Week 1: Into the Grand Canyon
Monday

WARM UP: Try to write down at least three things you know about the Grand Canyon.

LT: I can explain a brief history of the Grand Canyon and explain the importance of the Powell Expedition.
The Grand Canyon!

https://www.youtube.com/watch?v=_hoGpYyn4Bs
The Grand Canyon!
One of the seven natural wonders of the world!

**WHAT:** Rock canyon that is 277 river miles long, up to 18 miles long, and a mile deep!

**WHERE:** Arizona - near southern edge of CO plateau

**WHY:** Geological paradise (rock layers, erosion, vulcanism)

The variety of rocks and geological evidence help reveal geological history of earth!
Early Grand Canyon Inhabitants

- Native American people lived in the area for hundreds of years
- Early peoples lived in caves (1600-1200 BCE)
- Ancestral Puebloan people lived in pit houses in the area surrounding canyon and were hunters/gatherers (1-1150 BCE)
- Hopi people lived near the GC after the ancestral Puebloan people moved away. Lived in the area for hundreds of years...GC held religious significance to them
Early Grand Canyon Explorers

- **1540: Captain Garcia Lopez de Cardenas** - first European to view GC ... was searching for the “Seven Cities of Gold”, ran out of supplies so had to turn around

- **1776: Father Esclante** - first European to visit North Rim

- **1858: Lieutenant Joseph Christmas Ives** - commissioned to determine the navigability of Colorado River, determined it would be very difficult
John Wesley Powell

- One-armed Civil War veteran
- Geologist and Naturalist
- Led first expedition THROUGH the Grand Canyon...ended up going on 2 expeditions in GC
- Helped establish the US Geological Survey
Powell Expeditions

- Journey was “more an epic of survival than a exploration expedition” (NPS) due to short supplies and challenging conditions

- Very dangerous (loss of boats and supplies, near-drownings etc.)
Powell Expedition

- First expedition: 1869
- 9 men
- Four wooden boats
- Goal: mapping the uncharted parts of the Green and Colorado River
- 3 month expedition
- End of expedition: 6 men and 2 boats
- Second Expedition: 1871
John Wesley Powell Expedition

1. https://www.youtube.com/watch?v=BxbpeXYF4uk

2. https://www.youtube.com/watch?v=wPy9JbZHqQ
Read Powell Journal Entries and Answer Questions

- P. 49-54 and 58-59
- On WS: SKIP the right side of table one (about natural history of GC)!
- Worksheet DUE tomorrow
**Tuesday:**

**Warm Up:** Who was John Wesley Powell? What were some of his major accomplishments?

**LT:** I can identify the two main areas of Grand Canyon National Park, list three important facts about the Colorado River, and draw a map of Grand Canyon National Park.
Grand Canyon Facts

- 277 miles long (measured from Lees Ferry below Glen Canyon Dam at the southern end of Lake Powell to the Grand Wash Cliffs at Lake Mead)
- Averages 10 miles wide from rim to rim (widest is 18 miles, narrowest is 5 miles)
- About a mile deep
- Colorado River inside
Grand Canyon

- Grand Canyon National Park: established in 1919
- Over 5 million people visit GCNP every year!
- We can’t visit it with our class, so we are going to take a “virtual tour”!
- From N to S Rim by car...215 miles!
Begin sketch of map in journal (Journal entry #9)
Virtual Tour:

South Rim

- Approx. 1200 ft. lower than North Rim
- Grand Canyon Village
- 4.5 million visitors per year!

Time Lapse:
https://www.nps.gov/grca/learn/photosmultimedia/b-roll_hd01.htm
North Rim

- Reaches elevation over 9000 ft!
- More isolated and less popular for visitors
- Only 12 miles as the crow flies from the South Rim

NPS Video:
https://www.youtube.com/watch?v=iw5cDIskqBw

Time Lapse:
https://www.nps.gov/grca/learn/photomultimedia/b-roll_hd23.htm
Colorado River

- Water moves at speeds on average of 3-4 mph and in rapids at 8-10 mph
- Water depth from a few inches to hundreds of feet
- Drops 1709 ft in elevation over 278 miles (very steep!)
Colorado River

- To hike down to the bottom of the GC (to reach the river) takes a whole day!!
- Motorized raft trip - 1 week
- Oar-powered raft - 2-3 weeks
- https://www.nps.gov/grca/learn/photosmulti media/b-roll_hd05.htm
Journal Entry 9: Finish Drawing and then color Grand Canyon Map!

Map Should Include:

- South Rim
- North Rim
- State Boundaries
- Colorado River
- At least 5 facts about GCNP!

Make sure to include labels!
Finish Journal Entry #9: Observations about GC pictures

- Book pg. 3-11
- Write at least 5 observations about the pictures of the Grand Canyon (use complete sentences!)
- Write 3 questions you have about the Grand Canyon
- Write 3 sentences explaining why you think the Grand Canyon would be a good place to study geology and earth history
Warm Up: What are the two main areas of Grand Canyon National Park? What are two facts about the Colorado River?

LT: I can explain why the Grand Canyon is an important geological area to study.
Geological history of GC: https://www.youtube.com/watch?v=YBYvCJLb7tE

Nat Geo GC: https://www.youtube.com/watch?v=Cx3TGxFGE3Y
Complete **Response Questions...** DUE today!
Thursday

**Warm Up:** What is your favorite food?

**LT:** I can explain what a sedimentary rock is and use a lab test to identify sedimentary rocks.
What is your favorite ice cream flavor (just choose 1!)?

