

# Earth History Review Packet:

## Answer Key

### Investigations 3 -7 2011

#### Investigations 3.1 & 3.2

1. While examining the rocks from North and Nankoweap canyons, what tests or observations allowed you to separate them into three groups?

a. **Acid Test:** Any that fizzed were put in a separate group.

b. **Gritty Texture/No Fizz:** Any that had a gritty or sandpaper like texture and didn't fizz, were in a separate group. Also, when rubbed together, small individual pieces scrapped off.

c. **Smooth Texture/No Fizz:** only black rock, did not rub off small particles, and did not fizz.

Jun 6-7:10 AM

inv 3

2. What are the three types of **sedimentary rocks** you examined in North and Nankoweap canyons?

a. Limestone

b. Sandstone

c. Shale

3. When looking at the Chuar Butte from book page 18, which type of rock **weathers** (breaks down) at the fastest rate? How do you know looking at the picture?

Shale breaks down the fastest.

When looking at the Chuar Butte, the shale is the most weathered and is crumbling & mostly broken up rock.

The slopes are more gentle. The Limestone and Sandston are still mostly solid walls & are more durable rocks.

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# answer key - Earth History Review

4. When you **correlate** (compare) the rock layers in North Canyon at mile 20 and Nankoweap canyon at mile 52; what connections can you make about the following?

a. The order of the rocks:

Rock layers 9, 8, 7, 6, are in the same order in both North and Nankoweap canyon.

Rock layer 10 is only found in North & Rock layers 5, 4 are only found in Nankoweap.

b. The names of the rocks:

Rocks in layers 9,8,7,6 are identical names in both canyons. Rock layers 10, 5, 4 are unique to each canyon and do not have a corresponding layer in the other canyon.

5. Explain how you know which two layers of rock are below river level at North canyon, when you correlate it to Nankoweap canyon?

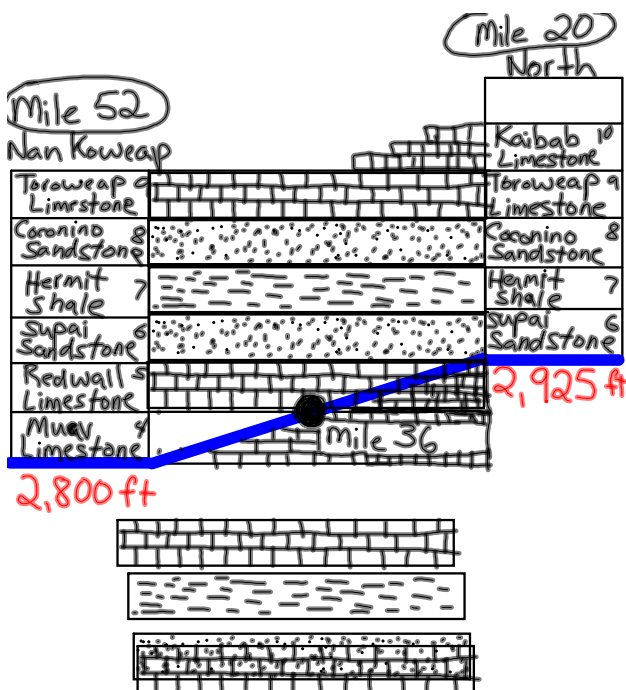
ON next page is the visual.

The two canyons are at different elevations, so the river is higher at North canyon and lower at Nankoweap. The river has cut deeper at Nankoweap and is 32 miles down river from North. The river has exposed two more layers or rock.

We also know that sedimentary rock is laid down in horizontal layers and we can make the correlation that the same layers we see at mile 52 in nankoweap, extend under the ground to north canyon below the river.

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## Investigations 4.1 - 4.5 & Weathering/Erosion Video

1. When rocks are being eroded by a river, they travel from the canyon and sometimes distances of 100 miles or more. As the rocks are being eroded, how are they undergoing **abrasion**?

The jagged / pointy rocks that have just been broken off of larger pieces of rock are undergoing abrasion as the rocks tumble across the bottom of the river, knock against other rocks, and the water smashes against them.

