Geography and Mining in BC

Purpose: Students will read about six mines in BC, learn challenging new vocabulary, and practice mapping skills on modified maps of BC.

Method: Under the guise of a “Super Sleuth of BC”, students will read their way through an information sheet about the mine, solve clues, complete a word scramble, deduce the mystery word for the mine, follow step-by-step instructions to place the mine on a map of BC, and plot the transportation route of the mine’s product. Topics covered include general geography of a region, some history, mine operations, mineral/metal processing, transportation routes, uses of minerals and metals, and interesting facts. The lessons are rich in new vocabulary and challenge words are highlighted in the text and reinforced in the student activities. Answer Keys are provided for each Student Page except for the mapping page. A reference map has been provided to assist with this activity.

Materials:
- atlas (one for each pair of students)
- dictionary (one for each child)
- overhead projector
- BLM for Mining Information Sheets (1 - 6)
- BLM for Super Sleuth of B.C. Clue/Word Scramble Page (1 - 6)
- BLM for Vocabulary Match Page (1 - 6)
- BLM for Mapping Instruction Page (1 - 6)
- BLM of Map of B.C. for each mine (1 - 6)
- Regional and Mine Location Reference Map (E-57) (Use for all Sleuthing)
- teacher-made overheads of B.C. maps (1 - 6)

Note: Only the worksheets for Quinsam Mine are included in the binder. The entire Geography and Mining in BC unit is in PDF form on the Resource Unit USB.

Considerations: The Super Sleuth of British Columbia section assumes the pre-teaching of mapping skills such as identifying a symbol, locating a body of water, understanding the function of a border, and being aware of cardinal directions.

Each of the six Mine Studies follows a similar format and may be taught independent of the others (length of information pages vary from 1 to 2 pages). As well, each activity may be completed on its own in combination with the information sheet. Select all or just one of the activities, the choice is yours. Students may work independently, with a partner or a small group, or as a whole class. A recommended sequence for the activities is listed below.

1. Read Information Sheet for the Mine
2. Complete the Vocabulary Match
3. Solve the Clue Chart and Word Scramble pages
4. Follow Mapping Instructions to locate the mine on a map of BC
SUGGESTED ACTIVITIES

K-W-L

Begin Geography and Mining in B.C. with the K-W-L strategy (E-48). Together on large chart paper, have students tell what they know about geography and mining in B.C.. Then brainstorm questions about what they want to know about these topics. At the end of each mine study, ask students to tell what they have learned.

Venn Diagram – Compare & Contrast

When you have completed two Mine studies, divide the class in half and give each group the responsibility of representing facts about one mine. On large chart paper, print facts that are “Like” and “Different” about the mines, the towns, and/or the transportation routes. Have a class discussion comparing and contrasting these topics. Print sentence frames showing comparisons (e.g. Campbell River and Kimberley are similar/different because ________________) Students may complete these frames using the completed Venn Diagram as a reference.

“Jigsaw-like” Presentations

Divide the class into six groups. Provide each group with a Mine Information Sheet. Set a time limit for students to read the study and prepare an interesting presentation. Remind them to keep their ideas TOP SECRET. Upon completion, have each group present their ideas. A presentation might be a skit showing the transformation of ore into a common object or a diagram describing a miner’s responsibility on the job.

Writing

Have students write their explanation of how the mystery word for each mine came to be. (See Table 2.)

Independent Research

Students may want to find out more about mining. The K-W-L chart is a good resource for ideas. Students may use resources such as the library or internet to research and present their ideas to the class. Some may want to write to the mine and ask specific questions about a particular job or process. (Addresses are included in Table 3.)

Research Topic Ideas: How Coal is Made; The Gold Rush in BC; How to Stake a Claim; Tell About Open Pit Mining; Tell About Underground Mining; Machines Used at a Mine; Why Mining is Important; Mining and the Environment; Living in a Mining Town; Barkerville. (These ideas may be used as a starting off point for a class research project).
Table 1: Mines and Regions of BC

<table>
<thead>
<tr>
<th># Mine</th>
<th>Nearest Town</th>
<th>Product</th>
<th>Region in BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quinsam (s), ①</td>
<td>Campbell River</td>
<td>Coal</td>
<td>Vancouver Island</td>
</tr>
<tr>
<td>2. Myra Falls (ug) ②</td>
<td>Campbell River</td>
<td>Lead/Zinc</td>
<td>Vancouver Island</td>
</tr>
<tr>
<td>3. Endako (s)* ③</td>
<td>Endako (village)</td>
<td>Molybdenum</td>
<td>Nechako</td>
</tr>
<tr>
<td>4. Elkview (s)</td>
<td>Sparwood</td>
<td>Coal</td>
<td>Kootenay</td>
</tr>
<tr>
<td>5. Trend (s)* ③</td>
<td>Tumbler Ridge</td>
<td>Coal</td>
<td>Northeast</td>
</tr>
<tr>
<td>6. Copper Mountain (s)</td>
<td>Princeton</td>
<td>Copper</td>
<td>Southwest</td>
</tr>
</tbody>
</table>

Note: UG = underground; S = surface.

Table 2: Mystery Solutions and Explanations

<table>
<thead>
<tr>
<th># Mine</th>
<th>&quot;Case of the..&quot;</th>
<th>Solution</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quinsam</td>
<td>Missing Gem Stone</td>
<td>Diamond</td>
<td>Coal and Diamond are both made of Carbon</td>
</tr>
<tr>
<td>2. Myra Falls</td>
<td>Island Park Mine</td>
<td>Myra</td>
<td>The mine is in Strathcona Park</td>
</tr>
<tr>
<td>3. Endako (s)*</td>
<td>Forgotten Mine</td>
<td>Thirty-Seven</td>
<td>Production started after 37 years</td>
</tr>
<tr>
<td>4. Elkview (s)</td>
<td>Overweight</td>
<td>Tonne</td>
<td>Haul truck measured in tonnes</td>
</tr>
<tr>
<td>5. Trend (s)*</td>
<td>Dinosaur Mine</td>
<td>Dinosaur</td>
<td>Dinosaur fossils found near the site</td>
</tr>
<tr>
<td>6. Copper Mountain (s)</td>
<td>Super Pit Mine</td>
<td>Community</td>
<td>Most workers come from Princeton</td>
</tr>
</tbody>
</table>

Table 3: Mine Addresses c/o Public Relations Officer

<table>
<thead>
<tr>
<th># Mine</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quinsam</td>
<td>Box 5000, Campbell River, BC V9W 5C5 ①</td>
</tr>
<tr>
<td>2. Myra Falls</td>
<td>Box 8000, Campbell River, BC V9W 5E2 ②</td>
</tr>
<tr>
<td>3. Endako (s)*</td>
<td>General Delivery, Endako, BC V0J 1L0 ③</td>
</tr>
<tr>
<td>4. Elkview (s)</td>
<td>R.R.#1, Highway 3, Sparwood, BC V0B 2G0</td>
</tr>
<tr>
<td>5. Trend (s)*</td>
<td>Box 919, Tumbler Ridge, BC V0C 2W0 ③</td>
</tr>
<tr>
<td>6. Copper Mountain (s)</td>
<td>PO Box 1400, Princeton, BC V0X 1W0</td>
</tr>
</tbody>
</table>

Note: Please limit number of letters to one per class.

