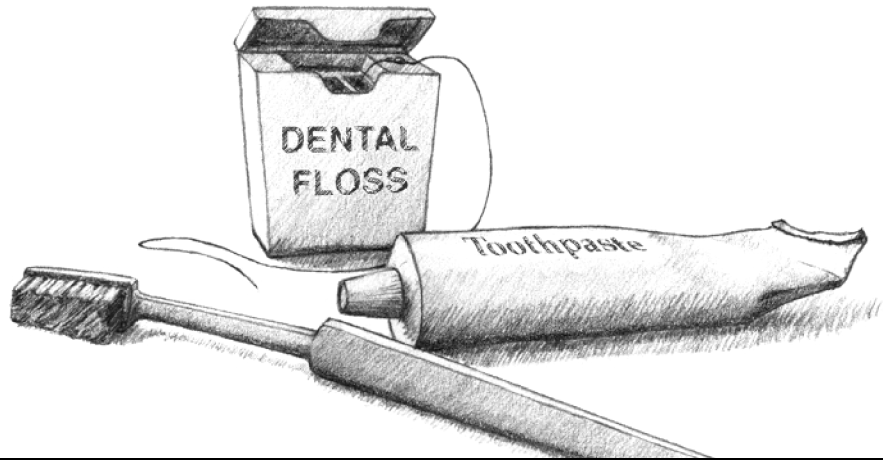


**SMILE!**

## LaCuKnoS Language Booster



### DESCRIPTION

After we eat, a sticky coating called plaque forms on our teeth. If we don't brush off the plaque, our teeth gradually change color from white to yellow or brown. Plaque also leads to cavities and other dental problems. People have known for a long time that using toothpaste helps to reduce cavities, toothaches, and bad breath.

The oldest known American toothpaste recipe was printed in the Old Farmer's Almanac in 1820. Recipes for other ways that people have cleaned their teeth have been found in ancient Egyptian hieroglyphs (picture-writing). An Egyptian recipe from 3000 BC listed powdered ashes from ox hooves, myrrh, eggshells, pumice, and water as ingredients for a tooth cleaner. It probably tasted terrible, but it did help to keep teeth clean. Later, in Greece and Rome, more ingredients were added to the powder mixture, like crushed bones and oyster shells. The Romans also added flavorings, such as powdered charcoal and tree bark, to help with bad breath, and to make their tooth cleaner taste better.

Soap was added in the early 1800's (Yuck!), and in 1873, the Colgate Company produced the first "tooth-paste" sold in jars. The jars of toothpaste were replaced by squeezable tubes made of lead in 1889.



In 1914, fluoride was added to toothpaste to help prevent cavities by strengthening the teeth. Later, synthetic ingredients were added (such as sodium lauryl sulphate, which causes foam), as well as sweeteners. Starting in the 1980's, toothpaste makers began trying all sorts of new improvements, such as gels and toothpaste for sensitive teeth. In 1989, Rembrandt brand toothpaste invented the first toothpaste that claimed to "whiten and brighten your smile."

Through all these changes, it's certain that you are getting better tooth care (and better tasting toothpaste) than our ancestors did, and that's a great thing!



**Talk with your partner about these questions, then write your answers...**

- 1 Imagine that you lived in ancient Egypt. How could you convince a friend to try this new invention, tooth cleaning powder?
- 2 Do you think whitening toothpaste really makes teeth whiter than regular toothpaste? How could you design an investigation to find out?

# TOOTHPASTE WHITENING

## LaCuKnoS Science Investigation



### Materials

- 1 toothbrush
- 1 boiled egg stained with Coca-Cola
- Samples of 2 brands of whitening toothpaste
- Samples of 2 brands of regular toothpaste
- 1 cup of water
- Sharpie marker
- Paper towel



### DESCRIPTION

Today, there are many different whitening toothpastes on the market. But do these whitening toothpastes really work? Are they better than other brands of toothpaste for making your teeth white? In this investigation, we will try to examine this question scientifically.

