Station 1

What happens to rocks when water in the cracks freezes?

At this lab station you will investigate how freezing and thawing water in the cracks of rocks can alter them over time. You will explore properties of water and ice in a plastic cup as a model for water and ice in rock.

Materials:

- One clear plastic cup
- A marker to label and mark the cups

Procedure:

Day 1

1) Filling a cup halfway full with water.
2) Using the marker, carefully mark the water level on the cup.
3) Write your names on the cup and give it to your teacher to freeze over night.

Day 2

1) Using your marker, carefully mark the new water level on the cup.
2) In your lab notebook, record how the initial water level compares to this new water level.
3) In your lab notebook, write down your thoughts about how water freezing in the cracks of rocks might affect them.
4) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.

Station 2

How does acid rain affect copper-bearing rocks?

At this lab station you will investigate how acid rain affects copper-bearing rocks. To model acid rain, you will use vinegar with a little salt added. To model copper-bearing rocks, you will use pennies which contain small amounts of copper.

Materials:

- 2 copper pennies
- 2 beakers
- Approximately 1 tsp. of salt
- Vinegar
- Water
- Pair of tweezers to remove the penny for observation
- A marker to label the beakers
- A teaspoon

Procedure:

Day 1

1) In your lab notebook, record your observations of the two pennies.
2) Place one penny in each of two beakers.
3) Using the tape and a marker, write your names on each beaker.
4) On one beaker, write "Acid Rain" on the label.
5) On the other beaker, write "Pure Rain" on the label.
6) In the beaker labeled "Acid Rain," sprinkle 1 tsp. of salt over the penny and then add enough vinegar to cover the penny.
7) In the beaker labeled "Pure Rain," add enough water to cover the penny.
8) Set these beakers aside for 10 minutes and then take another look. Record your observations in your lab notebook. Does the "acid rain" penny look different from the "pure rain" penny? How? Describe what the pennies look like in your notebook.
9) Set them aside again and take another look tomorrow.

Day 2

10) Take a look at the two pennies and record your observations in your lab notebook. Use the tweezers to take the pennies out of the beaker to get a closer look.
11) In your lab notebook, write down your thoughts about how acid rain might alter copper-bearing rocks.
12) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.

Station 3

How does water affect carbonate rocks?

At this lab station you will investigate how water affects carbonate rocks. To model this you will use antacid tablets (Alka-Seltzer is one brand of antacid tablets) that contain carbonates.

Materials:

- 2 Alka-Seltzer or other brand antacid tablets
- A small beaker
- Water
- Pair of tweezers to remove the tablet for observation
- Timer or clock

Procedure:

1) Take a look at the Alka-Seltzer tablet and record your careful observations.
2) Place one tablet in a small beaker and cover it with water.
3) Make careful observations for 3 minutes. Use the timer or a clock to watch the time.
4) After 3 minutes, use the tweezers to remove the tablet and then record your observations of the surface of the tablet in your lab notebook. Compare the tablet to an unused one to make sure your observations are accurate.
5) In your lab notebook, write down your thoughts about how water might alter carbonate rocks.
6) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
7) When you're all finished, make sure you rinse out the beaker and leave it ready for the next group to use.

Station 4

How does water affect limestone rocks? How does acid rain affect limestone rocks?

At this lab station you will investigate how water and acid rain affect limestone. To model limestone you will use chalk, which is a type of limestone. To model acid rain, you will use vinegar.