2018: ① Not operating at full capacity, ② Undergoing infrastructure upgrades
      ③ Care and Maintenance
K – W – L Geography and Mining in BC

K – What I Know

W – What I Want to Know

L – What I Have Learned
Venn Diagram

Geography & Mining in British Columbia

Different

Alike

Different

_______________ Mine

_______________ Mine
Information Sheet #1 - Quinsam Mine

Did you know that coal is actually packaged energy made mostly of carbon? Millions of years ago, rainforests of large, leafy plants grew from the sun's energy and over time were compressed into 30 foot layers called peat. Peat is Mother Nature's first step in making coal! Add a few millions years more, plus layers of sand and pressure and you get thermal coal. Thermal coal is low grade coal. Add even more time and pressure, plus the shifting of the Earth, (tectonics) and it is compressed into a 5 foot layer known as metallurgical coal. This is a higher grade of coal because it took more time and pressure to make it. Remember that the energy from the sun is not lost. It's just reduced into a package that we call coal. Another form of showy carbon is diamond.

The people at Quinsam Mine on Vancouver Island appreciate the science of how coal is formed. They also understand that people today need the energy that coal provides. For instance, the energy generated from coal is used to make the steam that turns the turbines that creates the electricity for the people who live in China. Coal is also used to make lighter and stronger cement to make safer bridges and skyscrapers. Because coal is an organic product made from plants, it is also found in things like lipstick, aspirin, disinfectants, almond flavouring, and mothballs. Did you know that coal is rich in colour and is used to make dyes and paints brighter?

Quinsam Mine is the only underground coal mine in BC. It currently employs about 50 people directly from the nearby town of Campbell River. Mining is the third largest industry in the area. Other nearby industries are forestry, pulp and paper, fishing, and tourism. The Campbell and Tsable Rivers flow near the town and the mine. This region of BC is called the Vancouver Island/Coast Region.

Quinsam operates 24 hours a day, 7 days a week and it produces 50,000 tonnes of clean coal each year. When the raw material called ore is removed from the ground, it is separated into good and lesser quality piles of coal. This lesser quality coal is stored in an open pit hold for future use. The mine can easily and cheaply export coal around the world because it is very close to the Pacific Ocean. Dump trucks move loads of coal 28 kilometres along the highway to a boat launch. Barges are loaded using conveyor belts and the coal is flattened down for the trip to Vancouver. Later the coal is transferred to seagoing ships and is sent to buyers in other countries.
Super Sleuth of B.C. Clue Chart for Quinsam Mine

*Mining Mystery #1 – The Case of the Missing Gemstone*

**Step 1:** Use the Quinsam Mine information sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clues</th>
<th>Clues Solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 30 foot layer of compressed rainforest is called</td>
<td>peat</td>
</tr>
<tr>
<td>The shifting of the Earth’s layers is called</td>
<td>tectonics</td>
</tr>
<tr>
<td>When coal is burned, it releases heat and</td>
<td>energy</td>
</tr>
<tr>
<td>People in China use coal to make steam and</td>
<td>electricity</td>
</tr>
<tr>
<td>The opposite of inorganic</td>
<td>organic</td>
</tr>
<tr>
<td>Coal makes cement lighter and</td>
<td>stronger</td>
</tr>
<tr>
<td>People use this to clean their toilet's germs.</td>
<td>disinfectant</td>
</tr>
<tr>
<td>Quinsam is located on this island.</td>
<td>Vancouver</td>
</tr>
<tr>
<td>Quinsam trucks its coal to this ocean.</td>
<td>Pacific</td>
</tr>
<tr>
<td>The opposite of import.</td>
<td>export</td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Missing Gemstone”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #1. Good Luck!
The Case of the Missing Gemstone
Word Search
No hidden words or phrases

DIAMOND   ELECTRICITY   EMPLOY
DISINFECTANT  ENERGY   GRADE
EXPORT   FILM   INDUSTRY
ORGANIC   PACIFIC   OPERATE
PEAT   STRONGER   ORE
TECTONICS   VANCOUVER   PRODUCE

I have solved The Case of the Missing Gemstone!
The answer is DIAMOND! It’s Elementary!
Super Sleuth of B.C. Clue Chart for Quinsam Mine

*Mining Mystery #1 – The Case of the Missing Gemstone*

**Step 1:** Use the Quinsam Mine information sheet to solve the following clues:

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**Intermediate Integrated Resource Unit on Mining**

**Topic E - Mapping the Mines**

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**The Case of the Missing Gemstone**

**Word Search**

No hidden words or phrases

```
V V T X G R T Y G R A D E Y W
U P R O D U C E X X Y E F N N
D R S F I B F C C T X A T J S
X I T K S E V F I T X I I T I
E E S S F W A C X W O O U L F
N Z B I X J I F Y K R N X P I
E R I L N R I T O X G R I A L
R L O X T F T Z P U A P J C M
G W R C H H E X E X N O X I S
Y S E R J A D C A X I P X F E
N L R E X P O R T L C E A I M
E F S K I S L E Y A X R S C P
V A N C O U V E R S N A B H L
Q A B O R L I N D U S T R Y O
I T U X R S T R O N G E R E Y
```

**Extra Words**

<table>
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<th>DIAMOND</th>
<th>ELECTRICITY</th>
<th>EMPLOY</th>
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<td>STRONGER</td>
<td>ORE</td>
</tr>
<tr>
<td>TECTONICS</td>
<td>VANCOUVER</td>
<td>PRODUCE</td>
</tr>
</tbody>
</table>

I have solved *The Case of the Missing Gemstone*!
The answer is ___________________. It's Elementary!
Vocabulary Match for Quinsam Mine

What to do: Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>turbine</th>
<th>generate</th>
<th>thermal</th>
<th>metallurgical</th>
<th>operate</th>
<th>shale</th>
<th>tectonics</th>
<th>compress</th>
<th>export</th>
<th>organic</th>
</tr>
</thead>
</table>

1. **compress**: (verb)  To squeeze together
2. **shale**: (noun)  A kind of clay-like stone that splits easily into thin plates
3. **thermal**: (noun)  A low grade coal used to make electricity
4. **tectonics**: (noun)  A geological change in the Earth's structure
5. **metallurgical**: (noun)  A higher grade of coal used to make steel
6. **generate**: (verb)  To produce; such as heat and electricity
7. **turbine**: (noun)  A kind of water wheel driven by steam
8. **organic**: (adjective)  Coming from living things, animals or plants
9. **operate**: (verb)  To work
10. **export**: (verb)  To send goods out to another country
**Vocabulary Match for Quinsam Mine**

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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1. ____________: (verb) To squeeze together
2. ____________: (noun) A kind of clay-like stone that splits easily into thin plates
3. ____________: (noun) A low grade coal used to make electricity
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5. ____________: (noun) A higher grade of coal used to make steel
6. ____________: (verb) To produce; such as heat and electricity
7. ____________: (noun) A kind of water wheel driven by steam
8. ____________: (adjective) Coming from living things, animals or plants
9. ____________: (verb) To work
10. ____________ : (verb) To send goods out to another country

Name: ___________________
Mapping Instructions for Quinsam Mine

What to do: Use the handout of the map of BC and the instructions below to find Quinsam Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
4. Find the town of Campbell River. Colour it red.
5. Draw pencil lines from your town, Victoria, and Barkerville to Campbell River.
6. Draw a small circle next to the symbol for Campbell River. Colour it black.
7. Draw a line above the circle you drew in #6 and print the words Quinsam Mine on that line.
8. Outline and lightly shade in the Vancouver Island/Coast Region of BC. Use green.
9. Name 3 other towns on Vancouver Island on the lines below:
   Courtenay, Parksville, Nanaimo, Duncan, etc. (check the map)
10. Name the two straits of water that surround Vancouver Island:
    Strait of Georgia and Juan de Fuca Strait

Congratulations! You have successfully located Quinsam Mine on the map!
Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Mapping Instructions for Quinsam Mine

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6. Draw a small circle next to the symbol for Campbell River. Colour it black.

