METHOD OF SCIENCE

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A STORY OF RINI

RINI'S STUDY

Observation

Rini, a girl child, watches her grandmother while baking bread. She asks her grandmother,

“ what makes the bread rise?”

The grandmother explains,” yeast releases a gas as it feeds on sugar".

Research Question

Rini thinks, ... Will less or more amount of sugar have any affect on the size of the bread?

Research (Literature survey)

Rini reads books on the areas of baking and fermentation and tries to come up with the idea to test her question.

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She keeps all the information on this topic in a rough book

(here it is Log Book).

Research (Contd…)

Rini talks with her teacher who gives her an **Experimental Design Diagram** to set up the Experiment (परीक्षण) for her investigation.

Research (Contd...)

She explaied her the experimental variables-

- **Independent (स्वतंत्र)**
- **Dependent (निर्भर)**

She also explained her -

Control (नियंत्रण)

&

Constants (स्थिरांक)

in the Experiment.

Formulation of Hypothesis

After talking with her teacher and friends and conducting further research, Rini comes up with a hypothesis-

"More amount of sugar, if added, the bread will rise higher."

What is a Hypothesis

The hypothesis is an educated guess about the relationship between the independent and dependent variables.

Objectives chosen for the research

It may be-

To find out optimum amount of sugar for getting maximum volume of the bread

Experimental Variables
(I. Independent Variable)

The independent variable is a variable (often denoted by *x*) whose variation does not depend on that of another.

An independent variable is also defined as the variable that is changed (if necessary) or controlled in a scientific experiment.

Here, Rini is going to use

25, 50, 100, 250 & 500 g. of sugar (per kg flour) in her experiment

Experimental Variables

(II. Dependent Variable)

The dependent, or responding variable, is the factor that may change as a result of changes made in the independent variable.

Here it is

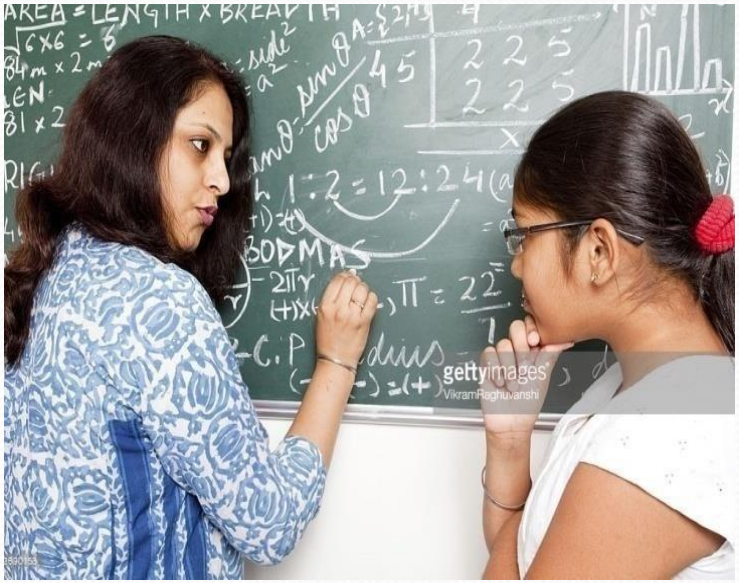
size of the bread

Experimental Variables

Independent Variables	Dependent Variable
25 50 100 250 500 gm of sugar	Size (Volume) of the bread, cm^3

Conducting Experiment

Her teacher helps her to come up with an experimental **procedure** and list of needed materials.



She also discusses with Rini about **control group**

What is Control Group ?

In a scientific experiment, the control is the group that serves as the standard of comparison.

The control group may be a

"no treatment"

or

“experimenter’s selected group".

All Scientific Experiments must have a Control Group.

Control Group in Rini's Experiment

Because her grandmother always used 50g. of sugar in her recipe, so, Rini decided to use that amount (i.e. 5og. of sugar) as

control group.

Constants

Rini's teacher reminds her to keep **all other factors same** so that any observed changes in the bread can be because of the variation in the amount of sugar.

Constants

The constants,
in an experiment,
are all the factors
that are kept unchanged.

