Geology in the TRUGG
Teacher Notes

This set of teacher notes is designed to guide teachers as they present the *Geology in the TRUGG* Slideshow in Lessons One, Two and Four of the TRUGG Grade 5 resource package. Feel free to adapt and modify as required..

Lesson One: Rock Name Game

Slide One: Title Slide

Slide Two: Lesson One Title Slide

Slide Three: Introduction to the TRUGG

- Explain the location of the Tumbler Ridge UNESCO Global Geopark (TRUGG).
- Briefly introduce the concept of a UNESCO Global Geopark: a collection of 140 places on Earth that have important geological significance, as recognized by the United Nations Education, Scientific and Cultural Organization (UNESCO). These parks are managed and protected by their local communities with support from UNESCO.
- Explain that Tumbler Ridge is one of three UNESCO Global Geoparks in North America. The other two are in New Brunswick (Stonehammer UNESCO Global Geopark) and Quebec (Percé UNESCO Global Geopark).

Slide Four: Location of the TRUGG

- Discuss the map showing the location of the TRUGG.
    - Ask students what they know about that region of British Columbia.

Slide Five: Types of Rocks

- Prior to showing the content, ask students if they know the three types of rocks found worldwide to access their prior knowledge.
- Explain the three types of rocks found worldwide.

- Students may know some examples of these rocks (yet may not know that they fit within these three categories). Explain to them that we will look at more specific examples in the next slides.

- Ask students why there might not be igneous rocks in the TRUGG.
  - The TRUGG is located where there was once an inland seaway. Most of the rocks are remnants of the seaway and its life forms – thus explaining the large deposits of fossils found in the park!

Slide Six: Igneous Rocks

- Define and describe igneous rocks to the students.
  - Igneous rocks usually require volcanic or significant tectonic activity to bring molten minerals to the surface. The TRUGG is not known as a place where significant volcanic activity has occurred.

Slide Seven: Igneous Rocks

- Show students the image of an igneous rock.
- Image details:
  - Obsidian from Panum Crater in Nevada. Obsidian is an extrusive igneous rock that rocks by the rapid cooling of lava, limiting the growth of crystals and leaving a smooth glass-like appearance.

Slide Eight: Sedimentary Rocks

- Define and describe sedimentary rocks to the students.
  - Sedimentary rocks can be tens to hundreds of millions of years old and are hallmarked by layers of different minerals and rock types.
  - TRUGG consists of many different types of sedimentary rocks – we will discuss more about this in Lesson Two!

Slide Nine: Sedimentary Rocks

- Show students the image of a sedimentary rock.
- Image details:
  - Sandstone and shale layers of sedimentary rock from Quality Canyon in the TRUGG. Sandstone cliffs are common all around the world and often contain plentiful fossil beds within the layers.

Slide Ten: Metamorphic Rocks

- Define and describe metamorphic rocks to the students.
    - Metamorphic rocks are formerly igneous and sedimentary rocks that have undergone immense pressure and extreme heat, causing them to be highly compressed layers of hardened minerals. The oldest rocks in the TRUGG are metamorphic rocks.
    - Metamorphic rocks usually represent the oldest rocks on Earth!

Slide Eleven: Metamorphic Rocks

- Show students the image of a metamorphic rock.
- Image details:
    - Metamorphic rock known as "gneiss" – this specimen is from the Acasta Gneiss outcrop in the Northwest Territories of Canada, the oldest outcrop on the planet – estimated 3.58 – 4.031 billion years old! It is found in the Natural History Museum in Vienna.

Lesson Two: Canadian Landscapes

Slide Twelve: Lesson Two Title Slide

Slides Thirteen to Eighteen: Guess the Landscape

- Have students try to guess where the landscapes on slides fourteen to eighteen are (all are in Canada).
- Once through all five images, also ask students the following questions:
    - What different geological formations did you see?
    - What different geological formations do you see?
    - How do the landscapes differ?
    - What is the most interesting formation or landscape in your opinion?

Slide Nineteen: Geological Formations in the TRUGG

- Explain to students that the TRUGG is a world famous geological site – thus, its status as a UNESCO Global Geopark.
    - Ask students what might be so significant about the region.
        - Range of phenomenal and terrific examples of sedimentary rock formations.
        - Quantity and quality of paleontological sites and artifacts, including fossils and dinosaur tracks!
- Prior to showing the second point of the slide, ask students if they can define the term "geological formation". Then, show the definition and discuss what it means.

Slide Twenty: Geological Formations in the TRUGG

- Review why the most abundant rock type in the TRUGG is sedimentary rock.
    - The presence of a large inland seaway hundreds of million years ago left behind significant organic lifeforms that mineralized into sandstone, limestone, shale, and even preserved fossils!
    - Over time, many of the sedimentary layers have been thrust to different elevations and decayed through weathering and erosion, thus explaining many of the unique features found in the park!
- Ask students if any of them have been to some of the famous geological formations listed, and what they saw / thought was cool!

Slide Twenty-One: Geological Formations in the TRUGG

- Explain that the rocks in the TRUGG are part of many geological formations that vary widely in age and composition.
    - Ask students why the oldest rocks are metamorphic rocks, and what clues they would look for to determine whether a rock in the TRUGG is sedimentary or metamorphic.

Slide Twenty-Two: TRUGG Rocks Trivia!

- Explain that the next three slides will show a well-known geological formation in the TRUGG, and that students need to discuss then make an informed prediction on the type of rock that is most present in the geological formation.
- Students should be aware of the clues that they agreed upon from slide fifteen.

Slide Twenty-Three: TRUGG Rocks Trivia: 1

- Show students the image of the first geological formation.
- Image details:
    - Boulder Gardens Geosite – the site is composed of many different sedimentary rocks. These **sedimentary rocks** known as sandstone, have broken off Mount Babcock and slid down to their current resting place.

Slide Twenty-Four: TRUGG Rocks Trivia: 2

- Show students the image of the second geological formation.
- Image details:
    - Known as "Shark's Fin", this rock formation is a **metamorphic rock** consisting of Quartzite – formerly sedimentary rock that was compressed under extreme temperatures and pressures for millions of years. This is amongst the oldest rock formations in the Tumbler Ridge area – over 500 million years old!!! Over time, the metamorphic rocks have been thrust up to the heights that they are now.

Slide Twenty-Five: TRUGG Rocks Trivia: 3

- Show students the image of the third geological formation.
- Image details:
    - Bergeron Falls is a prime example of **sedimentary rock**, specifically sandstone. The layers of sandstone are easily seen on either side of the cascading waterfall. The waterfall is the tallest accessible waterfall in Northern British Columbia!

Lesson Four: We are Ambassadors of the Land

Slide Twenty-Six: Lesson Four Title Slide

Slides Twenty-Seven to Thirty-One: Places in Northern BC

- For each slide, ask students:
    - Where is this place located?
    - What land (or water) based industries might be possible in this place?