



# **LESSON 1**

## **SUMMER BAG: A PENNY FOR YOUR DROPS**

**HANDS - ON DISTANCE LEARNING  
PROVIDED BY DOWNEAST INSTITUTE**

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## A PENNY FOR YOUR DROPS

(appropriate for all ages)

**Background:** The ability to dispense a liquid drop by drop using a simple pipette enhances students fine motor skills and is an activity most, if not all, students seem to enjoy. In addition, this activity includes the concepts of hypothesis, data, and analysis, all of which are essential to the scientific method.

### Materials:

- collecting bottle
- pipette
- penny
- data table (attached)
- pen or pencil

### Lesson Procedure:

1. Fill a collecting bottle about  $\frac{1}{2}$  full with water.
2. Place the coin on a flat surface that is okay to get wet.
3. Hypothesize (guess) how many drops of water can be carefully placed on the coin before the water begins to flow off the coin. Record your guess in the data table in the **Hypothesis** column (page 3).
4. Carefully pipette water onto the penny a drop at a time, counting the number of drops before the water begins to flow off the coin. (Try not to touch the water that is already on the penny to protect water's natural surface tension).
5. Record the number of drops in the data table for **Trial 1**.
6. Repeat 2 more times, recording the number of drops in the data table for **Trial 2** and **Trial 3**.
7. Repeat steps 2-6 with a nickel, a dime, and a quarter.
8. Attempt to explain any differences in the numbers of drops and write your idea(s) below your data table.

**\*Going Further - “Let’s Find Out”:** What is surface tension? Do research to find the answer and write the information on the data sheet. You should also write where you found the information.

**DEI Connection/Real Life Application:** Sterile pipettes are used weekly to transfer algal stocks into fresh media (when growing food for filter feeders being raised in the hatchery.) Pipettes are also used to sample and count small volumes of larvae in order to estimate larval density in the larger volumes housed in the hatchery. In Downeast Institute’s (DEI) chemistry lab, pipettes are used to buffer solutions by adding drops of NaOH or HCl to maintain the required pH. Pipetting is also used to assess water quality in tanks and aquariums (at DEI as well as in other settings such as home aquariums) by measuring pH, ammonia, nitrite, and nitrate concentrations.

**Adaptations/Extensions/Helpful Hints:**

- In conjunction with the “Going Further” suggestion above, older students may be instructed in proper citing of sources.
- A blank data table is included. If time permits, students should be encouraged to create their own data tables.

**NEXT GENERATION SCIENCE STANDARDS (NGSS)**

**All Grades**

**Practices**

- 3. Planning and Carrying Out Investigations
- 4. Analyzing and Interpreting Data
- 8. Obtaining, Evaluating, and Communicating Information

**Crosscutting Concept**

- 6. Structure and Function

**Disciplinary Core Idea**

- PS1A: Structure and Properties of Matter

**Performance Expectation** (right click on blue text for link to NGSS)

**Grades 9-12:**

**HS-PS1-3 Matter and its Interactions**

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

## Data Table - A Penny for Your Drops

Coin	Hypothesis	Number of drops (Trial 1)	Number of drops (Trial 2)	Number of drops (Trial 3)
penny				
nickel				
dime				
quarter				

More lessons available at: <http://www.DowneastInstitute.org/curriculum-resources>.