WS 11.2	Employs safe work practices and conducted experiment in an effective manner		Issues with safety AND/OR did not use time effectively		Issues with safety AND did not use time effectively
	3		2		1
Depth Study Description WS 11.6	Extensive evaluation of mining extraction, detailed diagram included	Thorough evaluation of mining extraction, includes a diagram	Evaluation of mining extraction	Description of mining extraction included	Basic description of mining extraction
	5	4	3	2	1
Depth Study Flow Chart WS 11.6	Exceptional flow chart and explanation of all stages in the processing of copper	Flow chart detailing all stages in the processing of copper, summary of process included	Flow chart including all stages in the processing of copper	Flow chart included	Flow chart included but missing some steps
	5	4	3	2	1
Depth Study Locations identified WS 11.6	Clearly identifies all locations in Australia where copper is extracted including a detailed diagram	All locations identified in Australia with diagram	Some locations identified in Australia with basic diagram	Limited locations identified in Australia with basic diagram	Limited locations identified in Australia
	5	4	3	2	1
Depth Study Cadia Mine Operation WS 11.8	Detailed explanation of the Cadia Mine operations	An explanation of the Cadia Mine operations	Information of the Cadia Mine operations	Cadia Mine operations are included but no detail provided	Brief mention of the Cadia Mine operations
	5	4	3	2	1
Depth Study Environmental Effects WS 11.8	Detailed assessment of the impacts of mining on the environment	Environmental effects of mining methods assessed thoroughly	Environmental effects of mining method description is satisfactory	Environmental effects of mining methods included	Little information on the environmental effects of mining included
	5	4	3	2	1
Reference list WS 11.1	Extensive (more than 10) reference list is included and is correctly formatted using the APA style		Reference list is included but the list is not correctly formatted		An attempt at a reference list has been made
	3		2		1
Conclusion WS 11.6	Extensive analysis of considering the economic profitability of the mine	Through analysis of considering the economic profitability of the mine	Explanation considering the economic profitability of the mine	Description in considering the economic profitability of the mine	Basic description of considering the economic profitability of the mine
	5	4	3	2	1

WS 11.4	/6	Feedback:
WS 11.2	/3	
WS 11.6	/20	
EES 11.8	/10	
WS 11.1	/3	
Total	/40	

Cookie Mining

Materials:

Chocolate chip cookie (\$3); Jumbo chip cookie (\$5)

Grid paper

Toothpick

Paper clips

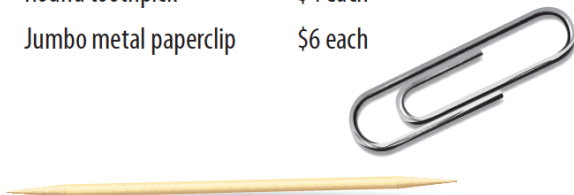
Directions:

1. Place your cookie on the grid paper. Remove the chocolate chips it contains using the tools that you purchase. Complete the cost sheet.

Special Instructions:

1. Select and purchase your mining property (cookie). Understand that the regular chocolate chip cookie is less costly (has fewer and smaller chocolate chips); while the jumbo chocolate chip cookie is costlier (larger chips). Record your cost on the sheet.
2. After choosing your mining property, place it on the grid paper and using a pencil, trace the outline of the cookie. This circle is your mine footprint.
3. Purchase your mining equipment. More than one piece of equipment may be purchased. Record your costs.

Mining equipment for sale:
Flat toothpick \$2 each
Round toothpick \$4 each
Jumbo metal paperclip \$6 each
4. Mine your cookie for no more than 5 minutes. During this time try to remove all of the ore it contains. The cost of mining is \$1 per minute. Record this cost.
5. The mine earns \$1 for every chocolate chip that is mined. Broken chips can be combined to make a whole chip.
6. When the mining process is complete, any remaining crumbs must be placed back into the footprint, the circled area, on the grid paper. You must use tools to complete this task.
7. Deduct \$1 for each grid square that is filled with crumbs that are returned to the mine footprint. This is the cost of reclaiming the mine site.
8. Analyse your results by answering the question about the mining process.



COOKIE MINING COST SHEET

1. Type of Cookie _____
Price of Cookie \$ _____
2. Equipment used
Flat Toothpick _____ x \$2 = \$ _____
Round Toothpick _____ x \$4 = \$ _____
Paper Clip _____ x \$6 = \$ _____
3. Mining _____ minutes to complete x \$1 = \$ _____
4. TOTAL COST OF MINING (ADD: Above items)
\$ _____
5. TOTAL VALUE OF CHIPS
(number of chips removed (mined) _____ x \$1)
\$ _____
6. RECLAMATION FEE
(reclamation: _____ grid squares x \$1 = \$ _____
* extra crumbs x \$1
\$ _____

HOW MUCH DID WE MAKE?

BUDGET	\$25
TOTAL VALUE OF CHIPS	+ \$ _____
	= \$ _____ (Total 1)
TOTAL COST OF MINING	- \$ _____
	= \$ _____ (Total 2)
RECLAMATION FEE	- \$ _____
	= \$ _____ (Total 3)
	Profit (+) of Loss (-)
Total 3	\$ _____
INITIAL BUDGET	- \$25
	= \$ _____ Profit (+) or Loss (-)

NAME YOUR MINE: _____

TOTAL CHOCOLATE CHIPS MINED: _____

CHIPS

CRUMBS

Conclusion:

Analyse why the reclamation of the mine should be considered when calculating the economic profitability of the mine? (5 marks)