7. Draw a line above the circle you drew in #6 and print the words Quinsam Mine on that line.

8. Outline and lightly shade in the Vancouver Island/Coast Region of BC. Use green.

9. Name 3 other towns on Vancouver Island on the lines below:

   ___________________  ___________________  ___________________

   etc. (check the map)

10. Name the two straits of water that surround Vancouver Island:

    ___________________________ and ___________________________

Congratulations! You have successfully located Quinsam Mine on the map!
Mapping Challenge: Show a possible transportation route for the trucks to take if they are moving the coal to the west coast of Vancouver Island. Then show a possible route for the barge to take to the city of Vancouver.
Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Region and Mine Location Reference Map
(Map may be used for all Super Sleuth investigations.)
Information Sheet #2 - Myra Falls

Can you think of a mine that is found in a park? Located within Strathcona Provincial Park, Myra Falls is the only mine in British Columbia within the boundaries of a park. Myra Falls Mine opened in 1966 as an open pit mine producing **zinc**, **copper**, **gold** and **silver**. Today, the mine operates underground. It runs 24 hours a day, 7 days a week, 365 days a year. The mine employs 130 people, mainly from the nearby towns of Campbell River and Comox. The workers that live in Campbell River and Comox travel to work by bus, just like many students get to school. Most of the workers work underground as miners, mechanics, operators, electricians and millwrights. The others work in geology, engineering and administration. Talk about supporting the local economy!

What do you think lives in the large wilderness of a park? What kinds of animals would you see? Birds, fish, mammals and amphibians all inhabit the Strathcona Provincial Park **ecosystem**. It is very important that Myra Falls Mine obeys all rules that are in place to protect the park and animals. What other activities do you do in a park? Some people hike, fish, camp or just explore the big trees and rocks around them. In this park, people can canoe Buttle Lake. This lake sits in the valley below the Myra Falls Mine site, making it an easy hike up to see the operation! Don’t forget your bug spray!

The mining process begins with **jumbos** that drill long holes into the rock. The holes are filled with explosives and then blasted, producing thousands of tonnes of ore every day! The next step in the process is crushing the ore and taking it up to the surface. It is then fed onto a **conveyor belt** that moves it one kilometre to the **mill**. At the mill, the ore is processed into two sand-sized materials: **concentrate** and **tailings**. Concentrate is made up mostly of the valuable minerals that contain zinc, copper, gold and silver. Tailings are the grains that have no valuable minerals in them. They are pumped outside to be stored in a **tailings pond**, and are used to make a **concrete paste** to back-fill mined out areas. Every day, the valuable concentrates are trucked 90 kilometers to Discovery Terminal in Campbell River. Once a month, conveyors load the concentrate on to large ships that travel overseas to smelters in Asia.

Did you know that when the concentrate arrives at the smelter it is refined into pure copper, zinc, gold and silver? These metals are then sent to manufacturers around the world and used to make things we use every day. Copper is used to make copper wire. Zinc is applied as a coating to steel objects to make them rustproof. This is called galvanizing. Silver is used to make jewelry and coins, and is an ingredient in solar energy cells. Gold is also used to make jewelry and coins, and is in all new electronics such as smart phones. All of this comes from the minerals that make up our Earth.
**Super Sleuth of B.C. Clue Chart for Myra Falls Mine**

**Mining Mystery #2 - The Case of the Island Park Mine**

**Step 1:** Use the Myra Falls information sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clues</th>
<th>Clues Solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myra Falls produced mostly zinc, copper, gold and _______</td>
<td>silver</td>
</tr>
<tr>
<td>Campbell River is located on what Island?</td>
<td>Vancouver</td>
</tr>
<tr>
<td>Where the miners work</td>
<td>underground</td>
</tr>
<tr>
<td>Sand-sized material containing valuable minerals</td>
<td>concentrate</td>
</tr>
<tr>
<td>Copper is used to make electrical</td>
<td>wire</td>
</tr>
<tr>
<td>The place where the concentrate is sent for refining</td>
<td>smelter</td>
</tr>
<tr>
<td>Sand-sized material containing no valuable minerals</td>
<td>tailings</td>
</tr>
<tr>
<td>The mine employs people who live in Campbell River and</td>
<td>Comox</td>
</tr>
<tr>
<td>Concentrate is shipped to</td>
<td>Asia</td>
</tr>
<tr>
<td>A way to make steel rust-proof</td>
<td>galvanize</td>
</tr>
<tr>
<td>People in Strathcona Park canoe in ______ Lake</td>
<td>Buttle</td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Island Park Mine”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #2. Good luck!
The Case of the Island Park Mine

Word Search

No hidden words or phrases

CONCENTRATE  BUTTLE  JEWELRY
SILVER  VANCOUVER  ECONOMY
HIKE  SMELTER  ASIA
GALVANIZE  MYRA  COIN
COMOX  TAILINGS  BIRDS
DISCOVERY  UNDERGROUND  WIRE

I have solved The Case of the Island Park Mine!
The answer is MYRA. It's Elementary!
### Super Sleuth of B.C. Clue Chart for Myra Falls Mine

#### Mining Mystery #2 - The Case of the Island Park Mine

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<td>Sand-sized material containing valuable minerals</td>
<td></td>
</tr>
<tr>
<td>Copper is used to make electrical</td>
<td></td>
</tr>
<tr>
<td>The place where the concentrate was sent for refining</td>
<td></td>
</tr>
<tr>
<td>Sand-sized material containing no valuable minerals</td>
<td></td>
</tr>
<tr>
<td>The mine employs people who live in Campbell River and</td>
<td></td>
</tr>
<tr>
<td>Concentrate is shipped to</td>
<td></td>
</tr>
<tr>
<td>A way to make steel rust-proof</td>
<td></td>
</tr>
<tr>
<td>People in Strathcona Park canoe in ______ Lake</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Island Park Mine”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #2. Good luck!
The Case of the Island Park Mine

Word Search

No hidden words or phrases

Z I D Z M A Y B G U A J Y F D
P M H I W R R J U N Y W I N K
C O N C E N T R A T E F U K D
V U X K I L C K T B T O Y I Y
O A I U F W O Y Y L R L S V R
R H N L C R M M V G Q C E G L
L E D C E P O U R B O E X A E
N Q T A O N X E E V F D L L W
I U R L O U D D E L W F K V E
O I K C E N V R S D R I B A J
C M E D U M Y E O O O P N N G
S I L V E R S F R S G Y Q I A
S G N I L I A T C I P O D Z S
Y F H Q C X W E F V W T U E I
T V G O N Z R V G C P M F S A

Extra Words

<table>
<thead>
<tr>
<th>CONCENTRATE</th>
<th>BUTTLE</th>
<th>JEWELRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILVER</td>
<td>VANCOUVER</td>
<td>ECONOMY</td>
</tr>
<tr>
<td>HIKE</td>
<td>SMELTER</td>
<td>ASIA</td>
</tr>
<tr>
<td>GALVANIZE</td>
<td>MYRA</td>
<td>COIN</td>
</tr>
<tr>
<td>COMOX</td>
<td>TAILINGS</td>
<td>BIRDS</td>
</tr>
<tr>
<td>DISCOVERY</td>
<td>UNDERGROUND</td>
<td>WIRE</td>
</tr>
</tbody>
</table>

I have solved The Case of the Island Park Mine!
The answer is ___________________. It’s Elementary!
Vocabulary Match for Myra Falls Mine

