



Absorption

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Grade-Level:

Middle-School

Absorption

Purpose:

To provide students with opportunities to explore the concept of absorption through the use of a variety of materials. This activity should take three 40-minute class periods.

Objectives:

Students will be able to:

- demonstrate their knowledge of absorption.
- use a variety of discovery methods.
- work in cooperative groups.
- experiment and use materials with varying absorbency.
- measure volume.
- relate this activity to parts of the body that absorb.
- tell about hypoxia and how it affects pilots.
- discuss how Native Americans used absorption.
- use the scientific method of research and write about it in their journals.

Teacher Preparation:

Have materials available for students.

- Journal materials. This is where students will write their scientific method for the experiments.
- Written instructions on tag board for students to use in the experiments.

Web sites for teachers to check:

<http://novatech.on.ca/medical/ischem.html> – *for a definition of hypoxia*

<http://www.batnet.com/mfwright/hypoxia.html>

<http://www.gretmar.com/hypoxia.html> – *for signs and symptoms*

<http://www.ktca.org/newtons/alpha.html> – *a science resource*

Web sites for students to check:

Note: Web sites change often. Students should pursue areas that are related to absorption, although not all of these sites may have information on this topic. Each of these sites may lead to many more sites:

http://dir.yahoo.com/News_and_Media/Television/Shows/Science/

<http://www.disney.com/DisneyTelevision/BillNye/>

<http://www.beakman.com/>

Materials:

- construction paper/copy paper
- food coloring
- large cylinder to hold water (example, small coffee, or tuna can)
- measuring cups
- rulers
- scissors
- stapler

- science journal for keeping records
- milk, graham crackers, and/or cookies
- a chart that includes: What type of paper was used? What size of paper did you use? How long did the paper stay in the water?

Preparation and Procedure:

1. Engage students by giving them a graham cracker (Oreo Cookie) with a little milk. (If not available, the teacher can demo this in front of the class).
2. Tell them not to do anything until the whole class is ready. Dunk-Observe-Eat-Discuss; (if you want them to use comparisons, don't eat before the comparisons are done). An alternative to this would be to use a piece of celery or a carnation in colored water to show absorption. If you use comparisons, use a graph and observe different brands of cookies or graham crackers.
3. Another observable tool is the sugar cube with water. Demo this and let them watch the cube absorb. Now would be a good time to show the students what you expect in their journals. They need to write the following in each day's lesson with a statement of each process. Demonstrate this on the board: the process of asking a question, predicting, materials, observing, hypothesis, and conclusion or conjecture.
4. Put students into cooperative groups and have them brainstorm the concept of absorption using KWL as the format. (What they know, want to know, and what they learned). They should be discussing many types of absorption.
5. Ask the students why they are using construction paper. Could they use a different type of paper? Would the results be different?
6. Demonstrate how to do the folding or fluting of the paper, like making a fan. (Students can choose how big to make the folds, but suggest smaller, more paper.) Materials and different kinds of papers should be ready for students to access to proceed. They cut the appropriate size, measure, and record in their journals for later use as a group.
7. Let students investigate, on their own, the concept of absorption. Then if students don't grasp the concept, assistance may be given in the form of additional directions. The teacher-written directions may be brought out and displayed.
8. Students need to determine the length of paper needed for the cylinder; this should be about one-half inch smaller than circumference of the cylinder. (This lesson could be a take-off of teaching math with the circumference and cylinder shapes). Both folded and flat need to be the same length after fluting, or vary this by having the flat one just the circumference, and make the fluted longer. Have students record the following information in their journals:
 - a. Cut a strip of paper measure and record.
 - b. Fold second paper fluted or accordion style, but it has to be the same length folded as the first strip of flat paper. Record.
 - c. Staple both pieces to form separate rings. Measure and record circumference and height.
9. Teacher or students can prepare the colored water for the following directions in their journal.

- a. Pour 12 ounces of colored water into each of the two cylinders, or the amount to fit the size of container you will be using.
10. Students need to predict which paper will absorb the most and why.
11. Immerse paper rings for two minutes. Try different lengths of time and make a graph. Record.
12. Remove the paper rings and discard. (This could be another lesson in measuring the weight of how much the paper absorbed to what was left in the cylinder).
13. Measure water with measuring cups or scales. Record remaining ounces in the journal.
14. Make and complete a data table.
15. Share data as a group with the class. (All students need to participate in the oral presentation of their findings. These can be taken from their journals).
16. Return to their groups and finish the chart, "what they learned."
17. Share this information with the whole class.
18. Journal should be complete with the following:
 - a. the question and hypothesis
 - b. their prediction
 - c. their procedure including measurements
 - d. their conclusion
 - e. pictures of the process (optional).

Extensions:

Native Americans used absorption in many ways...discuss. Examples:

- Chewing hides to make them soft.
- Swelling of reeds to bend easily for making baskets.
- Reeds or leather dipped in plant dye for colors.
- Charcoal is used to take poisons out of the system (by absorbing the poisons).
- Moss was used for putting on wounds to pull out infection (Project Wow).

Learning About Hypoxia:

- Students will investigate on the Internet to find sites that relate to hypoxia.
- Discuss how this relates to absorption.

Safety:

Students should have towels in case of spills. Use plastic as much as possible instead of glass.

Questions to Ask:

1. Does the kind of paper used make a difference in absorption?
2. What if we timed this for five minutes? Would you see something different?
3. Does the color of water make any difference?
4. How did you come up with your question or hypothesis?
5. What other questions could you have investigated?
6. What other experiments could we do to show absorption?
7. What would you do differently next time?
8. Will other substances absorb into the paper?

9. Is there more than one conclusion?
10. What could we do that would make the paper absorb more?
11. How about the use of salt water?
12. What about the temperature of the water?

Where to Go From Here:

1. Have students ask their own questions, then explore. They could use some of these questions for homework. Do some hands-on at home.
2. Demonstrate chromatography, or let the students discover chromatography. Let the students design their own plan and what to use.
3. The use of a marker on different types of paper shows how fibers absorb differently.
4. Use paper with different sizes of holes to show how the openings make a difference as to the amount of absorption.
5. Use sand, peas, corn, rice, or beans in the experiment with holes to show the difference in materials and what can be passed through.
6. Use different kinds of sponges showing absorption.
7. Use different brand names of paper towels.
8. Discuss hypoxia in relationship to the lungs not getting enough oxygen. (Hypoxia was mentioned in the teacher notes).
9. Discuss cohesiveness and adhesives.
10. Put different experiments in centers and have students rotate around every 15 minutes. (Writing in their journals is a must during this time).

References and Resources:

Acknowledgement to Rita Hoots, 1998 APS Summer Research Teacher for some technical details.

Suggestions for Assessment:

1. Group KWL.
2. Group data table.
3. Oral presentations.
4. Self-evaluation as well as group evaluations.
5. Science journal.