In this investigation we will compare two brands of whitening toothpaste and two brands of regular toothpaste to see if whitening toothpaste removes stains better than regular toothpaste. In order to have a fair test, we will need to think carefully about **variables** in our experiment.



**Pre-Lab Review:** In a science experiment like this one, what are some things we need to consider so that we design a fair test of our question?

3. What is a variable in science and how is this different from a variable in mathematics?
4. Why is thinking about variables important when we design a science experiment?
5. What will happen if we change many variables at the same time during a science experiment?
6. What does it mean to *control* a variable in a science experiment?

### PROCEDURE

1. You will receive 1 Coke-stained egg and 4 samples of toothpaste labeled A-D.
2. Place the coke-stained hard-boiled egg on a paper towel.
3. Wet the toothbrush in the water and apply brand A of toothpaste.
4. Brush one section of the egg. Think about the variables that you need to control as you do this.
5. Dry the egg with a paper towel and then record your observations about the effect of using Brand A of toothpaste to clean the Coke-stain. Use the sharpie marker to write an A to identify the part of the egg cleaned with brand A of toothpaste.
6. Clean the toothbrush well in water, and then repeat steps 2-4 with Brand B of toothpaste.
7. Clean the toothbrush, then repeat steps 2-4 with Brand C of toothpaste.
8. Clean the toothbrush, then repeat steps 2-4 with Brand D of toothpaste.



**Data Table for Results of Testing Toothpaste**

Brand of Toothpaste	Description of the egg after brushing with this brand of toothpaste
Brand A	
Brand B	
Brand C	
Brand D	

**With your group, discuss and then write an answer to the following question.**

**Examine your results. What do your data tell you about the effectiveness of whitening toothpastes and regular toothpastes for whitening your teeth?**



## TOOTHPASTE WHITENING

### LaCuKnoS Investigation Summary

#### NGSS SEP: Controlling Variables to Design a Fair Test

What is your **Independent Variable** in the toothpaste investigation? (the variable that you changed or manipulated – what you are testing)

What is your **Dependent Variable** in the toothpaste investigation? (the variable that changes in response to the independent variable – the result or outcome variable)

List two other variables you tried to **control** or keep **constant** in the toothpaste investigation (possible variables that should be kept the same to have a fair test).

What language would you use to describe to your family how you used **variables** in your toothpaste investigation?

What language would you use to describe to your science teacher how you used **variables** in your toothpaste investigation?



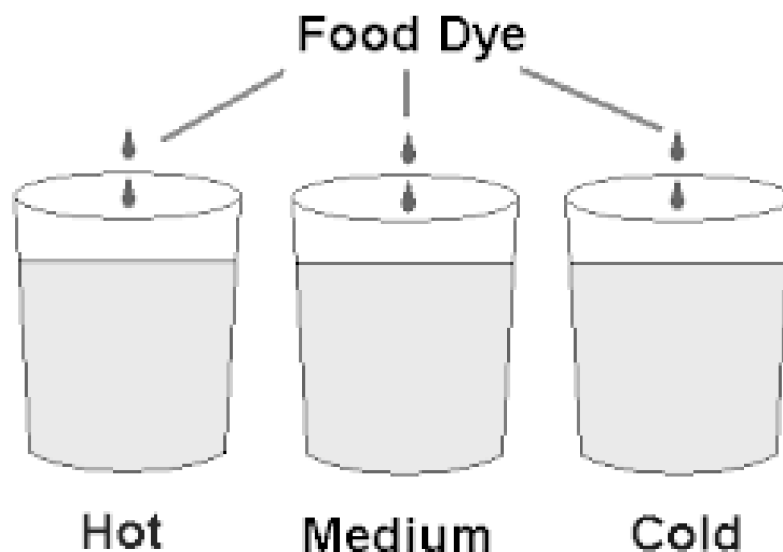
## TOOTHPASTE WHITENING

### LaCuKnoS Concept Cards

# Variable/Variable

A variable is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has three kinds of variables: independent, dependent, and control.