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>economy</td>
<td>(noun) Production, movement and consumption of goods in a community</td>
</tr>
<tr>
<td>ecosystem</td>
<td>(noun) A web of interacting organisms and their environment</td>
</tr>
<tr>
<td>employ</td>
<td>(verb) To hire for work</td>
</tr>
<tr>
<td>boundary</td>
<td>(noun) A line that marks the extent of an area</td>
</tr>
<tr>
<td>galvanize</td>
<td>(verb) To coat steel with zinc to protect it from rust</td>
</tr>
<tr>
<td>valuable</td>
<td>(noun) Considered to be of great worth</td>
</tr>
<tr>
<td>refine</td>
<td>(verb) To remove impurities; to purify</td>
</tr>
<tr>
<td>concentrate</td>
<td>(noun) A fine powder-like material of valuable minerals</td>
</tr>
<tr>
<td>ore</td>
<td>(noun) Valuable rock that can be mined for a project</td>
</tr>
<tr>
<td>mechanic</td>
<td>(noun) A person trained in the maintenance and repair of vehicles, machinery, and other mechanical devices</td>
</tr>
</tbody>
</table>

**KEY**
Vocabulary Match for Myra Falls Mine

What to do: Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>ecosystem</th>
<th>employ</th>
<th>concentrate</th>
<th>mechanic</th>
<th>refine</th>
</tr>
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<tbody>
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<td>economy</td>
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<td>valuable</td>
<td>ore</td>
</tr>
</tbody>
</table>

1. _____________________: (noun) Production, movement and consumption of goods in a community
2. _____________________: (noun) A web of interacting organisms and their environment
3. _____________________: (verb) To hire for work
4. _____________________: (noun) A line that marks the extent of an area
5. _____________________: (verb) To coat steel with zinc to protect it from rust
6. _____________________: (noun) Considered to be of great worth
7. _____________________: (verb) To remove impurities; to purify
8. _____________________: (noun) A fine powder-like material of valuable minerals
9. _____________________: (noun) Valuable rock that can be mined for a project
10. _____________________: (noun) A person trained in the maintenance and repair of vehicles, machinery, and other mechanical devices building material.
Mapping Instructions for Myra Falls Mine

**What to do:** Use the handout of the map of BC and the instructions below to find Myra Falls Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
4. Find the Fraser River. Colour it blue.
5. Find the town of Campbell River. Colour it red.
6. Draw pencil lines *from* your town, Victoria, and Barkerville *to* Campbell River.
7. Draw a small circle next to the symbol for Campbell River. Colour it black.
8. Draw a line above the circle you drew in #7. Print the words **Myra Falls Mine** on that line.
9. Outline and lightly shade in Vancouver Island B.C. Use green.
10. Name 3 other towns on Vancouver Island on the lines below: 
    *Port Alberni, Nanaimo, Victoria*
    (check other maps)
11. Which U.S. state is located southeast of Vancouver Island? 
    *Washington*

**Congratulations! You have successfully located Myra Falls Mine on the map!**
Mapping Instructions for Myra Falls Mine

What to do: Use the handout of the map of BC and the instructions below to find Myra Falls Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
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9. Outline and lightly shade in Vancouver Island B.C. Use green.
10. Name 3 other towns on Vancouver Island on the lines below:

   __________________________   _______________________  _______________________
   (check other maps)

11. Which U.S. state is located southeast of Vancouver Island?

   _________________________

Congratulations! You have successfully located Myra Falls Mine on the map!
Intermediate Integrated Resource Unit on Mining

Topic E - Mapping the Mines

Map of British Columbia for Myra Falls Mine

Mapping Challenge: Find the route the boat takes to deliver Myra Falls Mine concentrate to the smelter. Highlight the route on the map of BC. Good luck!
Information Sheet #3 – Endako Mine

What do the Jurassic Age and Endako Mine have in common? Answer: a mineral called molybdenite that contains the metal molybdenum. The conditions for the Earth to make molybdenum were started millions of years ago with the formation of sedimentary and volcanic rock layers. Two local hunters discovered the molybdenum deposit at Endako in 1927 but the mine did not start open pit mining until June 1964—37 years later! Endako is the third largest producer of molybdenum in the world! The mine was named after the small village of Endako—a community that is not shown on the map provided. The Mine is located near the towns of Fraser Lake and Burns Lake and a 160 kilometres west of Prince George. Nearby bodies of water are the Stilako and Nechako Rivers and the Francois and Fraser Lakes. The name of this region of B.C. is called Nechako.

Like many of the larger mines in B.C., Endako has become automated. This means they use computers and satellites to plot blasting hole patterns in the ground or to check for stability of rock walls in the open pit mine. 24 hours a day, workers truck the ore from the pit to the mill where it is crushed many times over and then floated and roasted to make the grade of molybdenum concentrate that a customer has ordered. Companies buy different blends of molybdenum depending on their needs. For example, the steel industry uses it to harden steel products like I-beams to build high-rises, while the oil companies use it to improve lubricants like oil and grease for smoother running machines and cars.

The molybdenum concentrate is packaged in 10 kilogram cans, 250 kilogram drums, or 2000 kilogram bags. It might travel to Japan by truck along the Trans Canada Highway to the port of Vancouver, and then by freighter across the Pacific Ocean. It might be trucked to Hamilton, Ontario through Prince George, over to Edmonton, Alberta, across the prairies, and finally to the southwest tip of Lake Ontario. Or, it might stop in Regina, Saskatchewan where it waits in a warehouse until the steel company is ready to use it. The molybdenum mined at Endako is shipped around the world to companies that make products like steel pipes and frying pans.
Super Sleuth of B.C. Clue Chart for Endako Mine

Mining Mystery #3 - The Case of the Forgotten Mine

Step 1: Use the Endako Mine Information Sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The word that means the forming of rock layers</td>
<td>formation</td>
</tr>
<tr>
<td>The mineral mined at Endako</td>
<td>molybdenite</td>
</tr>
<tr>
<td>Another word for a small town or neighborhood</td>
<td>community</td>
</tr>
<tr>
<td>A body of water surrounded by land</td>
<td>lake</td>
</tr>
<tr>
<td>The distance equal to 1 000 metres</td>
<td>kilometre</td>
</tr>
<tr>
<td>This is used to plot blast hole patterns from orbit</td>
<td>satellite</td>
</tr>
<tr>
<td>Oil and grease make things run smoothly and are called</td>
<td>lubricants</td>
</tr>
<tr>
<td>Ore that is crushed into a fine powder is called</td>
<td>concentrate</td>
</tr>
<tr>
<td>The weight equal to 1 000 grams</td>
<td>kilogram</td>
</tr>
<tr>
<td>Concentrate is packaged in cans, bags, and</td>
<td>drums</td>
</tr>
<tr>
<td>A type of ship that carries large shipments</td>
<td>freighter</td>
</tr>
</tbody>
</table>

Step 2: To solve “The Case of the Forgotten Mine”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #3. Good luck!
The Case of the Forgotten Mine

Word Search
No hidden words or phrases

I have solved The Case of the Forgotten Mine!
The answer is THIRTY-SEVEN. It’s Elementary!
Super Sleuth of B.C. Clue Chart for Endako Mine

Mining Mystery #3 - The Case of the Forgotten Mine

Step 1: Use the Endako Mine Information Sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clue</th>
<th>Solution</th>
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<tbody>
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<td>The word that means the forming of rock layers</td>
<td></td>
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The Case of the Forgotten Mine

Word Search
No hidden words or phrases

Extra Words

MOLYBDENUM      FREIGHTER
DRUMS            THIRTY-SEVEN
CONCENTRATE      KILOGRAM
COMMUNITY        KILOMETRE
LUBRICANTS       SATELLITE
FORMATION        LAKE

I have solved The Case of the Forgotten Mine!
The answer is ________ . It's Elementary!
Vocabulary Match for Endako Mine

What to do: Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>deposit</th>
<th>warehouse</th>
<th>automated</th>
<th>roast</th>
<th>float</th>
</tr>
</thead>
<tbody>
<tr>
<td>stability</td>
<td>village</td>
<td>lubricant</td>
<td>mine</td>
<td>molybdenum</td>
</tr>
</tbody>
</table>