- Mint Chocolate Chip
- Cookie Dough
- Strawberry
- Reeses Peanut Butter Cup

Move to the corner of the room that corresponds to your favorite!
Brainstorm Q’s with group...write responses on paper

● Mint Chocolate Chip: What are sedimentary rocks?
● Cookie Dough: What is a plateau?
● Strawberry: How do canyons form?
● Reeses: Why study canyons?

Write answers on paper...be prepared to share them with the group!
WHAT ARE SEDIMENTARY ROCKS?!
1. Sedimentary Rocks

Definition: rock formed of mechanical, chemical, or organic sediment

Examples:

- Limestone
- Sand
- Shale
WHAT IS A PLATEAU?!
2. Colorado Plateau

- **Plateau**: large, level area that has been uplifted from its surroundings

- **Colorado Plateau**: covers large portions of Arizona, Utah, Colorado, and New Mexico

- Mostly is **desert**
  - Rain and snow are rare

- Includes **many famous national parks**!
  - Zion
  - Grand Canyon
  - Bryce Canyon
  - Arches
2. Colorado Plateau Formation

- Rock foundation, used to be covered in ocean
- Sediments laid down in LAYERS
- Ocean recedes
- Leaves layered plateau!
- Then EROSION happens!

LOOK AT MODELS OF LAYERING!
3. Canyon Formation

- EROSION!
- WATER carved layers of sandstone and limestone into monuments, spires, buttes, arches and canyons
- WIND polishes and smooths features
- Colorado River carves out Grand Canyon
WHY STUDY CANYONS?!
4. Why study canyons?

- Sedimentation lines
- Canyons reveal earth’s history
- Geologists study exposed layers of rock and can learn specific information about that time period (climate, water availability, organisms that were alive etc.)
4. How do geologists study rocks?

- Observations!
- Tests!
- Today we are going to practice doing a test on rocks and making observations!
Acid Test
Directions:

1. Create a table:

<table>
<thead>
<tr>
<th>ROCK #</th>
<th>ROCK OBSERVATIONS</th>
<th>ROCK DRAWING</th>
<th>ACID TEST OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Make observation about each rock (color, texture, size, pattern), draw/write

3. Do acid test:
   a. Place rock on paper towel
   b. Squeeze one drop of acid from bottle onto rock
   c. Observe what happens
   d. Record observations
   e. Use paper towel to dry off rock
   f. Repeat for ALL rocks!

GOGGLES ON FOR THE ENTIRE LAB!!!
Example...look at chalkboard!
Journal Entry #10

Answer these questions in COMPLETE sentences

1. What are sedimentary rocks?
2. How do sedimentary rocks form?
3. List some examples of sedimentary rocks
4. What test did we use to determine if rocks were sedimentary rocks? How does the test work?
5. TABLE FOR ACID TEST
**Friday**

**LT:** What are sedimentary rocks? List three different types of sedimentary rocks.

**Warm Up:** I can correlate rocks from two different canyons and explain how canyon layers are formed.
RECAP: Acid Test Lab

- What were three key observations you found when conducting the acid test?
- What can we infer about sedimentary works?
- How do these observations and inferences apply to our study of Earth History and the Grand Canyon?
Rock Layers & Canyon Comparison

- We have completed the first steps in trying to read the story written in Grand Canyon Rocks
- We have observed individual rocks and recorded observations
- Now going to use that information to divide rocks into groups
Instructions:

- Today and Monday we will be correlating rocks from two locations: Colorado River, North Canyon at Mile 20 and Nankoweap Canyon at Mile 52

- Keep rocks from each canyon separate!
- Sort rocks from North Canyon into groups
- Sort rocks from Nankoweap Canyon into groups
- Make a descriptive name for each group of rocks
- WRITE DOWN YOUR NAMES AND GROUPS AND ROCK NUMBERS
Discussion Questions

- How many groups did you sort the rocks from the North Canyon into?
- How many groups did you sort the rocks from Nankoweap Canyon into?
- What properties did you use to sort these rocks?
- Why did rocks fizz?
Calcite

- Material that fizzed in rock was reacting with the acid
- Calcite!
- Calcite reacts with acid and gives off a gas, which results in fizzing
- Calcite is in LIMESTONE
Limestone

- Sedimentary rock
- Contains calcite
- All four rocks that fizzed are examples of limestone!
- Primarily made of Calcium Carbonate
- Commonly forms in clear, warm, shallow marine water and forms from accumulation of organic debris
- What observations do you have about rock 8?
- What rock(s) were with rock 8?
  - 6
- What properties do 6 and 8 have in common?
  - Sandy, rough
  - Acid soaked in
  - If you rubbed them together, they created small sand particles
Sandstone

- Sedimentary rock
- Made out of sand particles that are cemented together
- Is formed when layers of sand accumulate because of water or air (desert)...sand settles, is compacted, and forms a rock
- Typically red, yellow, or brown in color
- Which rock is not in a group?
- Why is group 7 without a group?
- Did rock 7 fizz?
  - No! Can’t be limestone
- What is the texture of rock 7?
  - Smooth, not sandy. Can’t be sandstone
- What other properties does rock 7 have?
  - Contains leaf fossils, black

Rock 7 is **SHALE!**
Shale

- Sedimentary rock
- Fine-grained
- Made of mud and flakes of clay, tiny fragments of minerals
- Thin layers and breaks easily
- Formed by compaction
Go back to notes and label rock samples with the correct name: limestone, sandstone, shale

Answers:
4 Limestone
5 Limestone
6 Sandstone
7 Shale
8 Sandstone
9 Limestone