Constants in Rini's Experiment

They may be:

- **Oven used**
- **Brand of ingredients**
- **Cooking time**
- **Type of pan used**
- **Air temperature and Humidity of the cooking place**
- **Oven temperature,**
- **Age of the yeast… etc.**

Rini's Experiment

Rini writes procedure for her experiment along with a materials list in her Rough Book.

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Rini got both of these checked by her teacher when teacher checks and gives caution if any safety measures to be taken during material handling.

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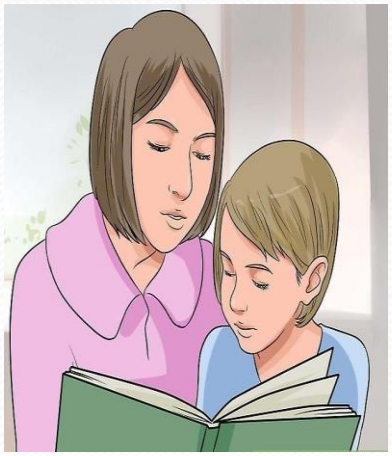

She also advised her to take photographs at all the steps of the experiment as documentation

Trials

Trials refer to replicate (repeat) groups that are exposed to the same conditions in an experiment.

Here, Rini is going to test -

each of the sugar variables (25, 50, 100 g... etc.) 3 times

Data Collection and Analysis of Results

Rini comes up with a table which she used to record her data (i.e. information).

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Analyzed data with simple statics

RESULT

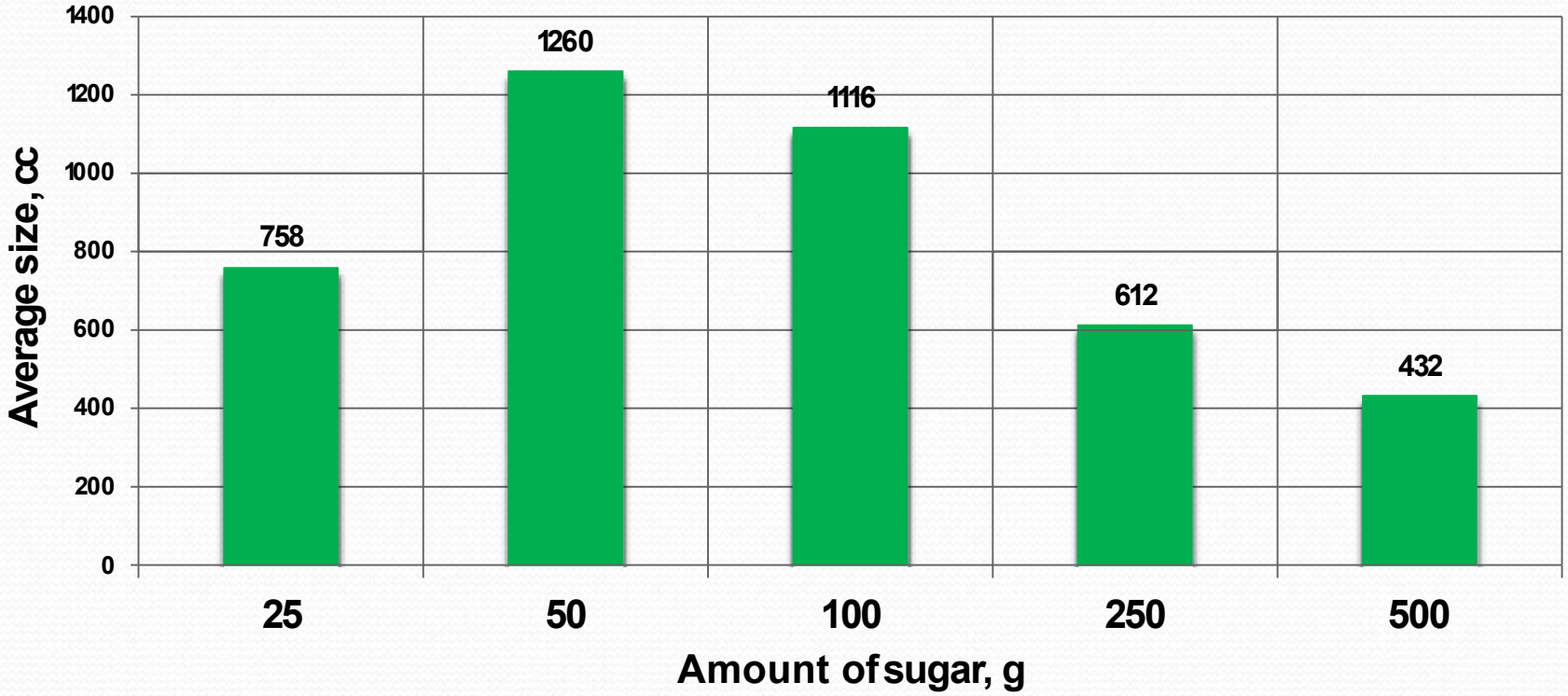
[Size of Baked Bread (LxWxH), cm^3]

