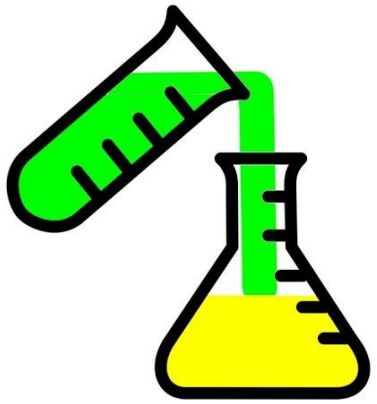


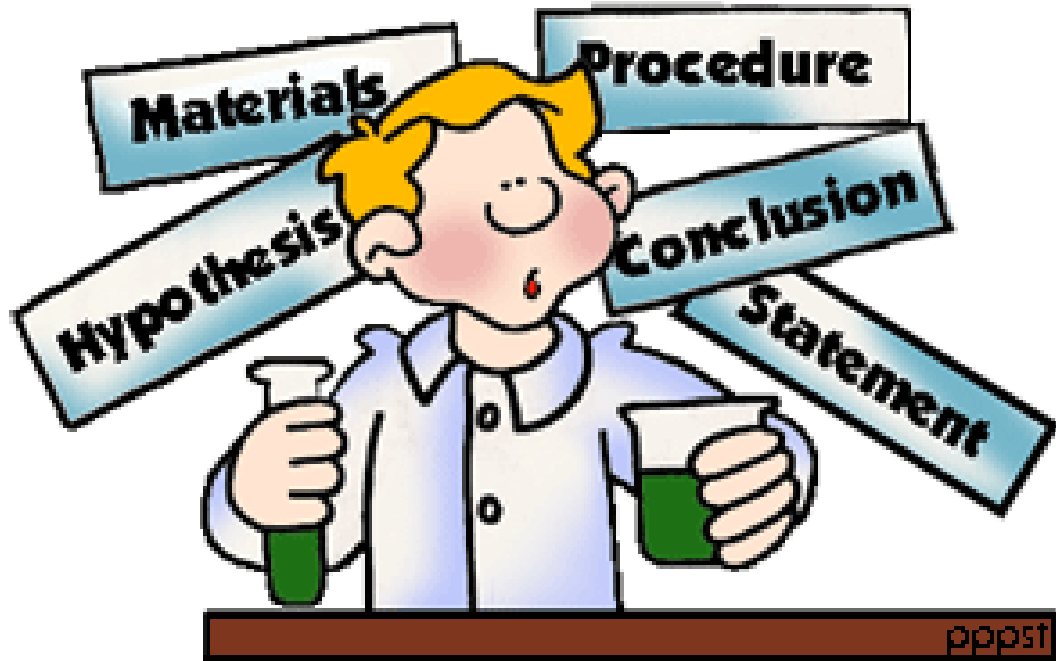


SCIENCE FAIR FOR YOUNG CHILDREN 2021



The
Scientific
Method





The **Scientific Method** involves a series of steps that are used to investigate a phenomena.

Steps of the Scientific Method

- Problem statement
- Aim
- Hypothesis
- Variables
- Apparatus and Material
- Procedure
- Results
- Conclusion
- Discussion



