

# Loupe and Microscope Analogy Activity

**Goals:** Students closely examine and draw found objects, make analogies and write about their objects, then theorize about the function of structures they observed.

**Time:** At least 15 minutes but can last up to 30 or more.

**Materials:** Jeweler's loupes or hand lenses, microscopes, pencils and paper.

## Procedure:

Give each kid a loupe or hand lens. Spend a few minutes just letting them look around at things with the lenses, then pick something special to focus on.

1. Direct them to look at their object closely, and ask themselves "What else does it remind me of?" and "What else does it look like?" (these questions are subtly different – an object may remind you of something in ways other than visually).
2. Ask them to write down at least 5-10 analogies generated using these questions. Encourage them to elaborate and refine by asking questions like "Why did it remind you of that?", "How are they similar – color? texture? shape? motion?", "How many ways are they similar?" and asking them to tell you more about their analogies.
3. Ask them to draw their object. While drawing, they may notice even more details and think of more analogies.
4. Have them use their analogy list to theorize about the function of things they notice about their object, by asking themselves "Why is it like that?" Tell them that form often follows function, and analogies often contain real clues that scientists use as a starting point to learn about how things work. Have them ask themselves "If it reminds me of that, does it actually function like that in some way?" Encourage them to think about what purpose the structure might serve to help the organism survive, and write these observations in their journals as well. This is a good place to tie in interrelationships. To stimulate their thinking even more, also ask them to imagine that they are small enough to walk on the surface and imagine what it would be like.

## Variations & Extensions:

**Warm Up:** Have students examine their hand with the lens, and make analogies using the questions "What else does it remind me of?" and "What else does it look like?"

**Variation:** Pick something you think is particularly interesting or illustrates a point you want to make. Have all students study it, make analogies, and guess why it is that way (what purpose the structure serves). For example, fuzzy plant leaves – insulation, protection against insects or animals? Have them imagine being insects or animals, how they would interact with the plant.

**Extension:** Have them use two lenses, one in front of the other to get twice the magnification, write analogies and draw the object again. Then move to microscopes and repeat the process.

**Extension:** The analogies and theories provide great bones for writing, so have students spend 5-10 min refining these ideas into a poem or essay.

## Background Information:

Analogy is a primary tool for thinking in science, art, even humor! Many Far Side cartoons use analogies that are very funny. Georgia O'Keeffe used the technique of changing scale in many of her paintings. Richard Feynman, Nobel Prize-winning physicist, got the idea for his breakthrough of quantum mechanical diagrams from watching students spinning plates in the cafeteria. Isaac Newton got ideas about gravity from analogy between the moon and a falling apple – he asked himself whether the moon was subject to the same forces an apple falling or a stone thrown, and came to the realization that the moon is indeed continually falling toward the earth. William James, one of the founders of psychology, defined genius as an unusual ability to perceive analogies and to use those insights in new situations.