1. village: (noun) a collection of houses smaller than a town
2. deposit: (noun) a rock body of naturally occurring ore minerals (e.g. molybdenite)
3. molybdenum: (noun) a silvery-white, brittle, metallic element
4. stable: (adjective) firmly fixed; not easily moved
5. float: (verb) to use chemicals and air bubbles to separate waste rock from valuable ore minerals
6. roast: (verb) to heat a mineral (like molybdenite) to remove sulphur
7. lubricant: (noun) any fluid or slippery substance used to reduced friction between materials
8. automated: (adjective) the use of machinery to make work easier
9. mine: (verb) to dig in the Earth for ore
10. warehouse: (noun) building in which goods are temporarily stored
Vocabulary Match for Endako Mine

What to do: Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
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<tr>
<th>deposit</th>
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</tr>
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8. _____________: (adjective) the use of machinery to make work easier
9. _____________: (verb) to dig in the Earth for ore
10. _____________: (noun) building in which goods are temporarily stored
Mapping Instructions for Endako Mine

What to do: Use the handout of the map of BC and the instructions below to find Endako Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
4. Find the Nechako River. Colour it blue.
5. Find the town of Burns Lake. Colour it red.
6. Draw pencil lines from your town, Victoria, and Barkerville to Burns Lake.
7. Draw a small circle next to the symbol for Burns Lake. Colour it black.
8. Draw a line above the circle you drew in #7 and print the words Endako Mine on that line.
9. Outline and lightly shade in the Nechako Region of BC. Use green.
10. Name 3 other towns in the Nechako Region on the lines below: Smithers, Dease Lake, Cassiar, Houston (check other maps)
11. Name the two borders that touch this northeast corner of BC. Yukon Territory and Alaska, USA

Congratulations! You have successfully located Endako Mine on the map!
Mapping Instructions for Endako Mine

What to do: Use the handout of the map of BC and the instructions below to find Endako Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.

2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.

3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.

4. Find the Nechako River. Colour it blue.

5. Find the town of Burns Lake. Colour it red.

6. Draw pencil lines from your town, Victoria, and Barkerville to Burns Lake.

7. Draw a small circle next to the symbol for Burns Lake. Colour it black.

8. Draw a line above the circle you drew in #7 and print the words Endako Mine on that line.

9. Outline and lightly shade in the Nechako Region of BC. Use green.

10. Name 3 other towns in the Nechako Region on the lines below:
    _______________ _______________ _______________ (check other maps)

11. Name the two borders that touch this northeast corner of BC.
    _______________ _______________

Congratulations! You have successfully located Endako Mine on the map!
Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Mapping Challenge: Find the transportation route for molybdenum on the Endako Information Sheet. On the map above, highlight the possible routes within B.C. that a truck might travel to deliver its cargo. Good luck!
Information Sheet #4 – Elkview

What do roaming herds of elk and mining for coal have in common? Answer: a fantastic view of the Rocky Mountains! Elkview Mine sits at the very top of a tall mountain. At the bottom of the mountain is the town of Sparwood. Sparwood has a population of about 3,700 people who either work at the mine, work for the logging industry, work for the government, or work for the tourism industry. All of these industries make Sparwood a thriving community in BC. The town of Fernie, BC is the next closest town to the mine. Just like the mine itself, the Elk River and the Elk Valley are named for the great elk herds. Mining in the Kootenay Region has been going on for over 100 years.

Elkview Mine is an open pit coal mine close to the BC/Alberta border. Today, Elkview blends its coal to make sure that customers are satisfied with their product. Workers at Elkview drive their cars to the base of the mountain and ride a bus to the top. At the end of a work shift, the bus takes the workers back to their cars and they go home until their next shift. A work shift is 12 hours for an employee, and the mine operates 24 hours a day, 7 days a week, 365 days a year. Imagine working for years and years without stopping! Maintenance crews work steadily to keep machinery running smoothly no matter what the weather is like. In the winter, snowfall can be as deep as 20 feet and the miners must wear winter coveralls to keep from freezing.

To mine for coal, miners drill and blast the rock and then separate the overburden (waste rock) from the coal. The overburden is sent to the waste rock dump. The coal is loaded into huge 240 tonne haul trucks and is taken to the breaker station where it is put into machines that look like cement mixers. Can you guess what happens at the “breaker” station? You’re right if you thought that the big chunks of coal are broken down into smaller chunks. Any rock that might be mixed with the coal is also removed. After the coal is downsized, it travels through a tunnel in the mountain along a conveyor belt to the valley below where it ends up at the coal plant. Once there, the coal is washed and dried and then loaded into a silo. When a customer, like the Japanese, buy coal, it is loaded onto a train for the long journey to a port near Vancouver, where it is loaded onto ships either in North Vancouver or at Robert's Bank in Delta. The train travels from Elkview to Cranbrook to Radium to Golden to Revelstoke to Kamloops and finally to Vancouver. After the coal is loaded onto the ship, it is sent overseas to Japan. The Japanese use coal to make steel and steel is used to build cars, trucks, and countless other things for people all over the world!
Super Sleuth of B.C. Clue Chart for Elkview Mine

*Mining Mystery #4 - The Case of the Overweight Truck*

**Step 1:** Use the Elkview Mine information sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clues</th>
<th>Clues Solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining, logging, and tourism are called</td>
<td>industries</td>
</tr>
<tr>
<td>The mine is named after this four-legged animal</td>
<td>elk</td>
</tr>
<tr>
<td>The town closest to Elkview Mine</td>
<td>Sparwood</td>
</tr>
<tr>
<td>The crew that takes care of machinery</td>
<td>maintenance</td>
</tr>
<tr>
<td>Cold, white fluffy stuff that falls from the sky</td>
<td>snow</td>
</tr>
<tr>
<td>What the miners must wear to keep from freezing</td>
<td>coveralls</td>
</tr>
<tr>
<td>Rock and coal are drilled, blasted, and</td>
<td>separated</td>
</tr>
<tr>
<td>Another name for waste rock</td>
<td>overburden</td>
</tr>
<tr>
<td>Coal travels through the mountain on this belt</td>
<td>conveyor</td>
</tr>
<tr>
<td>Clean coal is loaded and stored in a</td>
<td>silo</td>
</tr>
<tr>
<td>Trains carry the coal to this place near Vancouver.</td>
<td>port</td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Overweight Truck”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #4. Good luck!
The Case of the Overweight Truck

Word Search

No hidden words or phrases

Extra Words

MAINTENANCE  CONVEYOR  COMPANY
COVERALLS  PORT  CALGARY
OVERBURDEN  SNOW  TUNNEL
INDUSTRIES  ELK  REVELSTOKE
SPARWOOD  SILO  WEATHER
SEPARATED  TONNE  JOURNEY

I have solved The Case of the Overweight Truck!
The answer is _TONNE_ It’s Elementary!
**Super Sleuth of B.C. Clue Chart for Elkview Mine**

*Mining Mystery #4 - The Case of the Overweight Truck*

**Step 1:** Use the Elkview Mine information sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clues</th>
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<tbody>
<tr>
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**Step 2:** To solve “The Case of the Overweight Truck”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #4. Good luck!
The Case of the Overweight Truck

Word Search
No hidden words or phrases

W F E V A R S I L O T T O J R
E M I N D U S T R I E S T O R
A A C T H O U R E N F A L U X
T I W U E G C O N V E Y O R J
H N W N S A N O J O I C E N O
E T E N S A N D V E R E E J P
R E V E L S T O K E B D O Y W
O N E L S R O U G E R J L A E
S A L L E P L E O U C A X C R
X N S P H A A X B I O T L A Y
I C N S E P A R A T E D X L X
H E M A P B E A W N A C L G S
E F E S C V P B S O S N O A N
L A L C O M P A N Y O H E R O
K C S T T P O R T V P D X Y W