As a result, the farther down the river the rocks travel, the more rounded they become.

inv 3

inv 4

## answer key - Earth History Review

2. What is the difference between **weathering** and **erosion** based on what you learned in lab and from the video?

**Weathering:** is the break down of rock / sediments into smaller and smaller pieces. This is done by moving water, blowing wind, ice-wedging & moving ice, and gravity causing rocks to move down hill / rockslides.

**Erosion:** occurs when rocks or sediments are moved from their original location to a new location...sometimes as far as 100 miles away. They are often moved by blowing wind, moving water, glaciers, and gravity rockslides.

Both could occur at the same time.

Inv 4

Inv 4

3.

**B. Sand Dune (wind blown): Sand #2**

i. Shape- subrounded to rounded

ii. Sorting- very well sorted to well sorted

iii. Other Details- (Circle One) Etched/Frosted or Shiny/Glossy or Neither

inv 4

3. Following your examination of Sands 1-3, complete the listed observations to help you determine which **environment** each sand came from:

**A. Mountain Stream: Sand #1**

i. Shape- angular to sub angular

ii. Sorting- very poorly sorted to poorly sorted.

Other Details- (Circle One) Etched/Frosted or Shiny/Glossy or Neither

3.

**C. Beach (crashing waves): Sand #3**

i. Shape-very well rounded to rounded

ii. Sorting- moderately sorted

iii. Other Details- (Circle One) Etched/Frosted or Shiny/Glossy or Neither

inv 4

## answer key - Earth History Review

4. Use the observations you made from the stream table model at the front of class and computer simulation to answer the following questions:

a. Why did certain sizes of **sediment** (pebbles, sand, and silt/clay) **erode** different distances on the stream table?

Pebbles & Sand are the largest particles. As the speed of the water slows (on the delta, floodplain, as the river flattens out) these are the first to drop out of the water.

Silt & Clay will erode the farthest because they are the smallest and lightest. Even when water is moving slowly, it will carry these sediments a far distance.

inv 4

B. According to the **Principle of Original Horizontality**; what happens to sediment when it is carried to a **basin** filled with water, and **deposited** there?

When the sediment is deposited (set down) it settles in the water to the bottom of the basin.

When the sediment falls to the bottom over thousands and millions of years, the sediment makes flat, horizontal layers. Each layer is on top of the previous layer.

inv 4

1. Sedimentary Rock Formation- Fill in the missing blanks in the table below

Type of Rock	Sediments & Materials that make up the rock	Compaction of materials occur (yes or no)	A matrix bonds/glues sediment	Environment the rock forms
Limestone	- Shells - Sand/Clay/Silt <b>precipitate</b>	<u>Yes</u>	Yes	<b>Ocean &amp; Salt Sea</b>
Sandstone	- <b>Coarse to fine sand</b>	Yes	<u>Yes</u>	_____ or Cold Lake
<u>Shale</u>	- Silt - Clay <b>dead plants</b>	<u>Yes</u>	No	<b>Swamp &amp; floodplain</b>

inv 5

2. Limestone:

a. Because limestone contains **calcite**, what happens when hydrochloric acid is dripped on it? The HCl reacts with the calcite, and releases CO<sub>2</sub> in form of gas bubbles (fizz!)

Limestone is the only sedimentary rock that has this reaction

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## answer key - Earth History Review

B. Where did the calcite (also known as calcium carbonate) come from?

The ancient sea water contained large amounts of calcium. As fish & marine life release CO<sub>2</sub> into the water, it combines with calcium, forming a white precipitate. This then sinks to the bottom of the body of water & becomes part of the limestone rock.

Calcium is also taken out of the water by marine life, which incorporates it into their shells and use it to live.