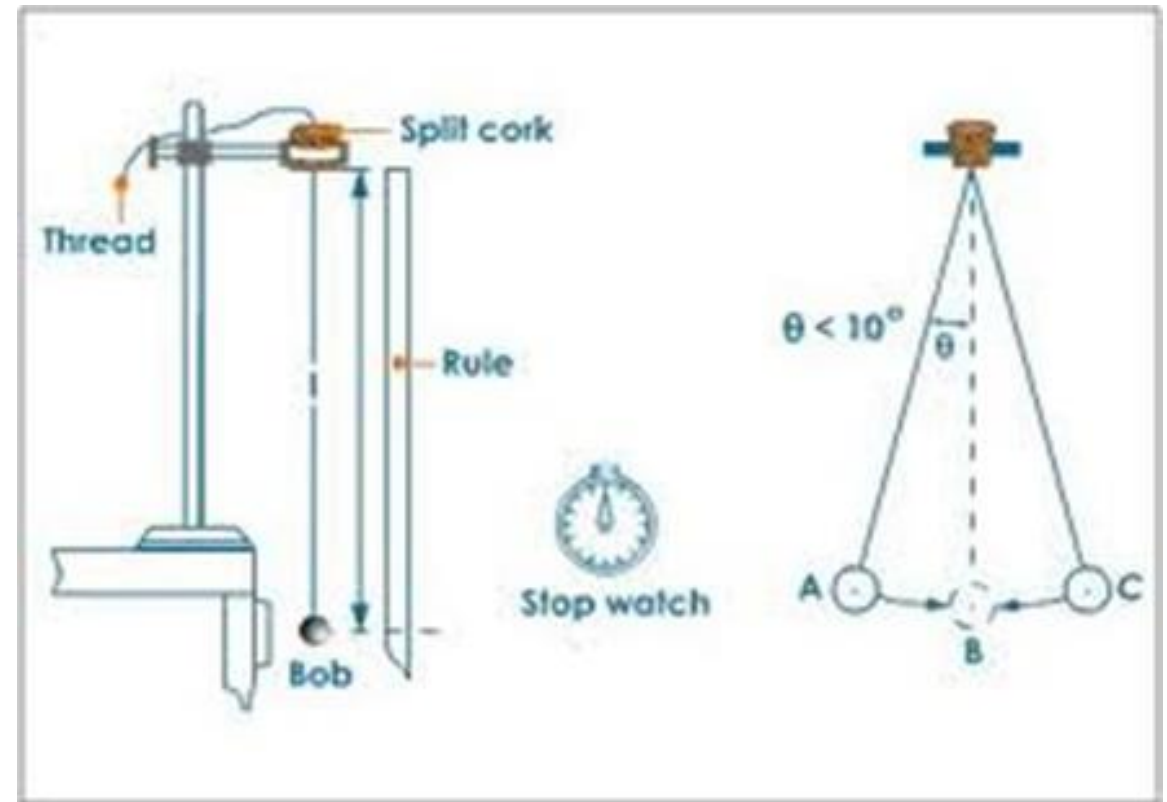
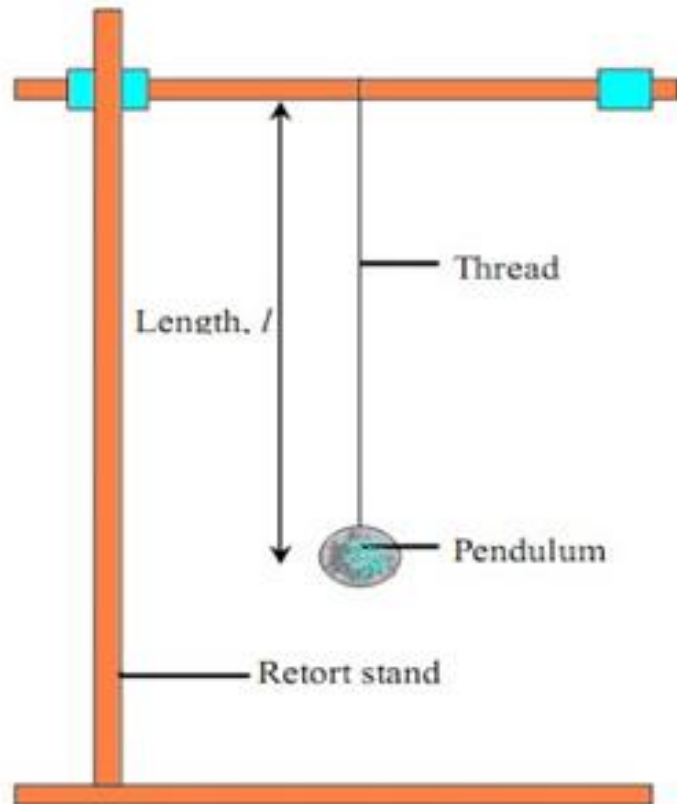
PROBLEM STATEMENT

- Identify the subject that you are going to study for the science project
- Develop a topic statement to answer during the experiment.
- Format: How does A affects B?
- Examples:

How does the length of pendulum string affect the time take to complete 10 oscillations?



