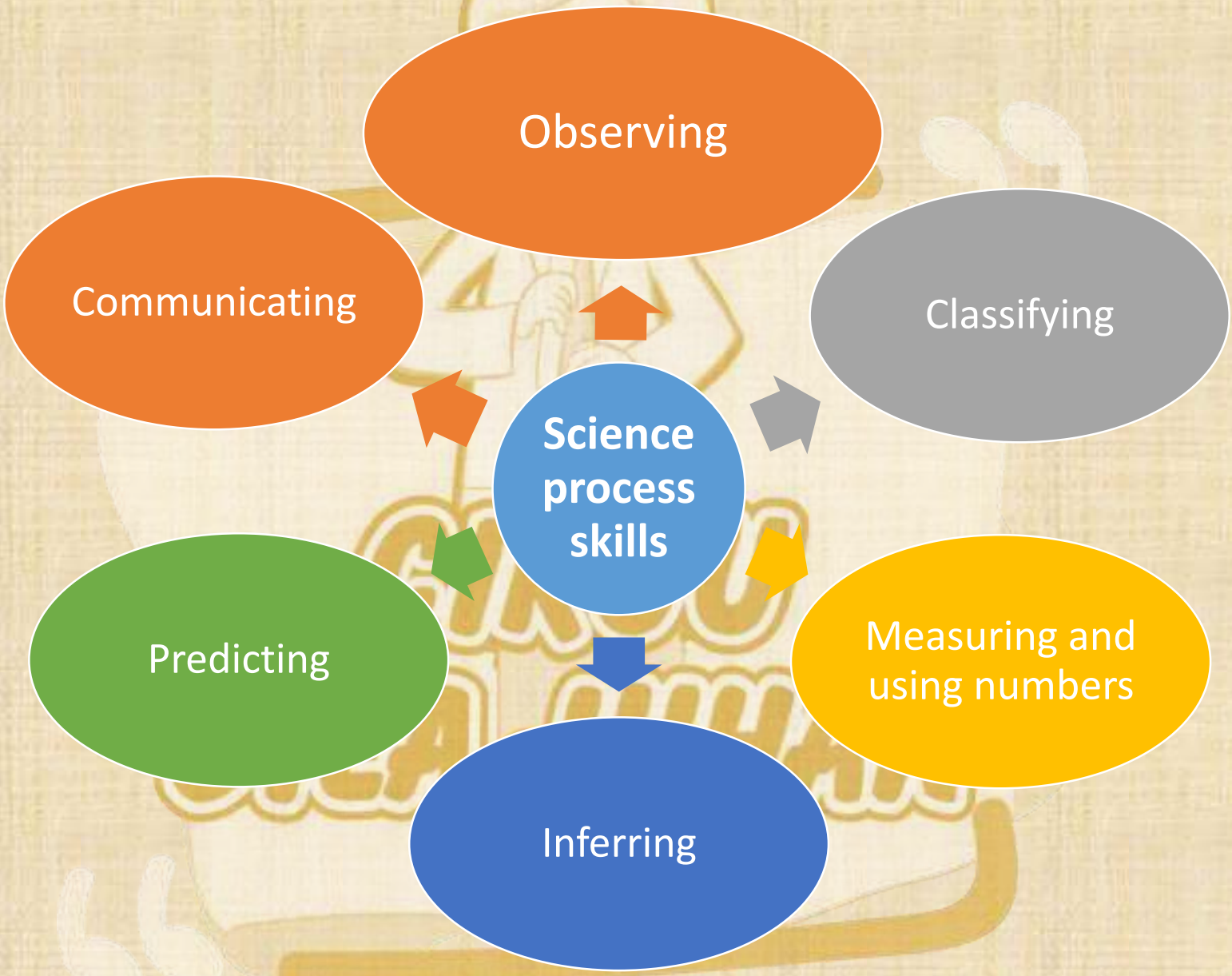
Scientific skills

Science Year 5

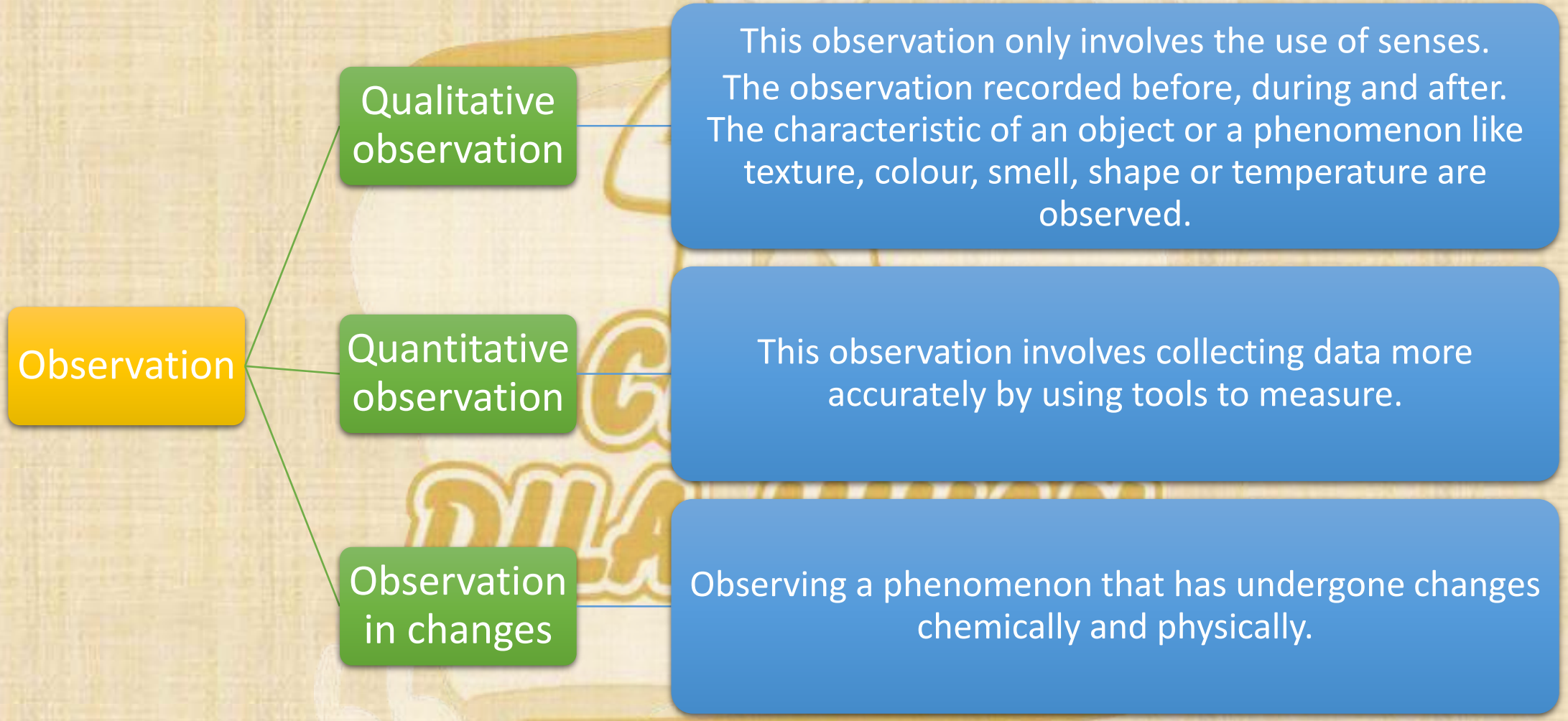
Unit 1

Scientific skills are the skills practiced when conducting an experiment or investigation.

- Science process skills
- Manipulative skills


Observing
Communicating
Classifying
Science process skills
Predicting
Measuring and using numbers
Inferring

Observing


Observation
Qualitative observation
This observation only involves the use of senses.
