| Lesson Plan | | |
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| **Title**: Panera  **Name:** Trek | | **Grades**: 8th, 9th |
| **Overview of Lesson**:   1. Students will examine different slices of bread, describe observations in their surface, and make predictions about absorption of honey. 2. Students will design an investigation to test their ideas of honey absorption 3. Students will present their findings and revise ideas (while eating the evidence) 4. Students will then examine different rocks and geologic formations, describe observations of their surface, and make predictions about how these formations interact with water. | | **Time**: 5 Class Periods |
| **Overview of Content**:  Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. [Clarification Statement: Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock cycle. Examples of mechanical investigations include stream transportation and deposition using a stream table, erosion using variations in soil moisture content, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids).] | | **Standards**: HS-ESS2-5 |
| **Key Topics**:  Permeability  Porosity  Capillarity  Absorption  Aquifer  Groundwater | **Misconceptions**:  Food is not science  Liquids travel only downhill  Water is above ground (rivers are only above ground)  My drinking water comes from nowhere | **Materials**:  Six Loaves of Soda Bread. [Recipe](https://www.allrecipes.com/recipe/16947/amazingly-easy-irish-soda-bread/):  Loaf 1: No Baking Soda  Loaf 2: As Per Recipe  Loaf 3: Double Baking Soda  Loaf 4: Laminate (~64 layers) in as little butter as possible  Loaf 5: Laminate (64) in 4tbls butter  Loaf 6: Laminate (64) in 8tbls butter  \*Slice laminated bread against the grain\*  1 Gallon of honey  /\*Graduated beaker of 1lb raw peanuts on a scale  Graduated beaker of 1lb peanut butter on a scale\*/  (Use photos instead if any severe allergies)  Four sticks of Butter  Grape jelly (for honey or butter intolerant, small amount)  Oven, or hotplate  Trays/containers for slices of bread  3xgroups Plastic ball-grain sediment tubes (small grain, med grain, large grain)  [PPC KAhoot](https://create.kahoot.it/share/ppc/9e06e44a-c6f1-47d7-9f77-bd6cae89423c)  [PPC Vocab](https://drive.google.com/file/d/15qSxxdEsTU29pJC2bJ-EhE1VvtxH1VaJ/view?usp=sharing)  [Teachback front](https://drive.google.com/file/d/15GPJvikIwJdbTSBiIyjJv_n2Quf2h0Qr/view?usp=sharing)  [Teachback back](https://docs.google.com/document/d/1cZn5oFtSkUjLobrAtWzRrQeGG7LOg2-J3p4o37E3xqU/edit?usp=sharing)  [Rubric(WDYS)](https://docs.google.com/document/d/1kiD7CcmBy39_IoESFz0AjI7u5UnuzzzgyznDTU0rjOw/edit?usp=sharing)  [Rubric(Lab)](https://docs.google.com/document/d/1YmQ3whKF-Ba8pImMQzq1epBcoL0cwqJH3hhRiqeUGJA/edit?usp=sharing)  [Rubric(Teachback)](https://docs.google.com/document/d/1R1fCEGsUwtRghD5b2pTouuPObjZYWKk6zbri4IUJnoU/edit?usp=sharing) |
| **Learning Goals and Objectives**:  Observable features of the student performance by the end of the lesson:   1. Identifying the phenomenon to be investigated    1. Students describe\* the phenomenon under investigation, which includes the following idea: connection between the properties of water and its effects on Earth materials and surface processes. 2. Planning for the Investigation    1. In their investigation plan, students include a means to indicate or measure the predicted effect of water on Earth’s materials or surface processes.    2. In the plan, students state whether the investigation will be conducted individually or collaboratively. 3. Collecting the data    1. Students collect and record measurements or indications of the predicted effect of a property of water on Earth’s materials or surface. 4. Refining the design    1. Students evaluate the accuracy and precision of the collected data.    2. Students evaluate whether the data can be used to infer the effect of water on processes in the natural world.    3. If necessary, students refine the plan to produce more accurate and precise data. | | |
| Body of Lesson | | |
| **Main Activity (Day 1)**  (5) Do Now - Peanuts and Peanut Butter are set up in an accessible location on scales in graduated beakers   * What weight of peanuts is there? Volume? * What weight of peanut *butter* is there? Volume? * What and why is something different?   (15) Activity   * Give each table a tray of six bread slices (one of each type) and a “What Do You See” sheet (#1). Give instructions for the worksheet, then time for the groups to analyze the bread and discuss/fill the worksheet.   + Matching colors, students should describe the bread using natural language (language baseline diagnostic)   (5) Group discussion - Vocabulary Collection   * Which words did we choose to use to describe the bread? Texture? Color? Put words on board (Inline Diagnostic). Which slice of bread will absorb honey the fastest? Encourage students to use new vocabulary * Which slice of bread will absorb the most honey? * Which slice of bread will drain honey the fastest?   (21) Investigation design   * Hand out rubric and lab template * Students have rest of class to design an investigation using classroom materials as per rubric (and they can eat the bread) * Procedure   + Materials   + Data Collection   (2) Minutes - Exit Ticket   * What was difficult to describe about the bread? * Collect WDYS1   **Main Activity (Day 2)**  (3) Do Now - Do you need any teacher support for your investigation?  (5) Opening Announcements/SEL hook  (37) Carrying out investigation/table support  \*(3)Exit Ticket - What went poorly and how can we avoid that challenge next time?  (students submit lab template - assessment #1, rubric)  **Main Activity (Day 3)**  Do Now  (10) Vocabulary Intro   * Give each student a vocabulary sheet. Discuss vocabulary with students pointing to specific phenomena examples. Play kahoot with examples of permeable, porous, and high capillarity materials ([kahoot link](https://create.kahoot.it/share/ppc/9e06e44a-c6f1-47d7-9f77-bd6cae89423c))   (10) Activity   * Set up a station with plastic-ball sediment tubes of different grain size. * Give each student a WDYS2 and a vocabulary sheet. * Have students fill out the WDYS2, analyzing the tubes and comparing them in groups   (WDYS2 v WDYS1 - assessment #2, rubric)  (21) Investigation   * Hand out rubric and lab template * Students have rest of class to design **and carry out** an investigation using classroom materials as per rubric   + Materials   + Data Collection   (2) Minutes - Exit Ticket   * Was the bread investigation able to approximate Porosity, Permeability, and Caillarity, compared to the plastic model? What was the bread model able to do well and what did it do poorly? * Collect WDYS2 and lab template   (lab template 2 - assessment#3)  **Main Activity (Day 4-5)**  (5) Do Now  Students collect Teachback fliers and rubrics and discuss and choose a type in their groups  (5) Announcements/SEL  (80) Main Activity - Teachback ([front](https://drive.google.com/file/d/15GPJvikIwJdbTSBiIyjJv_n2Quf2h0Qr/view?usp=sharing) - [back](https://docs.google.com/document/d/1cZn5oFtSkUjLobrAtWzRrQeGG7LOg2-J3p4o37E3xqU/edit?usp=sharing))   * Groups work together to produce an artifact discussing and teaching the topic   (Teachback artifact is due Sunday night - assessment #4) | | |
| **Summary of lesson and tie up (~15)**:  Groups may volunteer to share their Teachback | | |