Una variable es cualquier factor, rasgo o condición que puede existir en diferentes cantidades o tipos. Un experimento generalmente tiene tres tipos de variables: independiente, dependiente y control.





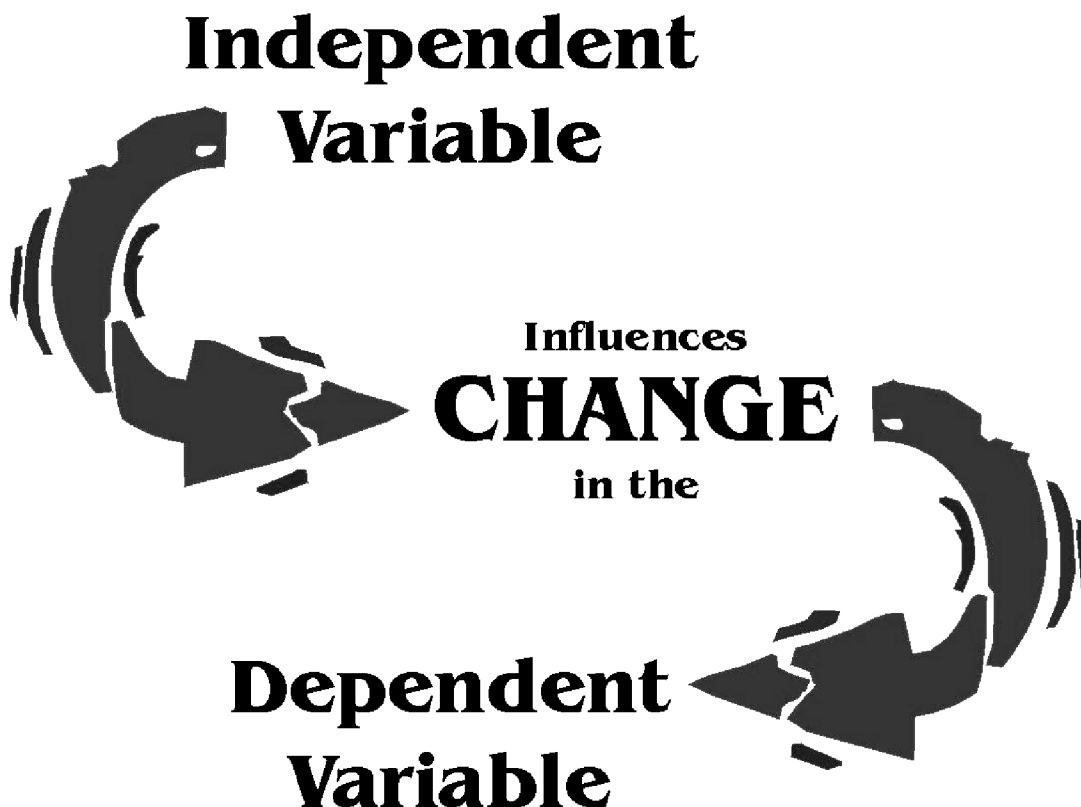
## TOOTHPASTE WHITENING

### LaCuKnoS Concept Cards

# Independent Variable/ Variable Independiente

The independent variable is the variable that is changed or manipulated in a science experiment

La variable independiente es la variable que se cambia o se manipula en un experimento científico