MAINTENANCE  CONVEYOR
COVERALLS  PORT
OVERBURDEN  SNOW
INDUSTRIES  ELK
SPARWOOD  SILO
SEPARATED  TONNE

Extra Words
COMPANY
CALGARY
TUNNEL
REVELSTOKE
WEATHER
JOURNEY

I have solved The Case of the Overweight Truck!
The answer is ______. It's Elementary!
Vocabulary Match for Elkview Mine

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>open pit mine</th>
<th>silo</th>
<th>region</th>
<th>mountain</th>
<th>maintenance crew</th>
</tr>
</thead>
<tbody>
<tr>
<td>port</td>
<td>valley</td>
<td>industry</td>
<td>site</td>
<td>overburden</td>
</tr>
</tbody>
</table>

1. **industry:** (noun) a branch of trade or manufacture (e.g. mining)
2. **region:** (noun) a place marked by boundaries
3. **open pit mine:** (noun) a surface mine, open to daylight such as a quarry
4. **maintenance crew:** (noun) a group of skilled workers keeping things in good repair
5. **site:** (noun) a location or place
6. **mountain:** (noun) a large or high landmass
7. **valley:** (noun) a long low area of land between hills or mountains
8. **silo:** (noun) a large structure in which material is stored (e.g. coal)
9. **port:** (noun) a harbour for the importing and exporting of goods
10. **overburden:** (noun) waste rock that occurs within coal beds
Vocabulary Match for Elkview Mine

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>open pit mine</th>
<th>silo</th>
<th>region</th>
<th>mountain</th>
<th>maintenance crew</th>
<th>overburden</th>
</tr>
</thead>
<tbody>
<tr>
<td>port</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. __________________ (noun) a branch of trade or manufacture (e.g. mining)
2. _________________ (noun) a place marked by boundaries
3. _________________ (noun) a surface mine, open to daylight such as a quarry
4. _________________ (noun) a group of skilled workers keeping things in good repair
5. _________________ (noun) a location or place
6. _________________ (noun) a large or high landmass
7. _________________ (noun) a long low area of land between hills or mountains
8. _________________ (noun) a large structure in which material is stored (e.g. coal)
9. _________________ (noun) a harbour for the importing and exporting of goods
10. ______________ (noun) waste rock that occurs within coal beds
Mapping Instructions for Elkview Mine

What to do: Use the handout of the map of BC and the instructions below to find Elkview Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.

2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.

3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.

4. Find the town of Sparwood. Colour it red.

5. Draw pencil lines from your town, Victoria, and Barkerville to Elkview Mine.

6. Draw a small circle just to the right of Sparwood near the Alberta border. Colour it black.

7. Draw a line above the circle you drew in #6 and print the words Elkview Mine on that line.

8. Outline and lightly shade in the Kootenay Region of BC. Use green.

9. Name the famous national park in this corner of the province:

   Banff National Park

10. Name the mountain range that travels along the BC and Alberta Borders

    Rocky Mountains

Congratulations! You have successfully located Elkview Mine on the map!
Mapping Instructions for Elkview Mine

What to do: Use the handout of the map of BC and the instructions below to find Elkview Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of British Columbia. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
4. Find the town of Sparwood. Colour it red.
5. Draw pencil lines from your town, Victoria, and Barkerville to Elkview Mine.
6. Draw a small circle just to the right of Sparwood near the Alberta border. Colour it black.
7. Draw a line above the circle you drew in #6 and print the words Elkview Mine on that line.
8. Outline and lightly shade in the Kootenay Region of BC. Use green.
9. Name the famous national park in this corner of the province:
   _______________________________________________________________
10. Name the mountain range that travels along the BC and Alberta Border.
    _______________________________________________________________

Congratulations! You have successfully located Elkview Mine on the map!
Intermediate Integrated Resource Unit on Mining

Topic E - Mapping the Mines

Name: ____________________________

Mapping Challenge: Read the Information Sheet to discover where Elkview sends its coal. Use the information to highlight the railway route on the map. Good luck!

Map of British Columbia for Elkview Mine

Mapping Challenge: Read the Information Sheet to discover where Elkview sends its coal. Use the information to highlight the railway route on the map. Good luck!
Information Sheet #5 – Trend Mine

What do dinosaurs and Trend Mine have in common? Answer: The town of Tumbler Ridge! Trend Mine is located in northeast British Columbia, 25 kilometers south of Tumbler Ridge. The mine opened in 2005 to produce metallurgical coal. It operates as an open pit, 24 hours a day, 7 days a week, 365 days a year. The mine employs 300 people, mainly from the nearby town of Tumbler Ridge. Each morning, the workers are transported out to the mine site by bus. Trend Mine is expected to be in operation for the next 10 years.

So what does the mine have in common with dinosaurs? It was back in 2000, when two local boys were tubing down Flatbed Creek that runs through Tumbler Ridge. They fell off their tubes and decided to walk back upstream along the bedrock. As they were walking, they noticed a series of depressions, or oddly shaped holes, in the rock. Right away they thought that it might be the footprints of a dinosaur, but knew it would be best to contact an expert. They called a paleontologist. A paleontologist is a scientist who studies fossils and trace fossils. He came out and examined the holes, and sure enough, they were dinosaur footprints! What would you do if you found dinosaur footprints? The paleontologist later went on to discover other evidence of dinosaurs, including fossil bones! So that means Trend Mine is built in rock made from sediments that dinosaurs used to walk on!

Coal occurs in layers, called seams, that alternate with sedimentary rocks, like sandstone, siltstone and shale. The coal mining process begins by blasting the sedimentary rock with explosives. Blasting also helps separate the rock from the coal. All the blasted material is hauled from the pit to the nearby processing plant or mill. Waste rock is transported to waste rock dumps. Both are done using shovels, loaders and haul trucks. At the plant, the coal is taken along a conveyor system to a crusher. It is crushed into smaller pieces and is spray washed to keep down dust. The processed coal is transported by truck to a railway where it is loaded onto a train that takes it all the way to the port in Prince Rupert. How far is Prince Rupert from Tumbler Ridge? The coal is then shipped from Prince Rupert to Asia. Western Canada is one of the few places in the world that produces high quality metallurgical coal.

But what do we use coal for these days? Metallurgical coal is a very important resource. Mainly, coal is used in blast furnaces. These furnaces are used to turn iron ore into steel. Think of how many things around you that are made from steel!
Super Sleuth of BC Clue Chart for Trend Mine

**Mining Mystery #5 - The Case of the Dinosaur Mine**

**Step 1:** Use the Trend Mine Information Sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trend Mine is found near the town of Tumbler Ridge</td>
<td></td>
</tr>
<tr>
<td>The workers are transported to the mine site by bus</td>
<td></td>
</tr>
<tr>
<td>The two local boys found dinosaur footprints</td>
<td></td>
</tr>
<tr>
<td>Someone who studies dinosaurs is a paleontologist</td>
<td></td>
</tr>
<tr>
<td>To reduce dust, the coal is spray washed</td>
<td></td>
</tr>
<tr>
<td>Coal from Trend Mine is shipped to Prince Rupert</td>
<td></td>
</tr>
<tr>
<td>Coal naturally occurs in seams</td>
<td></td>
</tr>
<tr>
<td>Coal is a necessary ingredient in making steel</td>
<td></td>
</tr>
<tr>
<td>The product mined at Trend Mine is metallurgical coal</td>
<td></td>
</tr>
<tr>
<td>Coal is used in blast furnaces</td>
<td></td>
</tr>
<tr>
<td>Trend mine coal is shipped to Asia</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Dinosaur Mine”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you are done all words but one will be circled. This word is the solution to Mystery #5. Good luck!
The Case of the Dinosaur Mine
Word Search
No hidden words or phrases

