

## ACTIVITY 3: MODELING THE CREATION OF STAMP SANDS

The purpose of this activity is for students to learn about mining and its impact on the earth by using chocolate chip cookies to model how stamp sands are created during the mining process.

### Materials:

- Chocolate chip cookies (dry, crispy kind)
- Rolling pin or heavy book or large block
- Plastic sandwich bags (1 per student)
- Small strainers or sieves
- Plates or trays
- Water and a container to pour it from
- Quarter-size aluminum roasting pans
- Paper towel

First, inform students that they'll be modeling how stamp sands are created during the mining process using chocolate chip cookies. Explain that during the mining process, large machines crush and grind rocks to extract the minerals, leaving behind waste materials known as stamp sands. Ask students to imagine their cookie represents a rock containing a valuable metal, like copper, represented by the chocolate chips. Much like the discussed during the warm up activity, they should consider a procedure for how they will extract the chocolate chips

Next, have students partner up and obtain the supplies needed to perform the chocolate chip cookie "mining" experiment, including a cookie, sandwich bag, and rolling pin. Each student within the pair should do the "mining" individually, but as a pair they can discuss techniques and compare their results. Instruct students to carefully place their cookie inside the bag, ensuring it is sealed. Have students crush the cookie inside the bag, applying enough pressure to break the cookie into smaller pieces but not completely pulverize it. This action "stamps" the rocks into stamp sands.



Then, provide each student with a small strainer or sieve and a plate or tray. Ask students to carefully pour the crushed cookie (stamp sands) onto the strainer over the plate or tray. Instruct them to gently shake the strainer to separate the smaller cookie crumbs (representing stamp sands) from the larger chocolate chips (representing copper). Encourage them to pay attention to how stamp sands contain leftover bits of copper (chocolate chips) mixed with crushed rock (cookie crumbs).

Last, have students pour water over their mixture onto strainer over the aluminum pan to see if any further separation is possible. Have them remove the copper (chocolate chips) and place on a paper towel to dry. If still attached to the cookie crumbs, discard it onto a separate paper towel to dry. Facilitate a class discussion on the methods students used and how effective they were, focusing in on:

- How did the crushing of the cookie simulate the mining process?
- What do the stamp sands (cookie crumbs) represent in real mining operations?
- How might stamp sands affect the environment, similar to real mining waste?
- What adjustments would you make to your mining process if repeating it?