Table-1. Size of Bread Loaf (cm^3)

Amt. of Sugar (g.)	Trials			Average Size (cm^3)
	1	2	3	
25	768	744	761	758
50 **(Control group)**	1296	1188	1296	**1260**
100	1188	1080	1080	**1116**
250	672	576	588	612
500	432	504	360	432

Statistical Representation of Result (1st Experiment)

Fig.-1. Size of the Bread (cc) in 1st Experiment



Data Collection and Analysis of Results

Rini examines her data and notices that her control worked best in this experiment,

But,

Not remarkably better than 100g. of sugar.

Conclusion

Rini **rejects** her hypothesis, but decides to **re-test** using amounts of sugar **Between 50g. and 100g.**

Experiment

Rini, once again, gathers her materials and carries out her experiment for the 2nd time.

The results she got are-

RESULT

[Size of Baked Bread (LxWxH), cm^3]

Table - 2. Size of Bread Loaf (cm^3)

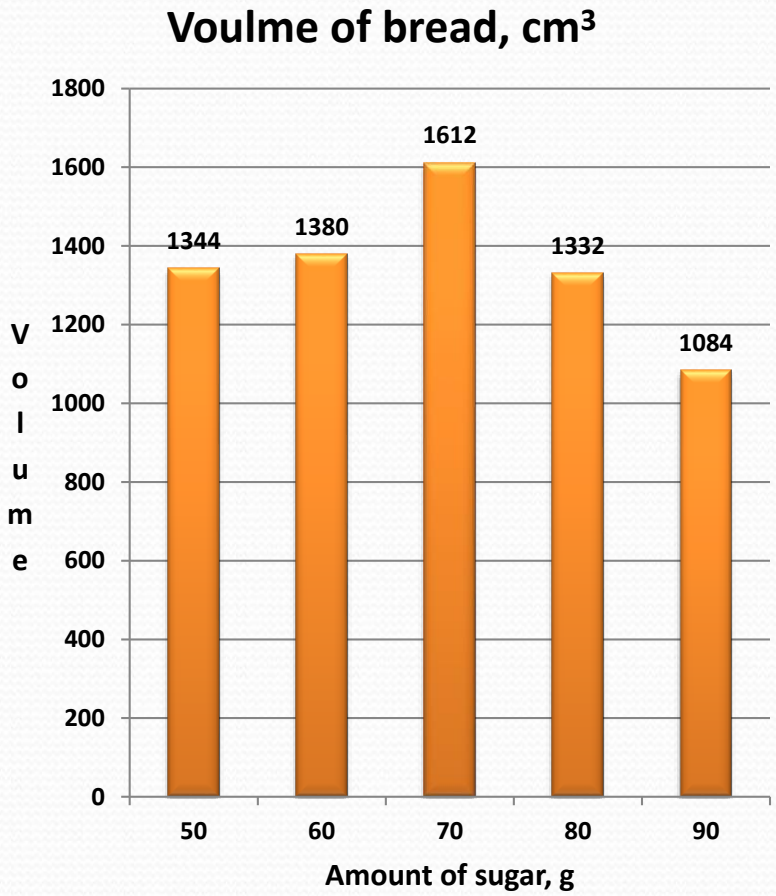
Amt. of Sugar (g.)	Trials			Average
	1	2	3	Size (cm^3)
50 (Control group)	1296	1440	1296	1344
60	1404	1296	1440	1380
70	1638	1638	1560	1612
80	1404	1296	1296	1332
90	1080	1200	972	1084