Materials:

- 2 pieces of chalk
- A mortar and pestle
- Water
- Vinegar
- 2 small beakers
- Pair of tweezers to remove the chalk for observation
- Tape and a marker to label the beakers

Procedure:

1) You need to have pebble-sized pieces of chalk for this experiment. If you need to, use a mortar and pestle to break the chalk into smaller pieces.
2) In your lab notebook, record your observations of the chalk. How does it feel? What does its surface look like?
3) Place half of the chalk pieces in one beaker and label it "Acid Rain".
4) Place the other half of the chalk pieces in the other beaker and label it "Water".
5) In the beaker labeled "Acid rain" cover the chalk with vinegar.
6) In the beaker labeled "Water" cover the chalk with water.
7) Record your observations in your lab notebook. After waiting about 3-5 minutes, you can try to take the chalk pieces out of the beakers if you want to make additional observations. Otherwise, record your final observations in your lab notebook.
8) In your lab notebook, write down your thoughts about how water and acid rain might affect limestone rocks.
9) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
10) When you're all finished, make sure you rinse out the mortar and pestle and the beakers and leave the station ready for the next group to use.

Station 5

How does water affect iron-bearing rocks?

At this lab station you will investigate how water affects iron-bearing rocks. To model iron-bearing rocks you will use pieces of iron wool. Iron wool contains iron just like iron-bearing rocks.

Materials:

- Super-fine iron wool
- Water
- One small beaker
- Pair of tweezers to remove the iron wool for observation
- Tape and a marker to label beaker with

Procedure:

Day 1

1) Take a close look the iron wool. Record your observations of what the iron wool looks like.
2) Use a piece of tape and the marker your write your names on a beaker.
3) Put a small clump of iron wool in a beaker and cover it will water.
4) Set it aside until tomorrow.

Day 2

1) Using the tweezers, remove the iron wool and record your observations.
2) In your lab notebook, write down your thoughts about how water might alter iron-bearing rocks.
3) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.

Station 6

How does shaking affect different types of rocks?

At this lab station you will explore how rocks are altered by vigorous movement such as ocean waves, falling down a rocky mountain slope in a rock or snow avalanche, or tumbling down a turbulent river. To model rocks of different hardnesses you will use gravel (a harder rock) and sugar cubes (a softer rock). Shaking them will mimic the vigorous motion that occurs in ocean waves, rock avalanches, or riverbeds.

Materials:

- Sugar cubes (approximately 5-7)
- One jar with lid
- Gravel (a small handful)

Procedure:

1) Pick out 5-7 sugar cubes and record your observations of the sugar cubes in your lab notebook.
2) Pick out a handful of gravel and record your observations of the gravel in your notebook.
3) Put both the sugar cubes and gravel in a jar and close the lid tightly. Then shake the contents of the jar vigorously for about 5 minutes. You and your partner may need to take turns so you don't get tired.
4) After five minutes open the jar and look carefully at the sugar cubes and gravel. Record your observations in your lab notebook.
5) In your lab notebook, write down your thoughts on how abrasion (whether tumbling down a mountain, being tossed around in waves, or washed down a riverbed) might affect different types of rocks.
6) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
7) When you've finished, clean out the jar so that the station is ready for the next group.

Station 7

How does wind affect rocks?

At this lab station you will investigate how wind affects rocks. To model the sand and dirt particles caught in the wind and blown over rocks, you will use sandpaper.

Materials:

- Sandpaper
- Rock samples

Procedure:

1) Choose two different rock samples and write down careful observations of them in your lab notebook.
2) Using a small piece of sandpaper, rub the sandpaper over the rock samples.
3) After five minutes of rubbing the rock samples, take another look at them. Record your new observations.
4) In your lab notebook, write down your thoughts about how wind affects rocks?
5) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
6) When you're finished, set aside the rock samples you've used so that next group doesn't use the same ones.

Station 8

How do raindrops, dripping water, and waterfalls impact rock?

At this lab station you will investigate how dripping or falling water affects rocks. To model waterfalls, raindrops, and dripping water from rock faces or cave ceilings, you will pour water from a jar held at different heights above the rock. To model the rocks, you will use a pan full of packed sand.

