Lab 1: Designing and Conducting an investigation into Oreos Start video (linked) at 35 seconds. Bell ringer: what are they making? why is this a good product? How do they make double stuf? How could you tell the difference between real oreos and store brand?

YOU MAY NOT EAT ANYTHING IN THE LAB YOU MAY NOT REMOVE ANY ITEMS FROM THE LAB I use this as my getting-to-know-you lab: simple equipment but safety emphasized

Possible equipment:

Up to 5 classic Oreos, up to 5 Double Stuf Oreos (I mention that this spelling has me feeling suspicious. Students usually expand by suggesting it is a legal thing. As a foreign teacher, I explain that in my country, the company would have to prove something is "double stuffed" to call itself that.), up to 5 classic Kaleidos (Kroger brand), up to 5 Double Filled Kaleidos (Kroger brand). Visual examination: students will likely notice that the cookies appear thinner in double stuf; leads onto a discussion of DV (a straight mass comparison or a % composition comparison - which is best?)

A spatula, paper towels, weighing papers, weighing boats, a ruler Beakers of varying sizes Access to a top pan balance Access to a tea kettle (Only required if a group chooses dunkability as an investigation.)

Question your group has chosen to answer: _____

Questions can include: are double stuf truly double stuffed? are original oreos the same as kaleidos in terms of composition? Do oreos disintegrate slower than kaleidos?

Define Independent variable

I set my group an EdPuzzle on variables as a PreLab as many were fully remote the previous year or have simply forgotten the terminology.

What is the independent variable (IV) for your experiment?

Define Dependent variable

| What is the dependent variable (DV) for your experiment? |
|--|
| |
| Define Control variable |
| State at least 3 control variables for your experiment |
| |
| What is a hypothesis? |
| State the hypothesis for your experiment |

Your chosen **Equipment** (list including sizes where applicable)

Your **Method** (a numbered list of instructions to perform your experiment)

I let my students have a practice run on a single cookie. They will soon notice that getting the cream off the spatula is not easy for weighing purposes. Leads to a discussion on weighing by difference (whole oreo, scraped cookie parts, subtract to get cream)

Results Table (put IV in 1st column, DV in 2nd column)

Check that students are being consistent with decimal places in recorded data, and that units (likely grams) go in the heading **only**.

Data Processing (calculate averages!)

Opportunity for differentiation: % composition rather than simply is the cream doubled? Opportunity to discuss sig figs if desired - how many sig figs can they quote their average to, based on their raw data?

Graph: Clip your graph to the packet

Opportunity to discuss how we choose graph type based on the data we have (continuous vs discrete)

Conclusion (was your hypothesis correct? If not, rewrite your hypothesis)

Evaluation

Opportunity to discuss precision vs accuracy vs reliability. Is double exactly 2x or do we have a tolerance?

What was difficult about getting accurate results? Students will likely mention accidentally scraping off part of cooking when removing cream / difficulty of removing all cream.

How would you change your method to get more accurate results?

How could you make your results more reliable?

To end the class, I like to save 5 mins for metacognition. I ask the class "why did I ask you to do this task?". Some will say because I like cookies, others will look deeper into the scientific process / how to write a lab report / how to make sure research is reproducible etc