Bright Future STEM Program

STEM LESSON PLAN

YEAR 6 SCIENCE

CHOC-CHIP BISCUIT COAL MINE

Physical sciences
Electrical energy can be transferred and transformed in electrical circuits and can be generated from a range of sources (ACSSU097)

This lesson plan encourages students to consider whether an energy source is sustainable

Teacher preparation

Overarching learning goal: Students understand what coal is, why we use it and how it is extracted. They recognise that the mining of coal can have environmental impacts, and they begin to understand that coal mining can be planned in ways that can minimise its environmental impact.

In this lessons students are asked to investigate how coal mining can impact the immediate environment.

Hot tip: Students may need to thoroughly clean the surface of the tables they are working on. Students must wash their hands before the activity starts.

Teaching sequence

10 minutes - All about coal

40 minutes - Choc-chip Biscuit Mining and Analysis

10 minutes - Reflection

Work through this resource material in the following sequence:

PART A: ALL ABOUT COAL

Step 1. Begin this lesson by introducing students to the topic of coal.

Learn more about coal here - https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/69736

Map of Australian Coal Resources - https://d28rz98at9flks.cloudfront.net/69736/69736.jpg

As part of your discussion, consider highlighting some of the following facts about coal mining and energy production in Australia:

- Coal is used to generate electricity and make steel
- Most of the coal mined in Australia is exported, mostly to eastern Asia.
- Coal provides about 70% of Australia's electricity production.
- Black coal is used to generate around half of all our electricity.
- The majority of Australia's black coal resources are located in Queensland and New South Wales in the Bowen, Surat and Sydney basins.

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PART B: CHOC-CHIP BISCUIT MINING

Step 1. In this lesson their task is to compare two different land sites (chocolate biscuits) that contain coal and attempt to mine the coal with minimal environmental impacts. Your students will mine your land (your two biscuits) looking for coal (chocolate chips) with their whiz-bang, state of the art mining equipment (the toothpicks).

YOUR STUDENTS ARE NOT ALLOWED TO EAT THE BISCUITS UNTIL THE EXERCISE IS COMPLETE!

As a class, decide which biscuits will be mine 'site A' and which will be mine 'site B'. Ask your students to label your biscuits as site A or B.

Step 2. Mining procedure

Guide your students through the following steps (instructions also available on the Student Worksheet):

1. Trace the outline of site A on a piece of paper. Map the location of the chocolate chips that you can see onto the outline of site.
2. Around each of your coal mines (your biscuits) draw a forest and a creek and any other natural features you'd like to include (eg. animals).
3. Count the pieces of coal on the surface of your site. Record this number on the chart.
4. Using your mining equipment, carefully mine as many pieces of coal from the cookie as you can. Set aside the coal in a pile.
5. Count the number of pieces of coal mined from your site. Record the number on your chart.
6. Put your site back together without the coal in it. Compare it to the map of your site.
7. Repeat for site B.

Following the successful mining of the coal mines, ask your students to fill out their Student Worksheet and compare class results. Also ask students to spend some time discussing the questions on their activity sheet.

Step 3. Analysis of results

Invite students to work in pairs or as a class to answer the following questions. Once complete, invite students to write their own answers to the questions using in the spaces provided on the Student Worksheet:

- Which site was easier to mine and why?
- How different did the site look after it was mined?
- How do you think the plants and animals at your site would feel about the mining at your site?
- Once the site is mined, what needs to happen?
- How do you think the plants and animals at your site would feel about the mining at your site?
- Back to the biscuit – is it possible to reconstruct it? Is it still a chocolate chip biscuit?
- Once the chocolate has been removed and consumed there is no more chocolate. Is this an example of a renewable resource or non-renewable resource? Explain your answer.

REFLECTION

Invite students to work independently to answer the following questions (also available on the Student Worksheet):

- I used to think...
- But now I think...

Cool Australia is acknowledged with developing this resource

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CHOC-CHIP BISCUIT COAL MINE

Name..... **Class**:.....

Thought starter: How deep can we mine?

Your job is to compare two different land sites (chocolate biscuits) that contain coal and mine the coal from these sites. You will mine your land (your two biscuits) looking for coal (chocolate chips) with the toothpicks. As a class, decide which biscuits will be mine 'site A' and which will be mine 'site' B. Label your biscuits as site A or B.

LET'S GET STARTED

1. Trace the outline of site A on a piece of paper. Map the location of the chocolate chips that you can see onto the outline of site.
2. Around each of your coal mines (your biscuits) draw a forest and a creek and any other natural features you'd like to include (eg. animals).
3. Count the pieces of coal on the surface of your site. Record this number on the chart.
4. Using your mining equipment, carefully mine as many pieces of coal from the cookie as you can. Set aside the coal in a pile.
5. Count the number of pieces of coal mined from your site. Record the number on your chart.
6. Put your site back together without the coal in it. Compare it to the map of your site.
7. Repeat for site B.

CHOC-CHIP BISCUIT COAL MINE ANALYSIS

MY TOTALS

Site	Number of pieces of coal on surface	Number of pieces of coal mined
A		
B		

MY CLASS TOTALS

Site	Number of pieces of coal on surface	Number of pieces of coal mined
A		
B		

ANALYSIS QUESTIONS

1. Which site was easier to mine and why?

2. How different did the site look after it was mined?

3. How do you think the plants and animals at your site would feel about the mining at your site?

4. Once the site is mined, what needs to happen?

5. How do you think the plants and animals at your site would feel about the mining at your site?

6. Back to the biscuit – is it possible to reconstruct it? Is it still a chocolate chip biscuit? Explain your answer.

7. Once the chocolate has been removed and consumed there is no more chocolate. Is this an example of a renewable resource or non-renewable resource? Explain your answer.

REFLECTION QUESTIONS

I used to think...	But now I think...
.....	.....
.....	.....
.....	.....
.....	.....