The observation recorded before, during and after.
The characteristic of an object or a phenomenon like texture, colour, smell, shape or temperature are observed.
Quantitative observation
This observation involves collecting data more accurately by using tools to measure.
Observation in changes
Observing a phenomenon that has undergone changes chemically and physically.

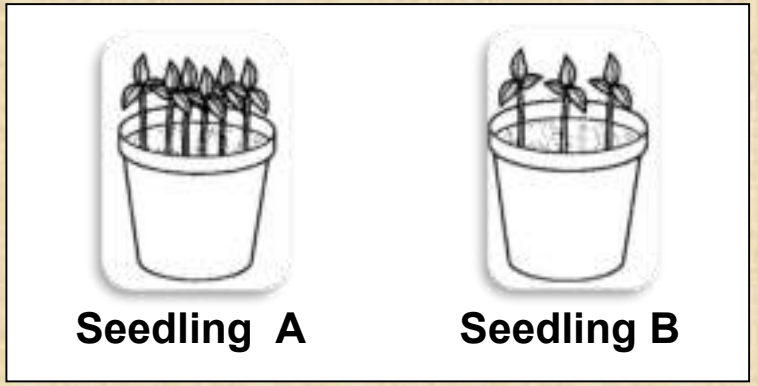
Observation

State what you can observe using 5 sensory organs:

- Eyes –see
- Ears – hear
- Nose – smell
- Tongue – Taste
- Skin - touch

Examples

- **The durian filling is yellow (eyes)**
- **The durian filling tastes sweet (tongue)**
- **The durian smells strong (nose)**
- **The durian has a prickly skin (skin)**



- **Seedling B is taller than seedling A**
- **The leaves of seedling B are larger than the leaves of seedling A**
- **The stem of seedling B is larger than the stem of seedling A**

How to answer observations (Method 1)

(When the MV is 2)

Write the RV , choose the MV and then compare

Animal	The number of eggs produced
	6
	200

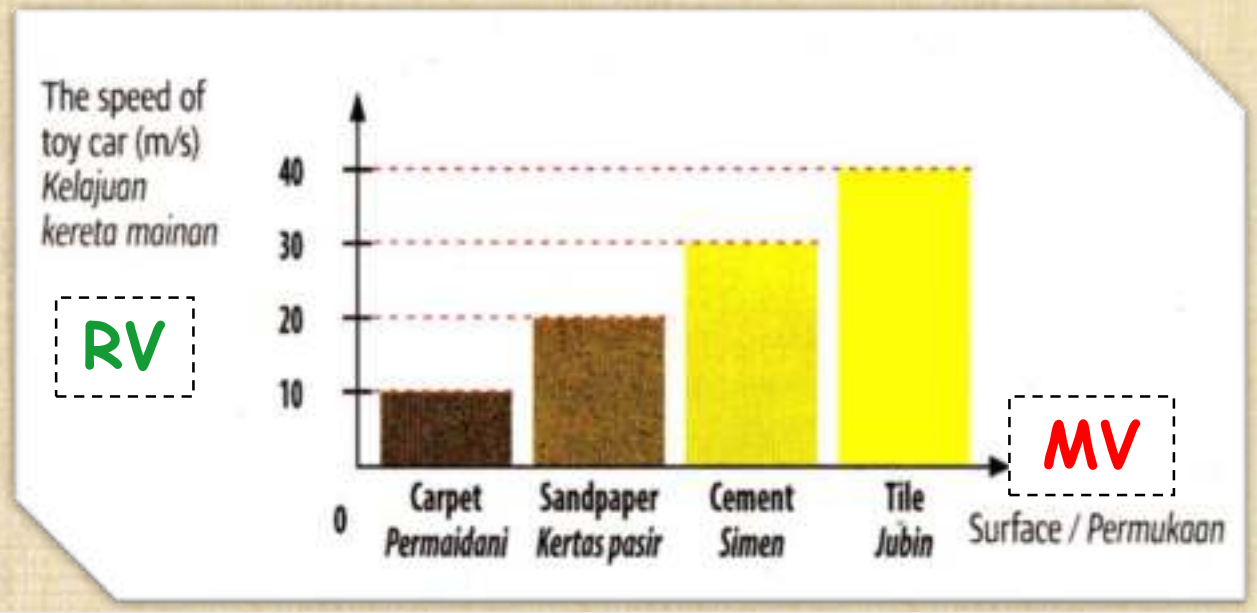
Compare

The number of eggs produced by frogs is more than the ducks
OR
The number of eggs produced by ducks is less than the frogs

How to answer observations (Method 2)

(When the MV is more than 2)

Write the RV choose the highest/lowest MV and then compare



The speed of the toy car on the surface of the tile is higher than on the surface of carpet, sandpaper and cement.