### EARTH HISTORY TIME LINE

Era	Time period	Age (years)
Cenozoic	Today	0.00
	Quaternary period	1,600,000
	Tertiary period	66,000,000
Mesozoic	Cretaceous period	144,000,000
	Jurassic period	208,000,000
	Triassic period	245,000,000
Paleozoic	Permian period	286,000,000
	Pennsylvanian period	320,000,000
	Mississippian period	360,000,000
	Devonian period	408,000,000
	Silurian period	438,000,000
	Ordovician period	505,000,000
	Cambrian period	570,000,000
Precambrian		4,500,000,000

Years ago

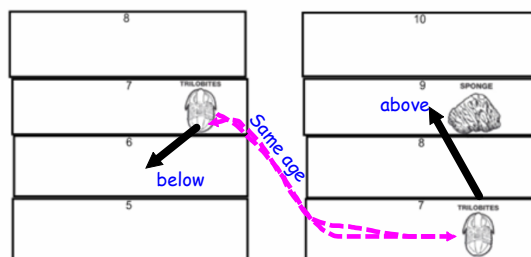
inv 5

inv 6

2. Use what you know about **index fossils** and the **Principle of Superposition** to answer the question below? Use the picture below as a reference and the fossils shown in the layers are all index fossils.

Rock Formation A

Rock Formation B



How do we know that layer 6 in Rock Formation A is older than layer 9 in Rock formation B?

**First:** You need to use the two trilobite (index fossils) to show that layer 7 in each canyon is the same age, because the same index fossil is found in each rock layer.

**Second:** If you know that layer 7 in each canyon is the same age. Then, anything above them is younger and anything below is older, according to the Principle of Superposition.

Thus layer 6 is below (older) the trilobite and layer 9 is above (younger) the trilobite.

### Investigation 7 - Time & Fossils

1. Why are **index fossils** different than all other fossils we find in rock layers?

Index Fossils are found in a specific/one type of environment all over the world. They existed for a short amount of time (1-3 million years)

If you find an index fossil in a rock layer, you are able to accurately determine the age of the rock in which it was found.

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## answer key - Earth History Review

3. How does the **Principle of Uniformitarianism** and all the processes you've seen in this unit; help explain why the earth looks the way it does today after 4.5 Billion years?

**Not on the test.**

This is the concept that everything that happens today (how water acts, gravity's affect on things, all things get energy from the sun...) has been happening the same way throughout earth's history. So all landforms and processes we observe today, were formed by the same processes we see today.

### Facts and Vocabulary Terms:

Fill in the blanks for the following questions and clues. Each word can only be used once and not all words will be used.

<b>Correlation</b>	<b>Principle of Superposition</b>
<b>Deposition</b>	<b>Matrix</b>
<b>Erosion</b>	<b>Rounding</b>
<b>Geological Time</b>	<b>Principle of Uniformitarianism</b>
<b>Grand Canyon</b>	<b>Sorting</b>
<b>Index Fossil</b>	<b>Weathering</b>
<b>Principle of Original Horizontality</b>	<b>Sedimentary Rock</b>

1. When the wind blows sand in a desert, all the smallest sediments will blow the furthest distance and the largest sediments will blow the shortest distance. This describes the **sorting** of sediments.

inv 7

page 5

2. When scientists discover a(n) **Index Fossil** in the rock layer, they can calculate the age of the rock that it was found, to within one million years of its formation.

3. When materials rocks are broken apart into smaller pieces by ice wedging, rock slides, and moving water - we call this **Weathering**.

4. Based my observations of how water acts, I know that water will flow from a higher area to a lower area. I also know that when water freezes it expands. Based on these constants, I can predict that water has always acted this way. This is an example of **Principle of Uniformitarianism**.

5. Rocks that form from other rocks that have been broken down, eroded to a new location, and deposited in flat layers are called **Sedimentary Rocks**.

6. When sediment is carried by wind or water to a new location and set down; we call this **Deposition**. When this occurs flat layers of sediment form, one on top of the other, which shows the **Principle of Horizontality**.

7. When one rock formation (specific sequence of rocks) can be seen in multiple sites, we are able to make a **Correlation** of the two locations and see if there are any connections.

8. Based on the **Rounding** of sand I know that sand from a mountain stream has only traveled a short distance from its source and is still very jagged. But when I look at a sample of sand from shore of a beach, I can see that it is very smooth and glossy after much pounding from waves.

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