Extra Words

RIDGE  PALEONTOLOGIST  OPERATION
BUS  WASHED  DISCOVER
FOOTPRINTS  RUPERT  NATURALLY
SEAMS  COAL  SHOVEL
STEEL  FURNACE  DINOSAUR
METALLURGICAL  ASIA  PORT

I have solved The Case of the Dinosaur Mine!
The answer is DINOSAUR! It's Elementary!
Super Sleuth of BC Clue Chart for Trend Mine

*Mining Mystery #5 - The Case of the Dinosaur Mine*

**Step 1:** Use the Trend Mine Information Sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trend Mine is found near the town of Tumbler</td>
<td></td>
</tr>
<tr>
<td>The workers are transported to the mine site by</td>
<td></td>
</tr>
<tr>
<td>The two local boys found dinosaur</td>
<td></td>
</tr>
<tr>
<td>Someone who studies dinosaurs is a</td>
<td></td>
</tr>
<tr>
<td>To reduce dust, the coal is spray</td>
<td></td>
</tr>
<tr>
<td>Coal from Trend Mine is shipped to Prince</td>
<td></td>
</tr>
<tr>
<td>Coal naturally occurs in</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>The product mined at Trend Mine is</td>
<td></td>
</tr>
<tr>
<td>Coal is used in blast</td>
<td></td>
</tr>
<tr>
<td>Trend Mine coal is shipped to</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Dinosaur Mine”, use the words from the list of solutions and the Extra Words list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you are done all words but one will be circled. This word is the solution to Mystery #5. Good luck!
The Case of the Dinosaur Mine

Word Search
No hidden words or phrases

W N A O I W S R Q V K P V Y F
E I O H D H A N F K W A P L M
L S L I O V R S S D Y L M L R
R Y L V T L M E H D E E P A O
S P E G I A C R S E T O M R C
S L O B D A R B W A D N Q U X
T M X R N E K E L G L T R T J
Q I A R T J V L P A W O Z A M
J S U E H N U Y O O K L G N R
U F T K S R H C U P H O N Q U
Q S S Q G E X F J U B G L A P
E U D I S C O V E R U I E V E
E E C E G D I R U Z S S E J R
X A S I A W D Y F A P T T B T
L S T N I R P T O O F K S Z M

Extra Words
RIDGE
BUS
FOOTPRINTS
SEAMS
STEEL
METALLURGICAL
PALEONTOLOGIST
WASHED
RUPERT
COAL
FURNACE
ASIA

OPERATION
DISCOVER
NATURALLY
SHOVEL
DINOSAUR
PORT

I have solved The Case of the Dinosaur Mine!
The answer is ____________. It's Elementary!
**Vocabulary Match for Trend Mine**

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it's been matched. Good luck!

<table>
<thead>
<tr>
<th>explosive</th>
<th>metallurgy</th>
<th>paleontologist</th>
<th>convey</th>
<th>bedrock</th>
<th>steel</th>
<th>naturally</th>
<th>expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
<td>(noun)</td>
</tr>
</tbody>
</table>

1. **explosive:** (noun) a substance that can be made to explode
2. **paleontologist:** (noun) someone who studies fossils
3. **bedrock:** (noun) solid rock at Earth's surface or beneath soil
4. **loader:** (noun) a large machine with a shovel or bucket
5. **expert:** (noun) person who has special knowledge about a topic
6. **metallurgy:** (noun) a science that studies the properties of metals
7. **naturally:** (adverb) in a natural or normal state
8. **convey:** (verb) to carry on a belt from one place to another
9. **furnace:** (noun) a fuel burning structure to generate heat
10. **steel:** (noun) material made of iron and carbon largely used as a building material
**Vocabulary Match for Trend Mine**

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
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<tr>
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<th>metallurgy</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. ________________: (noun) a substance that can be made to explode
2. ________________: (noun) someone who studies fossils
3. ________________: (noun) unbroken solid rock at Earth’s surface or beneath the soil
4. ________________: (noun) a large machine with a shovel or bucket
5. ________________: (noun) person who has special knowledge about a topic
6. ________________: (noun) a science that studies the properties of metals
7. ________________: (adverb) in a natural or normal state
8. ________________: (verb) to carry on a belt from one place to another
9. ________________: (noun) a fuel burning structure to generate heat
10. ________________: (noun) material made of iron and carbon largely used as a building material
Mapping Instructions for Trend Mine

What to do: Use the handout of the map of BC and the instructions below to find Trend Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.

2. Find the symbol that represents Victoria, the capital of BC. Colour it purple.

3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.


5. Find the town of Tumbler Ridge. Colour it red.

6. Draw pencil lines from your town, Victoria, and Barkerville to Tumbler Ridge.


8. Draw a line above the circle you drew in #7 and print the words Trend Mine on that line.

9. Outline and lightly shade in the Northeast Region of BC. Use green.

10. Name 3 other towns in the Northeast Region on the lines below:
    
    Dawson Creek, Fort St. John, Fort Nelson (check other maps)

11. Name the three borders that touch this northeast corner of BC:

    Alberta, Yukon Territory, Northwest Territories

Congratulations! You have successfully located Trend Mine on the map!
Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Name: __________________________

Mapping Instructions for Trend Mine

**What to do:** Use the handout of the map of BC and the instructions below to find Trend Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of BC. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
5. Find the town of Tumbler Ridge. Colour it red.
6. Draw pencil lines *from* your town, Victoria, and Barkerville to Tumbler Ridge.
8. Draw a line above the circle you drew in #7 and print the words Trend Mine on that line.
9. Outline and lightly shade in the Northeast Region of BC. Use green.
10. Name 3 other towns in the Northeast Region on the lines below: (check other maps)

   ___________________  ___________________  ___________________

11. Name the three borders that touch this northeast corner of BC:

   ___________________  ___________________  ___________________

   **Congratulations! You have successfully located Trend Mine on the map!**
Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Mapping Challenge: Read the Information Sheet to discover where Trend Mine sends its coal. Use the information to highlight the transportation route on the map. Good luck!
Information Sheet #6 - Copper Mountain Mine

What could be better than finding a small piece of copper? How about finding a whole mountain of it! Located in south-western British Columbia, Copper Mountain Mine is located about 20 kilometers south of the town of Princeton and mainly produces copper, along with some gold and silver. Princeton has a population of 2,800 people, with most working in ranching, forestry, tourism or mining. Today, Copper Mountain Mine operates as an open pit mine and employs 350 people on site. Most of the workers live in Princeton. These local workers help Copper Mountain Mine enjoy the full support of the community.

Exploration of Copper Mountain dates back to 1884! How old would you be if you were born in 1884? Mining on the mountain has gone on in three main stages. From 1923-1957 it was operated as an underground mine. From 1972 to 1996 it was operated as an open pit mine. From 2011 to today, it is operating again as an open pit mine. Each time the mine closed it was because of poor economic factors. Today, there is not just one, but three large pits close to each other that make up a “Super Pit.” By having these large pits, the miners can reach the minerals in the ground faster and easier.

The mining process begins by drilling holes 13 metres into the ore in the pit surface. The holes are filled with explosives and then blasted. The blasted ore is loaded by a large shovel into a large haul truck. Some of these trucks can be the size of your house! The trucks haul the ore to the primary crusher that breaks it down into football sized pieces. The ore from the crusher is then fed onto a conveyer belt that moves it into the mill.

At the mill, the ore is ground down and separated into two sand-sized materials: concentrate and tailings. Concentrate is made up mostly of the minerals that contain copper, gold and silver. Tailings are the grains that have no valuable minerals in them. The next step is to transport the sand sized material, or slurry, to flotation cells. These flotation cells are used to separate copper concentrate from the tailings, or waste rock. The concentrate is dried, loaded in large transport trucks and hauled to Vancouver’s port. From there it is shipped to smelters in Japan.