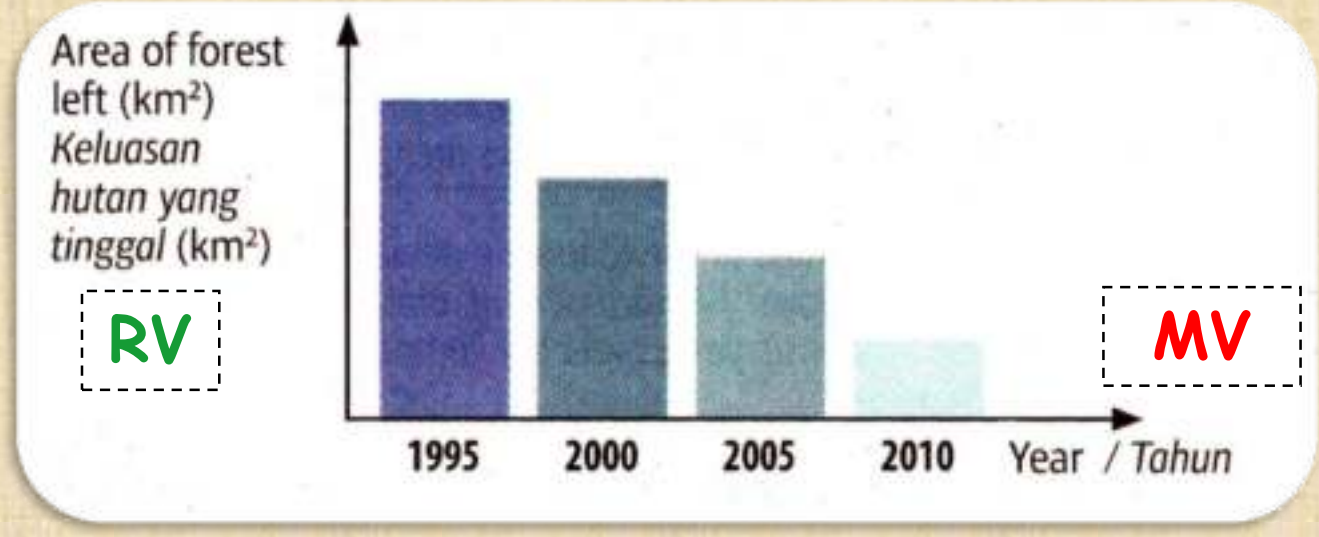
OR

The speed of toy cars on the surface the carpets is lower than on the surface of tiles, sandpaper and cement.

How to answer observations (Method 3)

(When the MV is same)

Write the RV increasing/decreasing



The area of forest left is decreasing
OR
The area of forest left in 2010 is the least compare to the previous year.

Classifying

Gather objects which similar characteristics in the same group.

Example:

Breathing Organs of Animals	
Lungs	Gills
Snake Bird Whale Cat	Shark Prawn Tadpole Crab

Measuring and using numbers

Involves the usage of standard measurement tools

Example:

Quantity	Standard Measuring Tools	Standard Unit
Length	Ruler, measuring tape	Millimetre (mm) Centimetre (cm) Metre (m)
Volume	Beaker, measuring cylinder, conical flask	Mililitre (mL) Litre (L)
Mass	Lever balance, triple beam balance	Miligram (mg) Gram (g) Kilogram (kg)
Time	Stopwatch	Second (s) Minutes (m) Hour (h)
Temperature	Thermometer	Degree Celsius (^{0}C)

Cikgu Dila Juhan

Making Inference

Making an early conclusion about an event based on observations made.

Answering Tips

1. **Identify OBSERVATIONS !!!!!**
2. **Find the reason (cause) of such things happening (observation)**
3. **Compare various logical reasons but the answer must be in the form of comparison.**

How to write the inference

- If the observation has been stated / written in the previous question:
- Because (State the reason)
- If the observation is not stated / written in the previous question:
- (Write the observation first) because (State the reason)