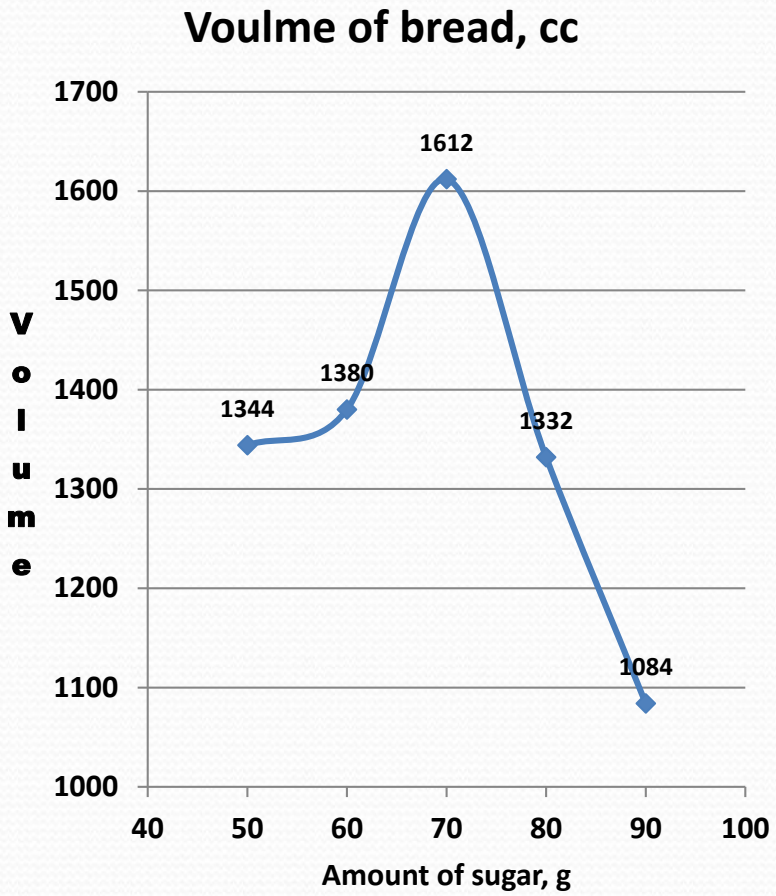
Data Analysis

Table -3. Expressing various ways of changes of size of the bread

Treatments (Amount of Sugar), (g.)	Size of bread, (cm^3)	Increase/ Decrease over control (by volume), (cm^3)	Increase/ Decrease over control (%)	Proportionate Increase/ Decrease over control
50	1344	0	100.00	1.00
60	1380	36	2.68	1.03
70	1612	268	19.42	1.20
80	1332	-12	-0.74	0.99
90	1084	-260	-19.52	0.81

Graphical representations of Result





Conclusion

Rini finds that 70g. of sugar produces Largest Loaf.

