

Geoscience Lesson #4: Exploration Company

Topic: Running an exploration company

Total Time: 50 minutes

Location: Wallace Rm. 245

Notes:

- This lesson will not work without an instructor that has some knowledge of geology. If they have not yet completed their first year geology course, it is advised that a different lesson be developed for that instructor.
- Additionally, this lesson will require an assistant. If the instructor has no junior staff assistant, the group leader will likely need to be the banker. This may have adverse effects on crowd control since this is a very active lesson.
- Prices will need to be adjusted depending on the quantities and denominations of play money available. Use your discretion.

Required materials:

- A few rolls of masking tape
- A few pens or pencils
- A wad of monopoly money or equivalent play money
- Pencil magnets (minimum 3)
- Hand lenses (minimum 3)
- Scintillometers (2) from room 316
- Uranium Ore sample from room 316
- "C" batteries for scintillometers (6)
- Chalk
- The crates of rocks from lesson #2
- The Malachite sample from lesson #2
- Any other interesting large rocks that can be collected/borrowed for this exercise
- Old drill bits (some can be found near the light switch in room 211)
- Some samples of core
- Four pieces of blank paper

Class Setup:

- Before beginning, make sure that drawers of samples that might be out in the open are put away or covered with newspaper to prevent students from misplacing them
 - It is recommended to allow university students who want to study those samples to freely enter/leave the room with drawers during the day, if they put the drawers at the tables in the hall. This compromise is more or less an absolute necessity in order to be able to use this room.
- On the side wall of the room, there is a large collection of large rocks. These rocks will need to be returned to the shelf at the end of the day in as close to the correct order as can be managed. It is recommended that the instructor take snapshots of the shelf with their cell-phone camera before the lesson begins in order to be able to replace them in the correct positions.
 - Distribute these rocks, except those which are exceptionally fragile, on the back three rows of tables at the back of the room
 - Interspersed between these rocks, add the limestone and granite pieces from lesson #2
 - Add any other interesting rocks, interspersed between the samples, including the Malachite sample from lesson #2
 - Beneath one of the larger limestone samples (one that is unlikely to be lifted by

the students), tape one of the cesium pucks to the underside of the table using masking tape. The pucks are in the scintillometer cases.

- Remove the chairs from the back three rows, moving them towards the front of the room or stacking them
- At the front of the room, place the scintillometers, pencil magnets, hand lenses, one cesium puck, the drill bits and the play money on the desk
- In the front two rows: pieces of drill core for the kids to inspect
- On the board:
 - 5 rules
 - Education requirements:
 - High School Graduation
 - Take Math, Physics, Chemistry
 - Go to University: U of Manitoba or Brandon University
 - Job name: Exploration Geologist
 - With related job: Geophysicist
 - Activity: Running an exploration company
 - Three people per company
 - Initial investment: \$200
 - Price chart
 - Prospecting: Free
 - Staking a claim: \$10/property
 - Magnet rental: \$20/table
 - Hand lense rental: \$20/table
 - Scintillometer rental: \$30/table
 - Expert advise: \$20/property
 - Drilling: \$40/property
 - In big letters "All that glitters is not gold"
- In the corners of the room, four pieces of white paper labeled N, S, E and W.

Before beginning class (5 minutes):

- Quick lesson summary before class begins
- Bags can be dropped in the room, or in front of museum if the Wallace doors are locked
- Instruct students to sit in front two rows of class before letting them into the room; remind them to look at but not to roll the drill core around (it's noisy)

Lecture section (15 minutes):

- Review rules
- Review education requirements
- Why Study Geoscience?:
 - Jobs/Money
 - Social Good: geoscience powers the economy
 - Lots of travel
- What is an exploration company:
 - Relate the current lesson to the mapping lesson
 - Explain the scale of money involved (millions for a small company, billions for a large company. Vale INCO spends 250 million each month on exploration globally)
 - Explain the tools of exploration
 - Hand lense: used to look for interested crystals
 - Pencil magnet -- relate it to the idea of a magnetometer and airborne mag

