Group members _____Class period _____

Stratigraphy and Mining Lab

Day One: Plan your model & make kinetic sand

Materials Needed:

- 2 cups of very fine sand
- 3 tablespoons of cornstarch
- 1 mixing bowl
- 1 graduated cylinder
- 15 ml water
- 1 mixing spoon
- Food coloring
- Dish soap
- Tea tree oil

Step 1: Choose jobs for building the model. Decide who is going to do these different jobs and write their name on the line provided:

1. Chief Geologist: _____
This is the leader who keeps the group on task. This person reads the directions, should understand what all of the other jobs are doing, and keeps the project moving.

2. Sedimentologist: _____
This person builds the sedimentary rock layers, making sure each layer is a different color and represents a unique depositional event. The Sedimentologist also adds ore nuggets to one of the layers to make the mineral deposit.

3. Paleontologist: _____
This person obtains the color(s) of the Nerds candies from the bowl. This person then buries the fossils between the kinetic sand layers. Remember, each fossil burial is considered its own event.

4. Geologic Historian: _____
The Geologic Historian writes down the order of geologic events and explains what is happening during each event.

Step 2: Measurement skill practice: Making kinetic sand! *(See ingredients for the recipe listed above)*

Directions: *(See ingredients for the recipe listed above)*

1. Mix 2 cups of sand and 3 tablespoons of cornstarch in the mixing bowl. ***Be sure to measure carefully!***
2. In the graduated cylinder, add 15 ml of water. Add three small drops of dish soap to the water and swirl the mixture together.
3. See the teacher for 7 drops of food coloring and 1 drop of tea tree oil to add to the liquid mixture.
4. Add the liquid to the dry mixture in the bowl. Stir together with a mixing spoon ***NOT YOUR HANDS!!!!***
5. Once your kinetic sand is mixed well and is the correct consistency, please add your sand to the appropriately labeled container on the front table.
6. If time allows, you can ask the teacher if you can repeat steps 1-5 and make another batch of sand.
7. *Clean up. Seriously. Clean up every tiny grain of sand. I'm serious. Clean it up. I don't want my classroom floor to look like beachfront property.*

Group members _____Class period _____

Day 2: Build stratigraphy model and record geologic events for your model

Materials Needed:

- 3 colors of kinetic sand
- Nerds candies
- Metallic beads
- Metal pie tin labeled with the cardinal directions (North, South, East, and West)
- Stratigraphy model answer key
- Rulers
- Colored pencils
- Plastic wrap (to cover your model so it doesn't dry out)
- Permanent marker to label the names and class period of your model

Step 3: Determine the geologic events of your landscape before building the model

Each kinetic sand layer represents the deposition of a types of rock layer and is considered a different event in geologic time. Each fossil burial and the mineral ore are their own events as well. For example, if a leaf becomes "fossilized" between two rock layers, the bottom layer is one depositional event, then the burial of the fossil leaf would be next, and then the deposition of the top layer would be next.
Your history record would look something like this:

1. Deposition of bottom sedimentary layer (red layer)
2. Burial of leaf fossil
3. Deposition of top sedimentary layer (yellow layer)

Geologic Historian: Please list the geologic events of your group's stratigraphic model in the space below. List the events in the order in which they occurred. This will become your answer key when another group unravels the history of your model and mines for your ore.

