Cleaning and Shining Pennies

WHAT YOU'LL NEED

- ❑ White vinegar
- ❑ Dish soap
- ❑ Lemon juice
- ❑ Ketchup
- ❑ Water
- ❑ Dirty pennies
- ❑ Shiny penny
- ❑ Paper towels
- ❑ Small bowls or cups (small plastic containers that can be covered work well)

WHAT TO DO

Remember: The purpose is NOT to teach a specific topic but to help children experience the excitement of **science exploration!**

GETTING READY

1. Set out clear cups or bowls with each of the following solutions: water with dish soap added, white vinegar, lemon juice and ketchup.
2. Put pennies in another bowl. Save the new shiny penny.
3. Prepare a bar graph to record children's predictions (be sure to leave the solution names off the paper until children guess what they are).

LET'S GO

1. Have each child choose one penny from the bowl of pennies. Then show them a shiny penny.
2. Ask each child to **observe** his/her penny. *How would you describe the penny you are holding? What differences do you **observe**?*
3. Show the children the bowls of solutions and explain they are going to do an **experiment** to try to make their pennies shiny again. Ask the children to make **observations** using their senses of touch, sight and smell to try to identify each solution. As you talk about what is in each bowl, ask the children to **predict** if it will clean the pennies. Have children record their prediction on a bar graph.

   *What do you **predict** is in each of the bowls? What do you **observe** about each solution? How are they different? Similar? Which solution(s) will clean the pennies? Why do you think some solutions will clean the pennies? Which solution do the most people **predict** will clean pennies? Are there any solutions that no one thinks will work? (Record the children's responses to discuss after the pennies have soaked.)*
4. Have each child submerge his/her penny in a solution. (If there is a solution that wasn't selected, put two of the dirty pennies in it

so that there is at least two pennies in each solution.) Take a break and return in 15 minutes or longer.

5. Give each child a sheet of paper towel, get the pennies out of the substance he/she selected, and wipe off their pennies with the towel.

   *What do you **observe**? Do your pennies look different? Are there other solutions that you would like to try? Did your actual results match the predictions?* (Refer back to the bar graph and the children's written predictions.) Add the actual results to the bar graph.

TALK IT OVER

Encourage children to compare their pennies with pennies that had soaked in the other substances.

- *Did all the pennies come out cleaner?*
- *Did any of the substances seem to clean the pennies better?*
- *Why do you think some of the substances worked differently on the pennies?*

GOOD TO KNOW

9- to 12-year-olds:

- Complete the experiment using the same procedures but leave a couple of pennies in the vinegar and in the soapy water solutions for an hour or more. Come back and see how the pennies have changed.
- Try cleaning some pennies minted before 1982 and some that were minted after, and see the difference. The pre-1982 pennies were made with more copper, and the chemical reaction is more intense.
- Older children could also explore acids versus bases and how they work for cleaning various materials. Try fresh lemon juice versus concentrated lemon juice. Try tomato sauce instead of ketchup. (Do not mix chemicals together)

THE SCIENCE BEHIND IT

Because vinegar is an acid, it is great for breaking bonds in many chemicals, such as water mineral deposits or oxidized copper. White distilled vinegar is a strong acid and a popular household cleanser, effective for killing mold, bacteria and other germs.

Vinegar and lemon juice are acidic and will remove the copper oxide, leaving the pennies shiny. Though a soap and water solution is good at cleaning many things, it does not contain an acid and does not clean the pennies as well.

RESOURCES

- Your local university Extension office – http://msue.anr.msu.edu/county.
- Science Blast website – http://4h.msue.msu.edu/programs/science_technology/science_blast.
- PBS – http://www.pbs.org/parents/education/science/activities/preschooler-kindergarten/
- Kitchen spring cleaning – part 2 – http://msue.anr.msu.edu/news/kitchen_spring_cleaning_part_2.
- Red and white vinegar cooking and household use – http://msue.anr.msu.edu/news/red_and_white_vinegar_cooking_and_household_uses.

MICHIGAN STATE UNIVERSITY | Extension