



Name _____

COOKIE CAPER

Purpose: To practice the skills used to design experimental investigations.

Background Information: The chocolate-chip cookie, also known as the Toll House Cookie, was accidentally invented by Ruth Graves Wakefield in the 1930s. Ruth and her husband Kenneth owned the Toll House Inn, near Whitman, Massachusetts. Wakefield was making chocolate cookies and ran out of regular baker's chocolate. She used a Nestle semi-sweet chocolate bar cut into bits in a butter cookie recipe instead, thinking the chocolate pieces would melt. They did not, and the chocolate chip cookie was born!

She and Andrew Nestle formed a partnership soon after, and Nestle developed a semi-sweet chip to use in the cookie. Wakefield's recipe was printed on the back of the chip package, and the cookies have been an American favorite ever since.

The chocolate chip cookie is the official state cookie of Massachusetts and Pennsylvania.

Chocolate chip cookies are made with sugar, flour, eggs, semi-sweet baker's chocolate and butter. While the Toll House recipe is considered the standard, the ingredients can be changed to give the cookies slightly different properties.

Problem: Since the chocolate chip cookie is so well-liked, many bakeries bake the cookies for sale in stores. Chips Ahoy® by Nabisco and Chips Deluxe® by Keebler are two of the most popular brands. Many stores have their own brand of cookie as well. With all the different brands of cookies available, how can you decide which brand is the best?

The Task: As a research team, design an experimental, quantitative investigation (a fair test) to determine the best chocolate chip cookie. **Remember to use your Science Handbook as a reference.**

You will have these materials to conduct the experiment:

3 different brands of cookie	Triple beam balance	Metric ruler
Calculator	Science handbook	Other materials as needed

Step 1: Operationally define “best”. Before you can determine what the best cookie is, you have to know what you mean by best.

Remember:

- Science deals in **facts** – observations that are true for everyone.
- This is an experimental, quantitative investigation – you must **measurable** data.

Definition of best:

Step 2: Identify the **INDEPENDENT / MANIPUALTED VARIABLE** [what you will change, or the difference between the groups], the **DEPENDENT / RESPONDING VARIABLE** [what you will observe and measure, the data that you will collect], and all of the **CONTROLLED VARIABLES / CONSTANTS** you can think of [all of the variables that could change, but won't].

Independent / Manipulated Variable

Dependent / Responding Variable:

Controlled Variables / Constants:

Step 3: Write a **RESEARCH QUESTION** using affect or effect.

Step 4: Write a **HYPOTHESIS** that shows the expected relationship between the variables. Use an **IF, THEN** statement.

Step 5: Design an **EXPERIMENTAL INVESTIGATION** to test your hypothesis.
Decide:

- *What your specific independent variables are:*

- *What you are going to observe and measure:*

- *How you will do the measuring:*

- *How many trials you will have:*

Step 6: Write the **PROCEDURE** you will follow during your investigation, **step-by-step**.

1.

2.

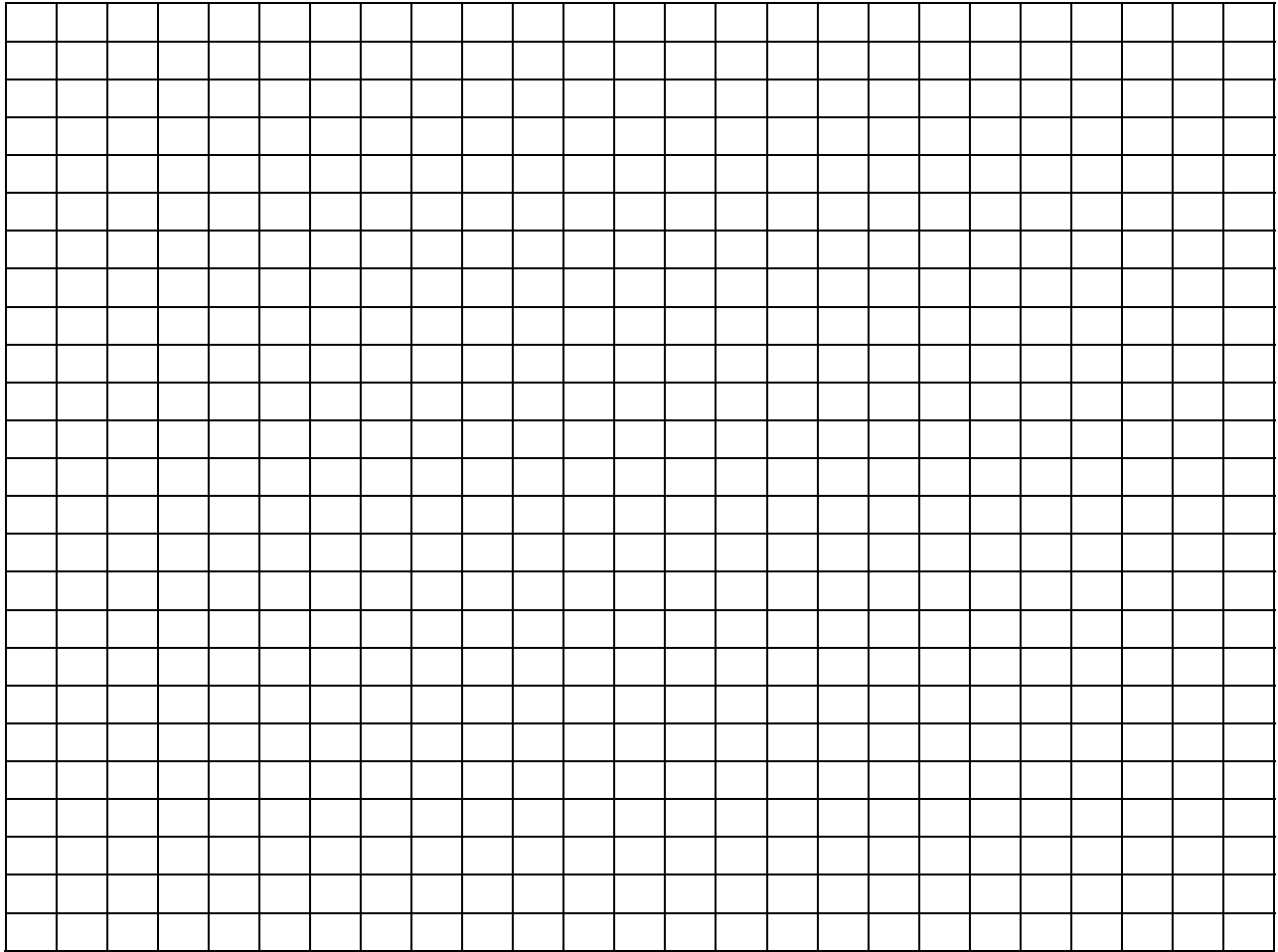
3.

Step 7: Make the **DATA TABLE** to record your data. Include a place for your reduced data & measures of central tendency [average].

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Step 8: Make a **GRAPH** of your reduced data. Remember **DRY MIX** and **TAILS**. Explain what type of graph you will use and why.

<p><i>Best type of graph:</i> _____</p> <p><i>Explanation:</i> _____</p>
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Step 9: ANALYZE your data: What story does the graph tell? What do you know about the effect of the independent variable on the dependent variable? Do you see a relationship?

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