Step 4: Start building your stratigraphic model to match your geologic history

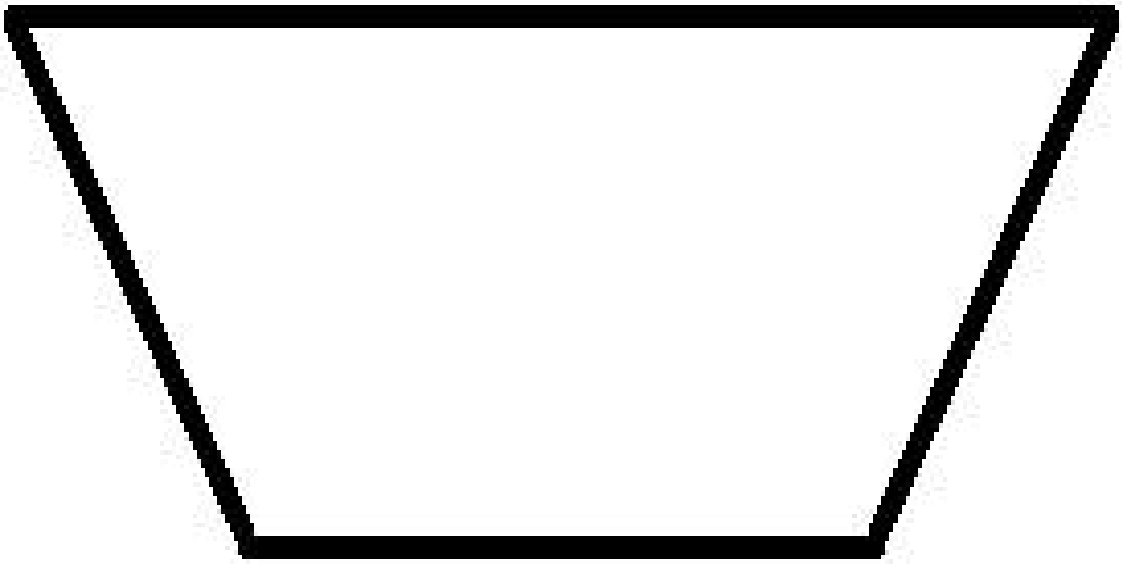
Sedimentologists: To create each layer of rock strata, flatten the kinetic sand into layers and build them upon each other. Each color of kinetic sand is a different layer of rock strata. Add ore nuggets to one of the layers to make the mineral deposit. This layer will be the mineral ore. To create this layer, add the ore "nuggets" into the clay of this layer. *Hint: To give your classmates an extra challenge, keep the ore nuggets hidden beneath the surface layer!*

Paleontologists: Determine which type of fossils would like to put in the layers of your strata. Each color represents a different type of fossil. Help the sedimentologist bury in the layers in the strata. You only need 10-15 Nerds per fossil deposit layer.

Group members _____Class period _____

Stratigraphy Model Answer Key

Cross section of stratigraphy model:



Mark the locations of ore and fossils as viewed from above:

N

W **E**

S

Group members _____Class period _____

Evidence presented (How we model it)	What this evidence suggests
Igneous rock (red sand)	
Sedimentary rock (blue-green sand)	
Limestone (yellow-green sand)	
Petrified wood (pink Nerds)	
Fossilized dino bones (yellow Nerds)	
Large oceanic fossils (orange Nerds)	
Plant fossils (green Nerds)	
Foram fossils (purple Nerds)	
Ore deposits (metallic beads)	

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Group members _____Class period _____

Day Three: Explore for ore and unravel geologic history

Materials Needed:

- 5 clear milkshake straws
- Permanent marker
- Rulers
- Jewelry tweezers
- Paper plate

Step 1: Your group will exchange your stratigraphic model with another group. Record the names of the group that made the model you will work with today:

Other group members' names: _____

Remember: Do not give away the geologic history of your model to the other group!

Step 2: Mineral exploration! After your group has exchanged models with another group, you will explore for the ore using the straws to "drill" for ore, just like an Exploration Geologist would do in an actual drilling project.

Drill project instructions:

1. Choose the locations you wish to drill.
2. Label with numbers 1–5 the location on the ground where you will drill. *(Make flags with numbers on them using toothpicks and masking tape)*
3. Label your straws with the same numbers to correspond to your drill-hole locations.
4. Slowly and carefully push the straw down to "drill" into your rock strata.
5. Pull your straw up and try to keep as much of the core sample intact as possible. You should put your finger over the top of the drill straw to keep the sediments from falling out the bottom.
6. Record your findings for each of the drill holes the Drill Core Log. Make sure you describe the layers and the order in which they are found.

Group members _____Class period _____

Drill Core Log

Mineral exploration and Geologic History Interpretation. Next, you will uncover the layers of sediment of your classmates' model and explore for the mineral ore. The Recorder writes the list of events in the Geologic History Interpretation as your group discusses and "mines" your classmates' model.

Geologic History Interpretation- List the order of events below.

Hint: Remember that the layers you are uncovering at the top are actually the youngest events.

EVIDENCE PRESENTED	WHAT THE EVIDENCE SUGGESTS

Group members _____Class period _____

Wrap-up questions_____

1. Summarize the geologic history of the model that you explored in the space below. Remember to cite evidence from the core samples to support your claims about the geologic history.

2. Why would the layers on the bottom be older, and the layers toward the top be younger? Include a model in your explanation.

3. How does drilling for rock strata core samples help geologists and other scientists understand Earth's history?