## TOOTHPASTE WHITENING

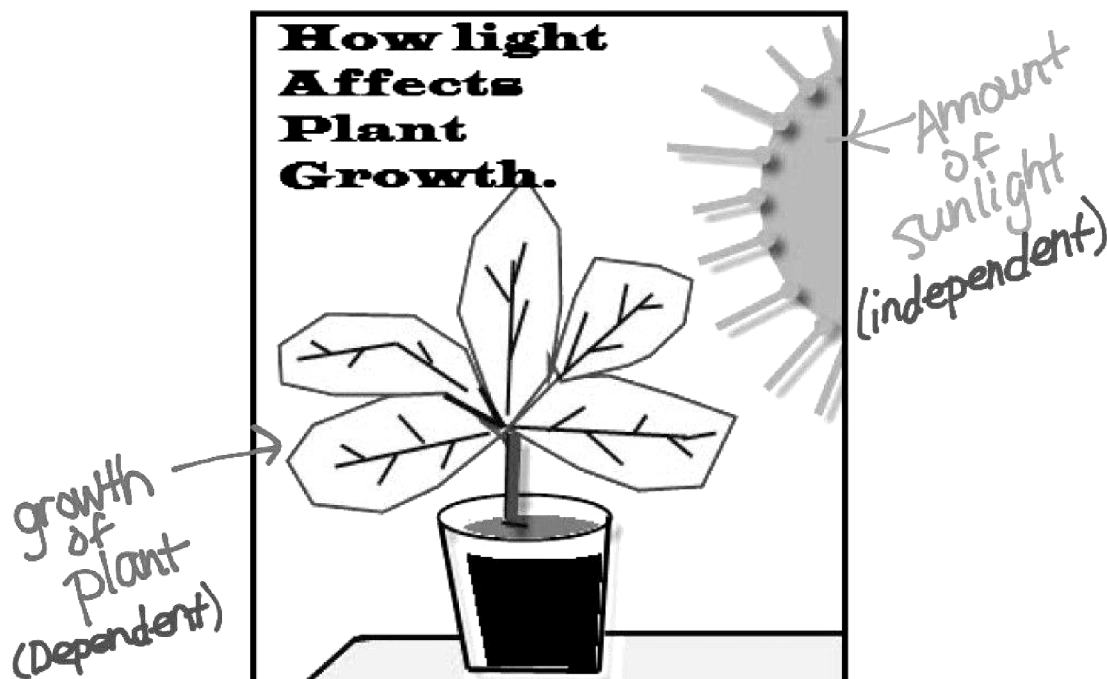
### LaCuKnoS Concept Cards

# Dependent Variable/ Variable Dependiente

The dependent variable is the variable that changes in response to the independent variable; the result in a science experiment

La variable dependiente es la variable que cambió en respuesta a la variable independiente; el resultado en un experimento científico

## INDEPENDENT & DEPENDENT VARIABLES





## TOOTHPASTE WHITENING

### LaCuKnoS Concept Cards

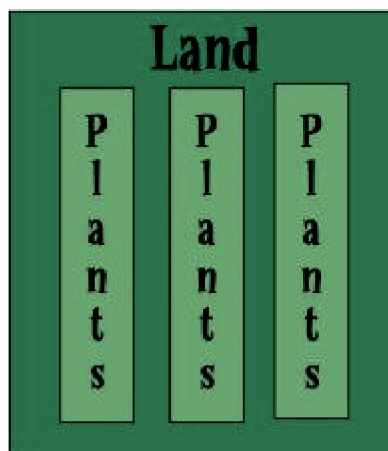
# Control Variables/ Variables de Control

The control variables are the variables or things that you do or keep the same in a science experiment to have a fair test

Las variables de control son las variables o cosas que usted hace o mantiene igual en un experimento científico para tener una prueba justa

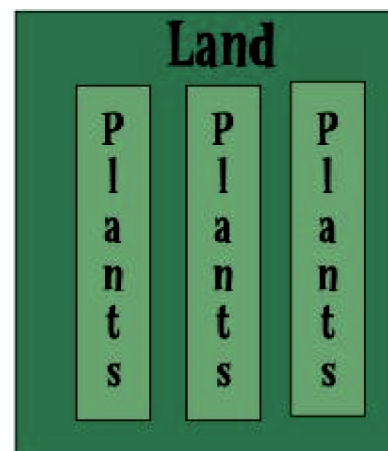
## Experiment

### Control Group



Soil, Water,  
Sunlight

### Variable Group



Fertilizer +  
Soil, Water,  
Sunlight