PENDULUM EXPERIMENT



AIM

- Aim is the objective/purpose of conducting that experiment.
- Format:
 - ❖ To study/determine/investigate the relationship between A and B.
- Examples:
 - ❖ To study the relationship between the length of pendulum string and time take to complete 10 oscillations.



HYPOTHESIS

- Predict a possible answer to the problem.
- Format:
 - ❖ When A increases/decreases B also increases/decreases.
 - ❖ The more/less the A, the more/less the B.
- Examples:
 - ❖ The longer the length of pendulum string, the longer the time taken to complete 10 oscillations.



Variables

- Variables are divided into three:

- ❖ Manipulated variable
- ❖ Responding variable
- ❖ Controlled variable



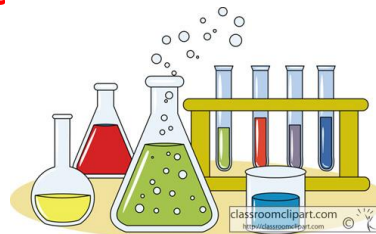
- **Manipulated/independent variable** is the one factor that's intentionally varied by the experimenter.
- Example: **The length of the pendulum string**
- **Responding/dependent variable** is the factor that may change as a result of changes made in the independent variable
- Example: **Time taken for 10 complete oscillations**
- **Controlled/Constant variables** factors which are controlled or held constant throughout an investigation.
- Example: **The mass of the pendulum bob, number of oscillations**

APPARATUS AND MATERIALS

- **Apparatus** are the instruments/things/objects/tools which can reuse after experiment.

- Apparatus are the tools which are used for measuring of a physical quantity required depending on the type of material.

- Example: **Pendulum bob, retort stand, stopwatch.**



- **Materials** are the things/tools/objects which can use only once and cannot reuse again in next experiment.

- Material is the one for which the experiment is conducted for its applications depending on its properties.

- Examples of materials: **length of string about 100 cm long.**



Procedures

- The procedure is the plan for how you will conduct your experiment.
- It will be the step-by-step description of the experiment.
- Example:
 - ❖ The thread is tied to the pendulum bob. The other end of the thread is tied around the arm of the retort stand so that it can swing freely.
 - ❖ The length of the pendulum, is measured to 20 cm as per the diagram.
 - ❖ With the thread taut and the bob at rest, the bob is lifted at a small amplitude about 20° . Ensured that the pendulum swings in a single plane.
 - ❖ The time for ten complete oscillations of the pendulum is measured using the stopwatch.
 - ❖ Step 4 is repeated, and the average of both readings are calculated.
 - ❖ Steps 1 to 5 are repeated using $l = 30\text{ cm}, 40\text{ cm}, 50\text{ cm}, \text{ and } 60\text{ cm}$.



Results/Observations

- Results/Observations are what you saw, heard, felt, etc. during the experiment; basically, the use of five senses.
- The results are sometimes only qualitative, sometimes only quantitative, but often they are quantitative.
- Qualitative refers to results which do not have numbers associated with them: colors, effervescence (fizzing), texture (smooth or rough), etc.
- Quantitative refers to results which have numbers: 21.6 s, 37°C, 12.8 cm, 110 Volts, etc.