Today, Copper Mountain mine is expected to have a 17 year life span, producing 105 million pounds of copper every year! Copper is everywhere. Take a minute and look around you. It’s in what you see and even in what you don’t see. Copper is used to bring electricity into our homes. Electrical wiring in our walls, refrigerators, microwaves, TV’s and computers are all made of copper. Can you think of other items around you that might be made from copper?
**Super Sleuth of BC Clue Chart for Copper Mountain Mine**

*Mining Mystery #6 - The Case of the Super Pit Mine*

**Step 1:** Use the Copper Mountain Mine Information Sheet to solve the following clues:

<table>
<thead>
<tr>
<th>Clue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Mountain is located in South-____ BC</td>
<td>west</td>
</tr>
<tr>
<td>The mine produces copper, gold and</td>
<td>silver</td>
</tr>
<tr>
<td>The mining process begins by drilling deep</td>
<td>holes</td>
</tr>
<tr>
<td>Most mine employees live in</td>
<td>Princeton</td>
</tr>
<tr>
<td>Copper Mountain has full support of the</td>
<td>community</td>
</tr>
<tr>
<td>How many open pits does this mine have?</td>
<td>three</td>
</tr>
<tr>
<td>Ore is conveyed from the crusher to the</td>
<td>mill</td>
</tr>
<tr>
<td>The ore is processed into concentrate and</td>
<td>tailings</td>
</tr>
<tr>
<td>The slurry is piped to flotation</td>
<td>cells</td>
</tr>
<tr>
<td>Copper Mountain is expected to operate for how many years?</td>
<td>seventeen</td>
</tr>
<tr>
<td>Copper concentrate is shipped to</td>
<td>Japan</td>
</tr>
</tbody>
</table>

**Step 2:** To solve “The Case of the Super Pit Mine,” use the words from the list of solutions and the Extra Word list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #6. Good luck!
The Case of the Super Pit Mine

Word Search
No hidden words or phrases

Extra Words

WEST
MILL
PRINCETON
COMMUNITY
ORE
TAILINGS

CELLS
JAPAN
SILVER
THREE
GOLD
SEVENTEEN

COPPER
LOCAL
VANCOUVER
PIT
MINERAL
PORT

I have solved The Case of the Super Pit Mine!
The answer is COMMUNITY! It's Elementary!
Super Sleuth of BC Clue Chart for Copper Mountain Mine

*Mining Mystery #6 - The Case of the Super Pit Mine*

**Step 1:** Use the Copper Mountain mine Information Sheet to solve the following clues:

<table>
<thead>
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<th>Solution</th>
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</thead>
<tbody>
<tr>
<td>Copper Mountain is located in South-____ BC</td>
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<td></td>
</tr>
<tr>
<td>The slurry is piped to flotation</td>
<td></td>
</tr>
<tr>
<td>Copper Mountain is expected to operate for how many years?</td>
<td></td>
</tr>
<tr>
<td>Copper concentrate is shipped to</td>
<td></td>
</tr>
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**Step 2:** To solve "The Case of the Super Pit Mine," use the words from the list of solutions and the Extra Word list. Words are printed horizontally and vertically. Be watchful! Some letters belong to more than one word! Each time you find a word, draw a circle around it and then cross the word off the list. When you’re done, all words but one will be circled. This word is the solution to Mystery #6. Good luck!
The Case of the Super Pit Mine
No hidden words or phrases

The answer is_______________. It's Elementary!
Vocabulary Match for Copper Mountain Mine

**What to do:** Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>tourism</th>
<th>economic</th>
<th>approximately</th>
<th>port</th>
<th>community</th>
</tr>
</thead>
<tbody>
<tr>
<td>copper</td>
<td>flotation</td>
<td>explosives</td>
<td>haul</td>
<td>ore</td>
</tr>
</tbody>
</table>

1. **tourism:** (noun) the organization of vacations and visits to places of interest
2. **economic:** (noun) relating to the state of the economy
3. **explosives:** (noun) a substance that can be made to explode
4. **ore:** (noun) naturally occurring Earth material from which a metal or mineral can be extracted
5. **community:** (noun) group of people living and working together in one space
6. **copper:** (noun) a good conductor of electricity and heat
7. **flotation:** (noun) a process to separate ore minerals from waste rock
8. **port:** (noun) town or city with a harbor where ships load and unload
9. **approximately:** (noun) close to reality, but not completely accurate or exact
10. **haul:** (verb) to transport, as with a truck or cart
Vocabulary Match for Copper Mountain Mine

What to do: Match each word to the correct meaning. You may use the mine information sheet and a dictionary for clues. When you have a match, print the word on the line next to the definition. Remember to cross each word off the list once it’s been matched. Good luck!

<table>
<thead>
<tr>
<th>tourism</th>
<th>copper</th>
<th>flotation</th>
<th>approximately</th>
<th>explosives</th>
<th>port haul</th>
<th>community</th>
</tr>
</thead>
<tbody>
<tr>
<td>tourism:</td>
<td>(noun)</td>
<td>the organization of vacations and visits to places of interest</td>
<td></td>
<td></td>
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<tr>
<td>economic:</td>
<td>(noun)</td>
<td>relating to the state of the economy</td>
<td></td>
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<tr>
<td>approximately:</td>
<td>(noun)</td>
<td>a substance that can be made to explode</td>
<td></td>
<td></td>
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<tr>
<td>port:</td>
<td>(noun)</td>
<td>naturally occurring Earth material from which a metal or mineral can be extracted</td>
<td></td>
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<tr>
<td>community:</td>
<td>(noun)</td>
<td>group of people living and working together in one space</td>
<td></td>
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</tr>
<tr>
<td>copper:</td>
<td>(noun)</td>
<td>it is a good conductor of electricity and heat</td>
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</tr>
<tr>
<td>flotation:</td>
<td>(noun)</td>
<td>a process to separate ore minerals from waste rock</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>approximately:</td>
<td>(noun)</td>
<td>town or city with a harbor where ships load and unload</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>explosives:</td>
<td>(noun)</td>
<td>close to reality, but not completely accurate or exact</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>port:</td>
<td>(verb)</td>
<td>to transport, as with a truck or cart</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Mapping Instructions for Copper Mountain Mine

What to do: Use the handout of the map of BC and the instructions below to find Copper Mountain Mine. Remember to check off each number before moving along to the next step. Good luck!

1. Find the symbol that represents where you live in BC. Colour it orange.
2. Find the symbol that represents Victoria, the capital of BC. Colour it purple.
3. Find the symbol that represents Barkerville, an historical gold mining town in BC. Colour it yellow.
4. Find the Fraser River. Colour it blue.
5. Find the city of Princeton. Colour it red.
7. Draw a line below the circle you drew in #6 and print the words Copper Mountain Mine on that line.
8. Draw pencil lines from your town, Victoria, and Barkerville to Copper Mountain Mine.
10. Name three other communities close to Copper Mountain Mine.

Kelowna, Penticton, Vancouver, Merrit, Hope

Congratulations! You have successfully located Copper Mountain Mine on the map!
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_________________       ___________________      ___________________

**Congratulations! You have successfully located Copper Mountain Mine on the map!**
Name: ______________________

Intermediate Integrated Resource Unit on Mining
Topic E - Mapping the Mines

Mapping Challenge: Read the Information Sheet to discover where the Copper Mountain Mine exports its copper concentrate. Highlight the transport route on the map. Good luck!

Map of BC for Copper Mountain Mine

Mapping Challenge: Read the Information Sheet to discover where the Copper Mountain Mine exports its copper concentrate. Highlight the transport route on the map. Good luck!