Materials:

- Water
- A beaker with a pouring lip
- Shallow pan
- Dry sand

Procedure:

1) Pack the pan full of dry sand so that it fills the pan about halfway up the side.
2) Make observations of the sand surface and record in your lab notebook.
3) Fill the beaker with water and slowly pour it onto one part of the pan. Also try sprinkling the water onto the sand and pouring more or less water each time. You can also adjust the speed at which you pour. Try adjusting the height at which your pour the water, too. Explore all the ways that waterfalls, rain, or dripping water can affect surfaces like this. Record your observations in your lab notebook.
4) As the sand gets wetter, you can always repack it, smooth it down and continue to experiment. What differences do you notice between how the water affects dry sand versus wet sand?
5) In your lab notebook, write down your thoughts about how raindrops, dripping water, and waterfalls impact rock.
6) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
7) When you've finished, dump out the wet used sand in the area where your teacher directs you so that the next group can start with a fresh pan of dry sand.

Station 9

How does water affect rocks and soil on hillsides and mountains?

At this lab station you will investigate how rainfall, snowmelt, or natural springs on hillsides or mountain slopes impacts the rock and soil on the slopes. To model the hillside or mountain, you will use a pan of packed dirt tilted up on a pile of books. To model rain, snowmelt, or springs, you will pour water from a container onto the top of the hillside or mountainside.

Materials:

- Large pan
- 2-3 textbooks
- Dirt
- Water
- Beaker with a pouring spout

Procedure:

1) Take a look at the "hillside" modeled by a pan of packed dirt leaning on the pile of books. Make some careful observations about the hillside and record these in your lab notebook.
2) Using the beaker, pour water in a slow, steady stream on the dirt near the top of the hill. Watch what happens to the hillside.
3) Record your observations in your lab notebook.
4) In your lab notebook, write down your thoughts on how water might affect hillsides or mountains.
5) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
6) When you're finished, pour any excess water out of the pan and repack the dirt for the next group. If the hillside is too muddy to stay in place, let your teacher know.

Station 10

How do waves impact beaches?

At this lab station you will investigate how waves impact beaches. To model a beach you will create a patch of sand on one end of a large pan and then slosh water back and forth inside the pan to model waves.

Materials:

- Large pan
- Water
- Sand (enough to make a "beach" at one end of the pan)

Procedure:

1) Using dry sand make a "beach" at one end of the pan. Pack the sand down, smooth it out, and then record your observations of what your beach looks like.
2) Make sure there is water in the pan and then slowly slosh the water back and forth to model waves washing up on the shore of your beach. Watch what happens to the beach the longer you do this.
3) Record your observations after you've experimented like this for about 5 minutes.
4) Write down your thoughts about how waves alter beaches. Make a prediction about what would happen over a long time period if the waves continued to do this to the beach.
5) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
6) When you've finished, scoop out any wet sand so that the next group can make a fresh new beach when it's their turn to explore this station.

Station 11

How do glaciers affect rocks?

At this lab station you will investigate how the movement of glaciers affects rocks. To model glaciers, you will use ice frozen with sand and gravel in it, and to model rock beneath a glacier, you will use a slab of clay and a brick.

Materials:

- A "mini glacier"
- A thick layer of clay (about the length and width of a brick)
- A brick

Procedure:

1) Get one side of a brick that hasn't been used by another group. Run your hand over the surface and record observations about the surface in your notebook.
2) Similarly, make sure you have a smooth surface of clay about the same length and width as the brick. Run your hand over the surface and record observations about the surface in your notebook.
3) Grab a mini glacier and move it slowly, pushing down, along the length of the clay. Pick it up and see what kind of track it left. Record your observations of its track.
4) Now, slide it slowly along the brick, pushing down. Do this several times and then feel the brick. Continue to do this until you notice a difference in how the bricks surface looks and feels.
5) In your notebook write down your thoughts about how slowly moving glaciers affect rocks.
6) In your lab notebook, record whether you think this exploration demonstrated chemical weathering, mechanical weathering, or erosion.
7) When you've finished, be sure to set aside the brick you used and clean up any debris left over by your melted glacier.