Lesson 5  

Student Worksheet

Question: What affects the rate of the weathering of a rock?

Rules:

- You must use your safety glasses.
- You will have 24 hours, and bottles cannot leave the classroom.
- The rock must stay inside the bottle at all times.
- As a group, choose one variable from each list (liquid and solid).
- After you have closed the container, you cannot open it up until instructed to do so on Day 2.
- On Day 2 you may not shake your container.
- Only the Materials Manager may get out of their seat.

Variables:

<table>
<thead>
<tr>
<th>Choose one liquid</th>
<th>Choose one solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vinegar (weak acid)</td>
<td>• Sand</td>
</tr>
<tr>
<td>• Carbonated water (water with carbon dioxide in it)</td>
<td>• Salt</td>
</tr>
<tr>
<td>• Water</td>
<td>• Gravel</td>
</tr>
</tbody>
</table>

Your materials and justification:

1. Write in the liquid and the solid your group chose.
2. Then check off each box that you think will apply as an Agent of Weathering.

<table>
<thead>
<tr>
<th>Agents (causes) of weathering</th>
<th>Liquid:</th>
<th>Solid:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freezing and Thawing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Release of Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Hypothesis:**

When we measure the weight (mass) of our rock by weighing it tomorrow, there will be (choose one):

- [ ] a little less mass
- [ ] a lot less mass
- [ ] a little more mass
- [ ] no change in mass

**Turn your hypothesis into a sentence:** When we measure the mass of our rock by weighing it tomorrow, there will be __________________________________________________________.

**DAY 1**

**Day 1 Materials:**

All groups will have safety glasses, funnels, plastic jar with top, rock sample, scale, 100mL graduated cylinder, 3oz. measuring cup.

**Group Jobs:**

<table>
<thead>
<tr>
<th>Materials Manager</th>
<th>Timer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale Expert</td>
<td>Pourer</td>
</tr>
</tbody>
</table>

**DAY 1 Procedure:**

- [ ] 1. **All students** put AND KEEP on safety goggles.
- [ ] 2. **Materials Manager:** Get one rock sample and one bottle.
- [ ] 3. **Scale Manager:** Use the scale to measure the weight (mass) of the rock.
- [ ] 4. **All students:** Write in the mass for DAY 1 on the data table.
- [ ] 5. **Pourer:** Put the rock into the bottle.
- [ ] 6. **Materials Manager:** Get 100mL of your chosen liquid and 3 oz. cup of your chosen solid.
- [ ] 7. **Pourer:** Use the funnel to add the liquid and the solid to your bottles.
- [ ] 8. **Pourer:** Screw the lid onto the bottle. Label your bottle with group member names.
- [ ] 9. **Timer:** Time the other 3 students shaking the bottle for one minute each.

**Data Table:**

<table>
<thead>
<tr>
<th><strong>DAY 1 – “Before”</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting mass (from scale): ___________g</td>
</tr>
</tbody>
</table>

Make sure that you are choosing “grams” to measure.

**DAY 2**
Day 2 materials: safety glasses, paper towels, bowl, scale, calculator.

GROUP JOBS:

<table>
<thead>
<tr>
<th>Materials Manager</th>
<th>Timer</th>
<th>Scale Expert</th>
<th>Pourer</th>
</tr>
</thead>
</table>

DAY 2 PROCEDURE:

☐ 1. All Students put AND KEEP on safety goggles.
☐ 2. Materials Manager: Pick up your bottle and a tray of materials.
☐ 3. Pourer: Empty contents of bottle into the waste bowl.
☐ 4. Timer: Remove the largest piece of your rock.
☐ 5. Timer: Use paper towel to dry off your rock.
☐ 6. Scale Manager: Measure the weight (mass) of the rock on the scale.
☐ 7. All Students: Record weight of the rock Day 2 in the analysis section below.
☐ 8. Materials Manager: Return all materials and place bowl in the waste bucket.
☐ 9. All Students: Complete the analysis and reflections sections.

ANALYSIS:

Calculate the difference in the mass rock from day 1 to day 2

\[
\text{Day 1 mass } \quad \underline{\quad g} \\
\text{Day 2 mass } \quad \underline{\quad g} \\
\text{Difference in mass } \quad \underline{\quad g}
\]

Calculate percent change – you may use a calculator.

\[
\frac{\text{Difference in mass}}{\text{Starting mass}} \times 100 = \underline{\quad}
\]

Class Results of Weathering Competition

Weathering Instructional Case
Lesson 5: Student Activity
### Summarize the Class Results:

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
<th>Group 6</th>
<th>Group 7</th>
<th>Group 8</th>
<th>Group 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
<td>%change</td>
</tr>
</tbody>
</table>

- **Liquid Variables:**
  - Vinegar
  - Water
  - Seltzer

- **Solid Variables:**
  - Sand
  - Salt
  - Gravel

**Fill in group number:**

<table>
<thead>
<tr>
<th>Biggest % change: Group #</th>
<th>Liquid Variable</th>
<th>Solid Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2&lt;sup&gt;nd&lt;/sup&gt; biggest % change: Group #</th>
<th>Liquid Variable</th>
<th>Solid Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3&lt;sup&gt;rd&lt;/sup&gt; biggest % change: Group #</th>
<th>Liquid Variable</th>
<th>Solid Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**GROUP REFLECTIONS:** Discuss the following question in your group and write down your answer:

**Which variable (liquid or solid) made the biggest difference in weathering the rock?**
**Weathering Competition Conclusion**

Based on your experimental results, the table of class results and your discussion complete the following in the C-E-R format.

**Claim:** Based on our class results, ____________________________ (variable) caused the largest % change in weight (mass).

**Evidence:** The data that provides the evidence for my claim is

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

**Reasoning:** The results of this lab make sense with what we learned about weathering, because____

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

Weathering Instructional Case
Lesson 5: Student Activity