So, her Hypothesis is Accepted

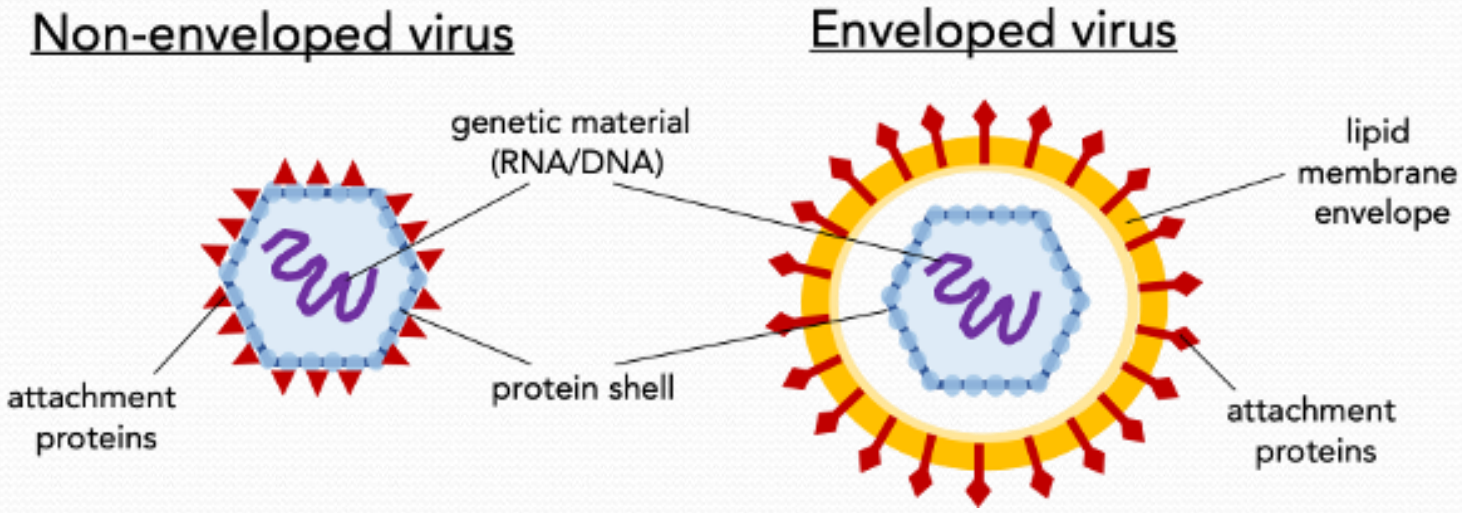
Communication of the Results

Rini tells her grandmother about her findings and Prepares 4 charts to present her project at CSC.

ECONOMY	अर्थव्यवस्था
INFRASTRUCTURE	आधारिक संरचना
SYSTEM	प्रणाली
DEMOGRAPHY	जनसांख्यिकी
DEMAND	मांग

