Unit 0: SCIENCE SKILLS

0.1: **Scientific Method**

What is a Scientific Method?

- A step by step process that Scientist uses to solve problems and determine answers to question in a logical format.

Steps in Scientific Method

1. Identify a problem.
2. Research the Problems
3. Formulate a Hypothesis
4. Conduct an experiment.
5. Reach a conclusion.

Hypothesis

- A smart or an intelligent guess
- Should be clearly and simply stated and should be in a statement form NOT a question.

If you're guessing about the growth of bean plants, the following statement is a clear, concise hypothesis.

"BEAN PLANTS WILL GROW BETTER IN DIRECT SUNLIGHT THAN IN INDIRECT SUNLIGHT OR SHADE"

EXERCISE 1

Read the stories shown below and write down a hypothesis for each one.

STORY 1

As you walk in your village each day at 6:00pm, you pass a pig farm. You observe that the pigs are always grouped together, standing next to each by a small house. When you walk by the farm on days your school lets you out early, the pigs are not grouped together but are standing all over the field.

HYPOTHESIS:

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STORY 2

The hina harvest is near. One day while working in the bush you notice that a few trees have fallen and have cast a shadow over an area of the Hina crop. You also observe that the Hina in the shade are small, and seem to be dying.

HYPOTHESIS:

STORY 3

You notice lately that you have been getting a lot of flies behind your house. Also, a sister has moved in with your family. She has been leaving food scraps uncovered behind the house.

HYPOTHESIS:

STORY 4

An oil spill occurs at Touliki. A few weeks later, while walking through the reef nearby, you notice that the number of sea cucumbers (te'epupulu), clams (fingota), parrot fish (hohomo), and sea anemones (umana) have been greatly reduced.

HYPOTHESIS:

STORY 5

Marks are given out for your Form 4 class after the first term. One day after the class you overhead two teachers talking about the results. One of the teachers is holding a seating chart, which has the names of the students and where they sit in the classroom each day. You notice that students sitting in the back of the classroom did poorly. Students who sat on the side of the classroom near the windows had bad marks, but not as bad as the students who were sitting in the back row. The students who did their best in the first term sat in the first three rows near the teacher.

HYPOTHESIS:

0.2: **Variables in Experiment**

What is a variable?

-   A variable is an object, event, idea, feeling, time period or any other type of category you are trying to measure. There are two types of variables- independent and dependent.

What is an independent variable?

-   The factor or variable that change or alter in the experiment.

What is a dependent variable?

-   The factor that affected when changing the independent variable.

An easy way to remember them is to insert the names of the two variables you are using in this sentence in the way that makes the most sense.
(**Independent variable**) causes a change in (**dependent variable)**.

Example:

(Time spend studying) causes a change in (Test Score).

Exercise 2:

Read each experiment given below and identify the dependent and Independent variable.

1. An experiment is done with pendulums. The frequency (number of swings per minute) of the pendulum is timed using pendulums with lengths of 10cm, 20cm, 40cm and 80cm. The height of the bob (mass hanging from string) remains constant.
Independent variable:
Dependent variable:

2. You decide to experiment with trees. You plant a MANGO tree in your yard and record how high the trees grow after 1,2,3 and 4 months.

Independent variable:_____

Dependent variable: _____

0.3 **Drawing a Best-Fit Line Graph**

-   A best fit line graph show most likely the relationship between the independent and the dependent variables.

A graph helps to:

-   Organise data
-   Show pattern in the result.
-   Show the relationship between the variables.

To draw a Best Fit Line Graph, you must have:

-   Title
-   Label axis
-   Scaling
-   Plotting

Eg. The table below shows some data collected. Use it to draw a graph with the line that best fit.

Day	Temperature ($\circ$C)	Electricity (Kw)
1	28	1000
2	30	1500
3	31	1700
4	32	2000
5	34	2400
6	33	2500

EXERCISE 3:

Draw a Best Fit Line Graph using the data given above.

Trends of a Best-Fit Line Graph
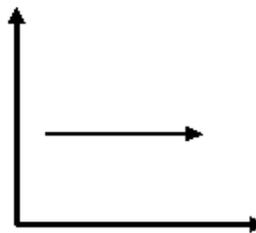- A trend may be seen in a graph when the data goes in one direction.
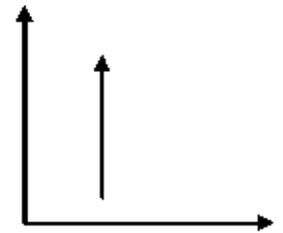
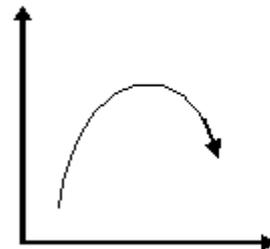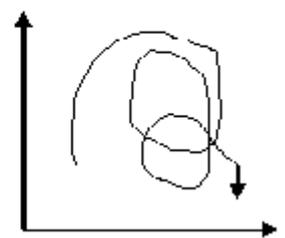a. Upward Trend

b. Downward Trend

c. Horizontal Trend

d. Vertical Trend

e. Curve Trend

f. No Trend