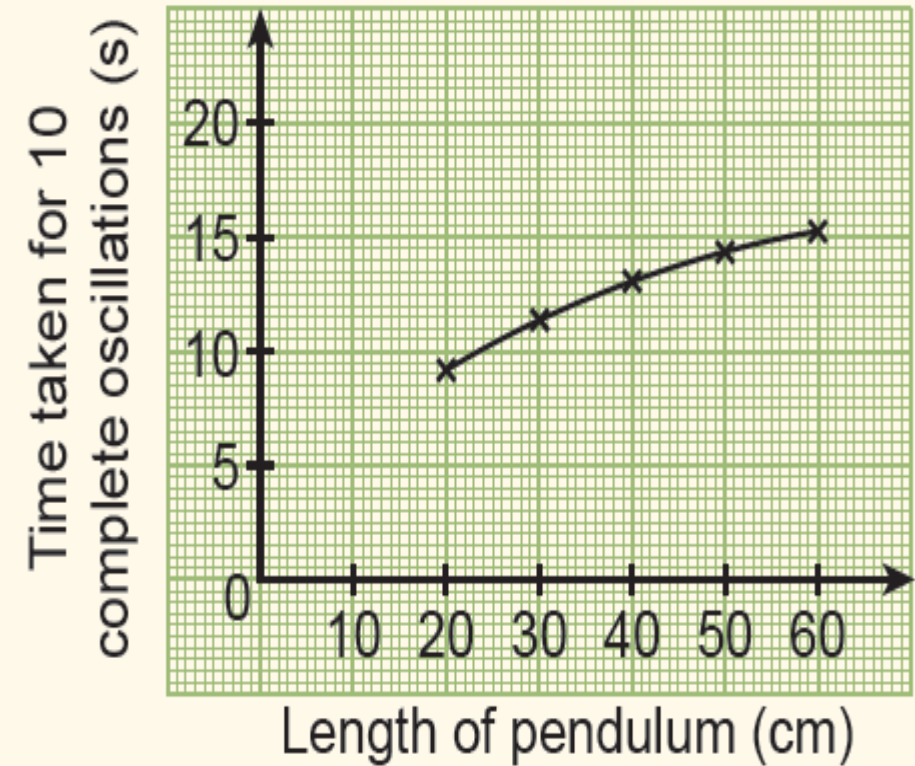
Results/Observations

- Qualitative refers to results which do not have numbers associated with them: colors, effervescence (fizzing), texture (smooth or rough), etc.
- Quantitative refers to results which have numbers: 109 bubbles, 37°C, 12.8 cm, 110 Volts, etc.
- The raw data is best presented in the form of table.

Length of Pendulum, l (cm)	Time taken for 10 oscillations, t (s)			
	Reading T ₁	Reading T ₂	Reading T ₃	Average
20	9.1	9.2	9.0	9.1
30	11.3	11.4	11.4	11.4
40	13.1	13.0	13.1	13.1
50	14.4	14.3	14.3	14.3
60	15.2	15.1	15.3	15.2

ANALYSING AND INTERPRETING DATA

- The raw data in the form of table can best presented in form of graphs.
- To plot a graph, the independent variable is plotted on the x-axis, while the dependent variable is recorded on the y-axis.



CONCLUSION

- An interpretation of results.
- A conclusion is a short paragraph that discusses the overall results of an experiment and explains whether the proposed hypothesis at the beginning of the experiment was accepted or rejected.
- Example:

The longer the length of the pendulum string, the longer time taken for the 10 complete oscillation.
The hypothesis is accepted.



DISCUSSION

- Remember to offer your readers a critical overview of your findings from a comprehensive point of view in the discussion section.
- Discuss any limitations to your research that prevented further study. Also, discuss the reasons for your limitations, if there were any to your study.
- Include the science concept involved in the experiment and application of the concept in daily life.
- Example:
- The graph of length of the pendulum string versus the time taken for the 10 complete oscillation will produce straight line if the experiment was carried out in an enclosed room to avoid the influence of wind.



2021 SCIENCE FAIR FOR YOUNG CHILDREN QUESTIONS

2021 இளம் ஆய்வாளர்களுக்கான அறிவியல் விழா கேள்விகள்

- 1) Study the effect of the volume of a container on the time taken for a candle to extinguish.

ஒரு கொள்கலனின் கொள்ளளவு எவ்வாறு ஒரு கெழுகுவர்த்தி எரியும் நேரத்தைப் பாதிக்கிறது என ஆராயவும்.

- 2) Study the effect of the amount of salt on the density of water.

உப்பின் அளவிற்கும் நீரின் அடர்த்திக்கும் இடையிலானத் தொடர்பை ஆராயவும்.

3) Study the effect of the number of magnets on the collective magnetic force that it produces.

காந்தங்களின் எண்ணிக்கைக்கும் அவற்றின் ஒருங்கிணைக்கட்ட
நர்ப்பு விசைக்கும் இடையிலானத் தொடர்பை ஆராயவும்.

4) Study the effect of the mass of the bob of a pendulum on the time it takes to make a complete swing.

ஓர் ஊசல் குண்டின் பொருண்மைக்கும் அது முழுமையாக
ஊசலாட எடுத்துக்கொள்ளும் நேரத்திற்கும் இடையிலானத்
தொடர்பை ஆராயவும்.