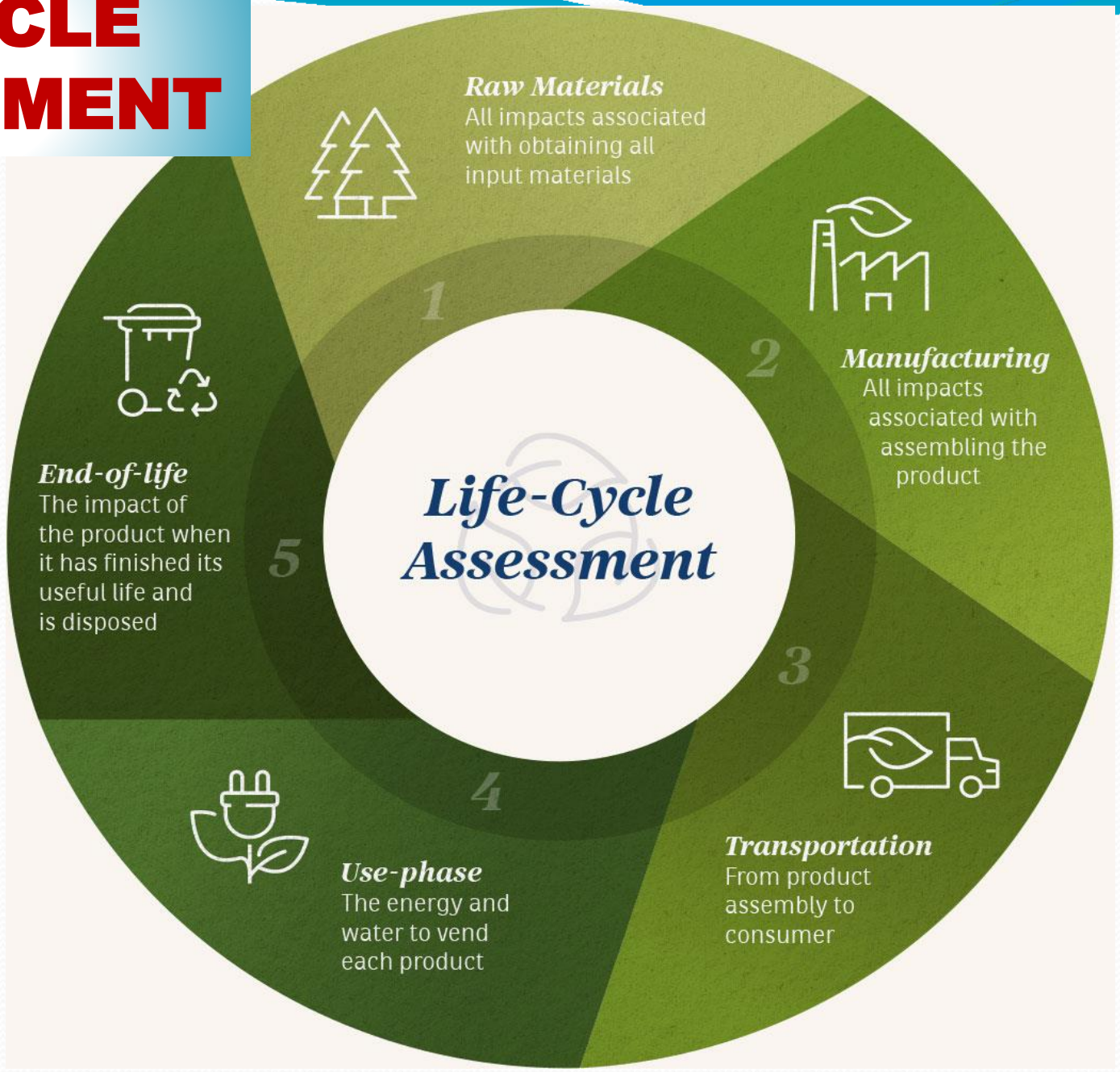
PROJECT IDEAS

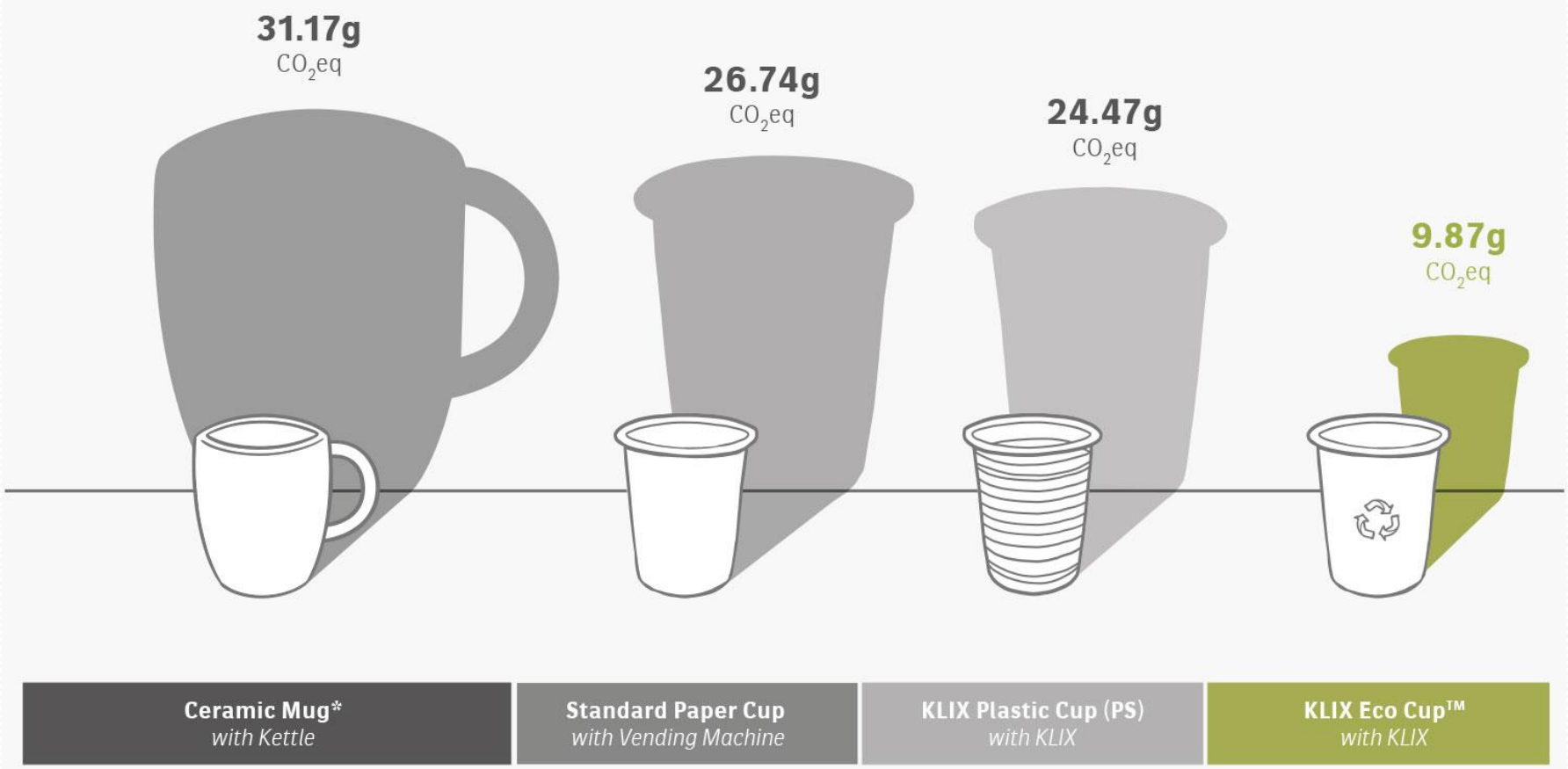
MODEL OF VIRUS



STUDY ON SNEEZING

LIFE CYCLE ASSESSMENT




31.17g
CO_2eq
26.74g
CO_2eq
24.47g
CO_2eq
9.87g
CO_2eq
Ceramic Mug*
with Kettle
Standard Paper Cup
with Vending Machine
KLIX Plastic Cup (PS)
with KLIX
KLIX Eco Cup™
with KLIX

SOIL SOLARIZATION

मृदा सौर्यीकरण

Figure 1. A raised bed being solarized. (Source: Garden Betty, www.gardenbetty.com)

Figure 2. Mid-scale, or large-garden, solarization. (Source: The Samuel Roberts Noble Foundation, www.noble.org)

Soil solarization is a method of soil-disinfestation based on its solar **heating** by mulching a soil with a transparent polyethylene during the hot season, thereby controlling soilborne pests. Pathogen and disease control are attributed to microbial, chemical, and physical processes in addition to the thermal killing.

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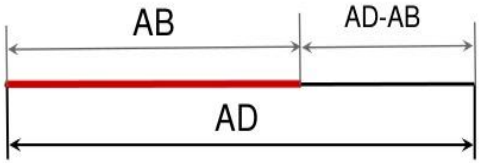
शरीर खुरचनेवाला

तुरई

Golden Ratio

$$\frac{AB}{AD-AB} = \frac{AD}{AB} = 1.618$$



