

Grand Canyon Self-Guided Activity ANSWER SHEET

SECTION 1: GRAND CANYON GEOLOGY

Complete this section at Yavapai Point Museum

Teachers' instructions: These worksheets were designed for students to complete in any order. If your whole class can't fit around each exhibit, you can split your class into 4 groups. One group can start at each of the four "crime scenes" and the class can rotate.

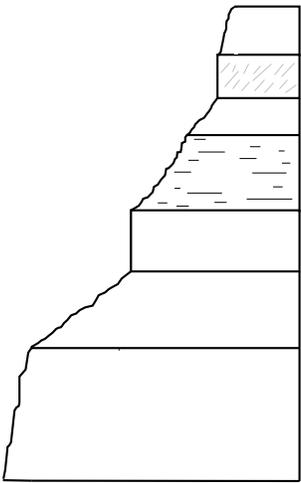
Crime Scene #1: Inside the West Door

Read "The Way the Canyon Crumbles" in the "Forces of Change" exhibit.

1. The mystery: Which layers do you think become steep cliffs, soft layers or hard layers? (If you need help figuring this out, look at the "Canyon in a Canyon" exhibit behind you.)

The verdict (circle one): soft layers hard layers

Now use your sleuthing skills to find the 3-D exhibit that looks like the diagram on the right.



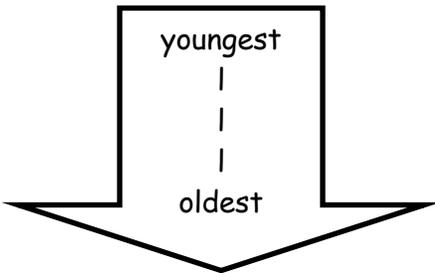
2. Looking at the shape of the cliffs, which layers do you think are the hardest rock layers in the canyon?

Answers may vary. Hard layers include: Kaibab limestone, Coconino sandstone, Redwall limestone, Tapeats sandstone, Muav limestone, Basement rocks.

Assess the scene: Look out the glass windows. Can you find these three rock layers in the canyon?

3. Cipher puzzle: Come back to the 3D exhibit. By looking at the order of the rock layers, you can put these rock layers in order of youngest to oldest:

- | | |
|--------------------|---------------------------|
| Bright Angel shale | <u>Hermit formation</u> |
| Hermit formation | <u>Redwall limestone</u> |
| Basement rocks | <u>Muav limestone</u> |
| Muav limestone | <u>Bright Angel Shale</u> |
| Redwall Limestone | <u>Basement rocks</u> |

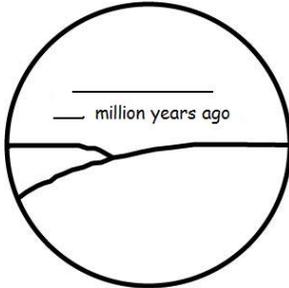


4. Unscramble the clue: p t s o i n i d o e

When layers of rock and soil are piled up on the earth, we call it d e p o s i t i o n.

Crime Scene #2: Back exhibit room under "Basement Rocks"

5. Find the symbols below and fill in the names and ages you see.

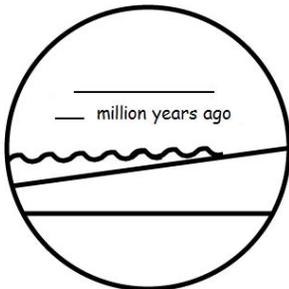


The crime: Two culprits changed the Vishnu Schist you see here.

Name the main suspects: heat and pressure.

The verdict: This is metamorphic rock.

6. **The crime:** Plants and animals were fossilized into the layers of the canyon.



Suspect a: Trilobites

Draw the crime scene where a trilobite would have lived.

Suspect b: Club moss

Make a rubbing of the moss fossil exhibit.

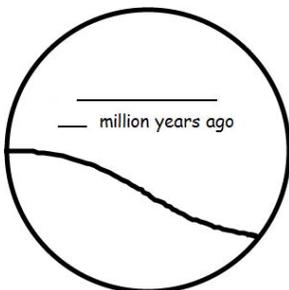
Suspect c: You can "track" this animal's identity in the Coconino Sandstone exhibit. **Sketch** what the suspect might have looked like.

Drawings may vary. Use exhibit illustration of trilobite in ocean environment.

Moss rubbings may vary.

Drawings may vary. Tracks were made by ancient reptile.

7.



Unscramble the clue: i p t l u f

After all of the rocks were laid down, plates collided, causing u p l i f t.

Crime Scene #3: 3D Map of the Grand Canyon

8. Assess the scene: Can you find where you are on the map?

9. The crime: A powerful force has been carving the canyon for the past 5-6 million years.

Name the main suspect: The Colorado River

10. Which rim is closer to the river?

(circle one)