5) Study the relationship between the length of a spring and the weight it can hold.

ஒரு சுருள் கம்பியின் நீளத்திற்கும் அதில் தொங்கவிடப்படும் பொருளின் எடைக்கும் இடையிலானத் தொடர்பை ஆராயவும்.

6) Study the relationship between the amount of sugar used and the volume of gas released in a fermentation process by using yeast.

நுரைமம் கொண்டு மேற்கொள்ளப்படும் நொதித்தல் செயல்முறையில், பயன்படுத்தப்படும் சக்கரையின் அளவிற்கும் அதில் உற்பத்தி செய்யப்படும் வளியின் அளவிற்கும் இடையிலானத் தொடர்பை ஆராயவும்.

7) Study the effect of mass of a substance on the substance's speed.

ஒரு பொருள் செல்லும் வேகத்திற்கும் அதன் பொருண்மைக்கும்
இடையிலானத் தொடர்பை ஆராயவும்.

8) Study the effect of the base area of a substance on its' stability.

ஒரு பொருளின் அடித்தளத்தின் பரப்பளவுக்கும் அதன்
நிலைத்தன்மைக்கும் இடையிலானத் தொடர்பை ஆராயவும்.

9) Study the effect of the amount of salt and time taken for the salt to dissolve.

உப்பின் அளவுக்கும், நீரில் கரைய உப்பு எடுத்துக் கொள்ளும் நேரத்திற்கும் இடையிலானத் தொடர்பை ஆராயவும்.

10) Study the size of an object's image when the distance between the object and screen changes.

ஒரு பொருளுக்கும் அதன் திரைக்கும் இடையிலான தூரத்தை மாற்றும் போது அப்பொருளின் நிழலின் அளவில் ஏற்படும் மாற்றத்தை ஆராயவும்.

JUDGING CRITERIA

2 ASPECTS WILL BE JUDGED

- POSTER
- DEMO AND
PRESENTATION(VIDEO)

JUDGING CRITERIA FOR POSTER

**5 FUNDAMENTAL CRITERIAS
WILL BE LOOKED INTO FOR
POSTER EVALUATION**

CRITERIA 1

STANDARD REQUIREMENTS

- a. Title of the experiment
- b. Name of school
- c. Name of group members
- d. Maximum 1 Powerpoint slide

CRITERIA 2

CONTENT OF POSTER

- a. Aim
- b. Hypothesis
- c. List of materials and apparatus
- d. List of variables
- e. Procedure (in past tense and passive manner)

CRITERIA 2

CONTENT OF POSTER

- f. Tabulation of data
 - data is quantitative and with correct unit
 - samples

CRITERIA 2

CONTENT OF POSTER

- g. Repetition
- h. Representation of data in graph / chart and interpreted
- i. Discussion using scientific principles and terms

CRITERIA 2

CONTENT OF POSTER

- j. Conclusion
- k. Safety precautions

CRITERIA 3

ILLUSTRATIONS

a. Diagrams

CRITERIA 4

ACKNOWLEDGEMENT

CRITERIA 5

BIBLIOGRAPHY

a. APA format

JUDGING CRITERIA FOR DEMO AND PRESENTATION (VIDEO)

4 FUNDAMENTAL CRITERIAS
WILL BE LOOKED INTO FOR
DEMO AND PRESENTATION
(VIDEO)
EVALUATION

CRITERIA 1

DEMO AND PRESENTATION

- a. Title of the experiment
- b. Aim of the experiment
- c. Hypothesis
- d. List of variables

CRITERIA 1

DEMO AND PRESENTATION

- e. Procedure of the experiment
- f. Observation of the experiment
- g. Results of the experiment
- h. Conclusion

CRITERIA 1

DEMO AND PRESENTATION

- i. Discussion on the result of the experiment
- j. Recommendations
- k. Presenters confidence, eloquence and usage of terms

CRITERIA 1

DEMO AND PRESENTATION

- l. Scientific principles
- m. Practical / daily usage

CRITERIA 2

AUDIO AND VIDEO QUALITY

CRITERIA 3

LENGTH OF VIDEO

- a. Within 15 minutes

CRITERIA 4

SOCIAL DISTANCING AND SAFETY MEASURES

THANK YOU !