- for finding iron and other metals (demonstrate with a sample at the front)
 - Scintillometer -- looking for radioactive rocks (demonstrate with remaining cesium puck)
 - Expert advise -- when you don't know for certain what something is, you can always ask someone who knows
- Relating the rules of the activity:
 - Groups of (two or) three
 - Each group will get an initial investment of money.
 - In each group, they should designate an exploration manager
 - warn the kids that the exploration manager has the final say when it comes to spending money, but that they're the first member of the company to get fired if the company loses too much money
 - (this should avoid having the entire group from wanting to be the manager)
 - the other two will be the geologist (studies the rocks) and the geophysicist (uses the tools)
 - Most decisions are to be made as a group, where the exploration manager should take the advise of the geologist and the geophysicist. If he/she doesn't, suggest that the other two group members have the power to fire their manager.
 - Explain how and why they need to spend money on each of the items on the price sheet
 - Prospecting: free, since you're just walking around and looking at rocks
 - hand lense: more involved equipment costs money - need to rent it
 - rental is only good for one table, so they'll need to rent three times for all three tables if they want to use the tool on all three tables
 - Expert advise is asking you a question about a specific rock. Be vague, and tell them that they may have to do some interpretation. Give an example like: "I recommend ensuring that no other company is able to obtain this property." Define that that means that the property is probably worth something.
 - Before you can drill, or ask for expert advise, you must have a claim on that property. Claim staking is done by creating a masking tape square on the table around the sample with the person's name written on the tape. Claims can be sold back to the bank.
 - Drilling is the only way to make money. If you don't drill, you never make money. Some properties will not be worth anything when you drill - others will make your company rich.
 - Explain drilling by showing drill bits, and referring to the core in front of them
 - Assign groups by assigning the cardinal directions (N, S, E, W). If there are more than 12 people, add a "centre" direction which will meet at the middle of the room. Tell them to go to those direction signs in the classroom when they are assigned a direction.

Activity (Remaining time):

- Once in groups, get them to designate their three positions (geologist, geophysicist, manager) amongst themselves, then have them send the manager up to the front to pick up their initial investment from the banker.
- If there is a leader/junior staff available that isn't the banker, make them the "cop", to ensure that rented equipment is only being used on a single table (there are three tables - they will need to pay three times the price to use the tool at all tables)
- Suggest that they begin by prospecting, since it's free, or by renting some tools.
- Remind them that the only way to make money in this game is to spend money.

- Once the students are underway, the instructor will be quite occupied with giving "expert advise" or drilling.
 - When offering expert advise, be vague intentionally on occasion. Other times, be blunt. Pretend you are a contractor offering a property report.
 - When drilling, be consistent with your expert advise on a given property. If you said that the property was probably worth a fortune (as a contractor), don't let them down when drilling.
 - If they drill limestone or granite, except for the limestone with the cesium puck hidden under the table, the student will make no money
 - For other samples, try to determine a reasonable "profit margin" for the students. If you are using the prices defined in this document, the following might make a good guide.
 - Gold: \$1000 (select one quartz sample for the gold property. Only have one single gold property)
 - Uranium: \$200 to 500, depending on which sample. There are not many radioactive samples in the collection, except the ore sample from room 316, and your faked limestone sample with the cesium puck. Some rocks from the shelf have low radiation levels.
 - Copper/Zinc/Nickel/etc. (anything with sulphides that aren't pyrite): \$100 to 400
 - Pegmatites: (lithium, etc.) \$100 to 200
 - Garnets: \$50
 - Iron formation: \$100
 - Other prices as can be justified with the samples that are available. Try to be geologically reasonable.
- If a group goes bankrupt or fires their manager, have them regroup with the banker, and get a new investment loan to cover their next drilling. Point them to a property that will make money so they can repay their loan and get back into the game.
- At the end of the lesson, with 5 minutes left before having to leave, get them to count up their money. The company that made the most money will likely have the individual who deserves the geology award. Keep those people in mind.

Between lessons:

- Remove claim tape. If the gold sample was discovered, move it somewhere else in the room so that the groups cannot tell each other where it is as they pass each other (or during lunch) - if it wasn't found, don't bother.
- Count out initial investment sums for next lesson

Teardown:

- Make sure to return the samples to wherever they came from. Return the chairs to the back row, and wipe chalkboard. Return remaining equipment and supplies, and don't forget the cesium puck that is taped under the table.