North Rim

South Rim

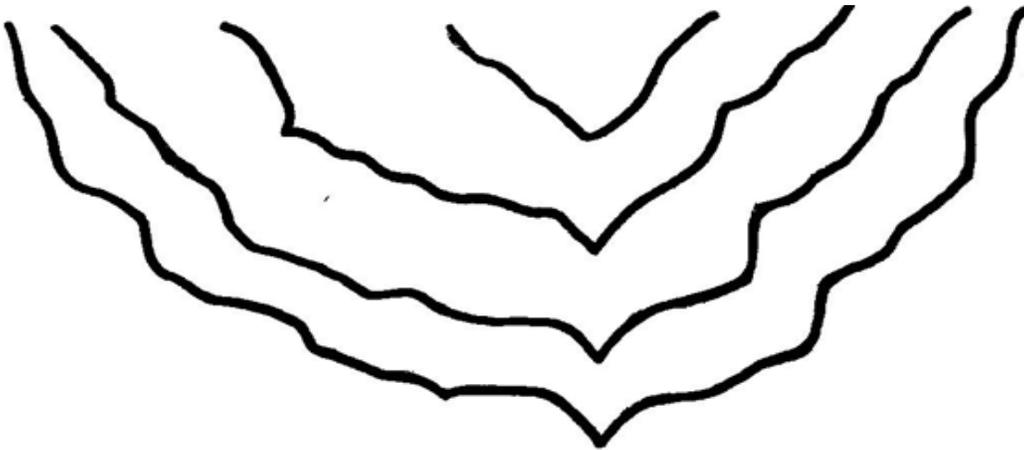
11. Crime scene statistics:

a. How wide is Grand Canyon? 10 Miles

b. How deep is Grand Canyon? 1 Mile(s)

c. How long is Grand Canyon? 277 Miles

12. Suspect profile: Using the “Canyon in a Canyon” exhibit next to the 3D map, draw how wide the river is in each of the stages of the Grand Canyon’s growth.



(Answers may vary. River should be about the same width in each stage.)

13. Question for the jury: Was the river guilty of being any wider 5 million years ago?

Circle one:

Guilty

Not Guilty

14. Unscramble the clue:

t o c d g i w t n u

When a river carves downward into rock, we call it d o w n c u t t i n g.

Crime Scene #4: Glass Windows Overlooking Canyon

15. Assess the scene: Look closely at the rock layers in Grand Canyon for several minutes. What colors of rock do you see?

(Answers vary. Almost all colors of the rainbow are represented in the canyon.)

16. Use the “Looking Back at You” display to locate these Grand Canyon hotspots:

Plateau Point

Phantom Ranch

The Colorado River

Composite sketch: Draw a picture of something you noticed during your close observation of Grand Canyon that you did not notice at first glance.

(Drawings may vary.)

17. Now find the “Too Thick to Drink, Too Thin to Plow” display.

The crime: A giant structure has changed the color of the Colorado River.

Name the culprit: Colorado River

What color is the river today? Sometimes green-blue, sometimes reddish-brown

18. Unscramble the clue: o r e s n i o

When the walls of the canyon crack and crumble, we call it e r o s i o n.

19. Crack the Case: Now you are ready to solve the great mystery: *who is the culprit who created this enormous formation?*

Arrange your worksheets in order 1-4. Look at the **unscramble the clue** question on each page. Write the first letter of each unscrambled word in the spaces below, in order 1-4:

D U D E!
1 2 3 4

Excellent work, gumshoe! That’s what we call the culprit. You solved the mystery of the Grand Canyon!

SECTION 2: GRAND CANYON ECOLOGY

1. (Students looking for wildlife or evidence of)
2. (students draw pictures of two plants)
3. Some answers include: different animals eat different plants or use different plants as their home, different size animals graze or browse on different size plants (elk browse on trees, rabbits eat small shrubs, etc.), hawks and other birds of prey perch on tall trees to look for prey such as mice, mice use small shrubs to hide from predators, etc.
4. a) Answers include many birds, such as woodpeckers, owls and hawks, many insects such as ants and bees, many reptiles live in dead trees, etc.

b) They provide food, shelter, a home (especially the holes in the trees), a perch to watch for prey, safety from predators, etc.
5. a) (students draw the different needles)

b) Small bluish or brownish berries? juniper

Cones 1"-2" long? pinyon

Cones about 3"-5" long? ponderosa

Add the berries and cones to the appropriate drawing above.
- c) (students pass around the different plant parts)
d) Often described as vanilla or butterscotch
e) Each plant and animal plays it's own role in the environment. A wider variety of plants and animals creates a more balanced ecosystem.
6. a) No definite answer since it depends on where students are from

b) Answers include elevation, amount of annual precipitation, average temperature, soil and rock type.



SECTION 3: PEOPLE AT GRAND CANYON

1. Verkamps
2. Hopi House is the building
3. a) Mary Jane Colter
b) Although she designed several employee housing buildings, the following are the ones visitors use and are familiar with; Hermits Rest, Desert View Watchtower, Lookout Studio, Hopi House, Bright Angel Lodge and cabins, Phantom Ranch.
4. a) El Tovar
b) Art and music rooms, ladies' lounge, solarium, roof gardens, dining overlooking canyon.
5. a) Stagecoach
b)
 1. the train was much cheaper (3.50/person versus \$20/person on stagecoach)
 2. The train was faster (about 2 hours versus an all-day stagecoach ride)
 3. The stagecoach ride was a jolting, bumpy ride, and the train was smooth
6. a) No grassy area; wooden plank walkway; original buildings gone; some trees are gone; "island" with rock bench not built yet; telephone pole is gone; rock wall not built yet (students may see others too).
b) (subjective answer)
7. a) Young women. Harvey Girls.
b) She used the cultural heritage of the region rather than imitate European styles.
c) Made of rocks from the canyon that are stacked in the same order as the layers in the canyon (reflects the natural strata of the canyon).
8. Kaibab limestone
9. a) To get to water at Indian Gardens, and because the Bright Angel fault allows access into the canyon by creating a break in the cliffs.
b) Prehistoric People
c) Male burro and female horse
d) Carry more weight, less temperamental, smoother ride, more economical
10. a) The most apparent images are of a "herd" of animals which appear to be bighorn sheep or deer.
b) Subjective answer, no right or wrong
c) Subjective answer, no right or wrong