The Golden Ratio is found when we divide a line segment into two parts so that:

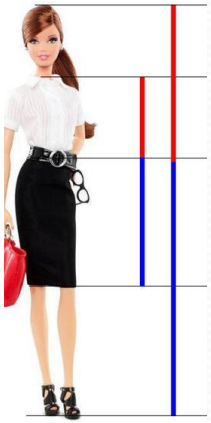
the longer part divided by the shorter part

is also equal to

the whole length divided by the longer part

and the result of these divisions equals

1.618



Example:

Let, AB = 1, AD = 2.62

& (AD – AB) = 2.62 – 1 = 1.62

Then, AD/ (AD – AB) = 2.62 /1.62 = 1.617

(AD – AB) /AB = 1.62/1 = 1.62

The Fibonacci Sequence

1,1,2,3,5,8,13,21,34,55,89,144,233,377…

1+1=2
1+2=3
2+3=5
3+5=8
5+8=13
8+13=21
13+21=34
21+34=55
34+55=89
55+89=144
89+144=233
144+233=377

Pineapples Grow in a Numerical Sequence

8 parallel rows of scales spiraling gradually

13 parallel rows of scales spiraling at a medium slope

21parallel rows of scales spiraling steeply

1-2-3-5-8-13-21-34-55-89…

MORE AREAS

1. Hydroponics
2. Making some useful model using thrown away materials
3. Mulching of crop
4. Water filter using bio-materials
5. Making & marketing mask
6. Demographic changes in the area (by age and sex), in school
7. Impact of demographic changes in domestic animals

Thanks to all my little friends

& Wish you all a grand success