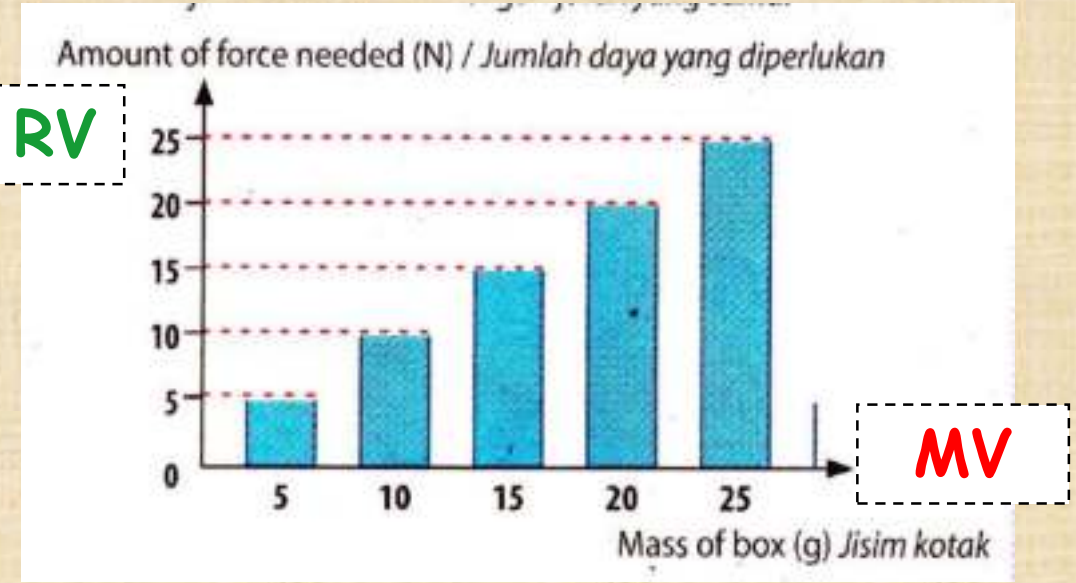
Cikgu Dila Juhan

How to answer an inference (Method 1)

Write observation because (reason) refer to the MV

The bar chart below shows the results of an investigation of the force required to push a box of different masses on the floor at the same distance.

Observation	MV
Inference	RV

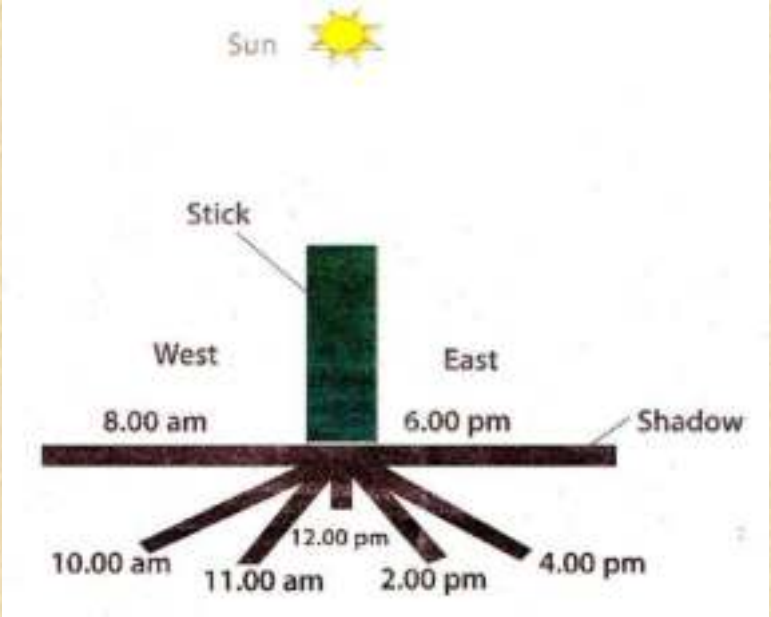


Observation: The amount of force needed to push the box is increases.
Inference: The amount of force needed to push the box is increase because the mass of the box increases.

How to answer an inference (Method 2)

Write observation because (reason) science fact

The diagram below shows the shadows formed under the sunlight

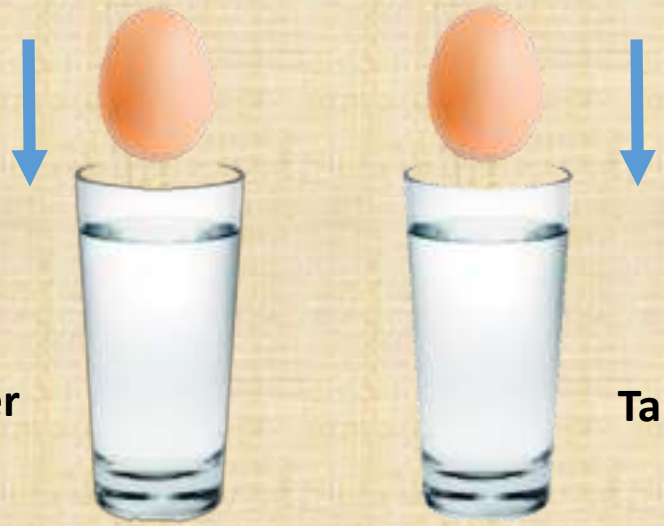


Observation: The length of the shadow at 12 noon is the shortest compared to other times.

Inference: The length of the shadow at 12 noon is the shortest compared to other times because the position of the Sun is upright on the stick.

Practice

Diagram shows two glasses filled with 250 mℓ of different liquids. Then one egg is put into each glass.



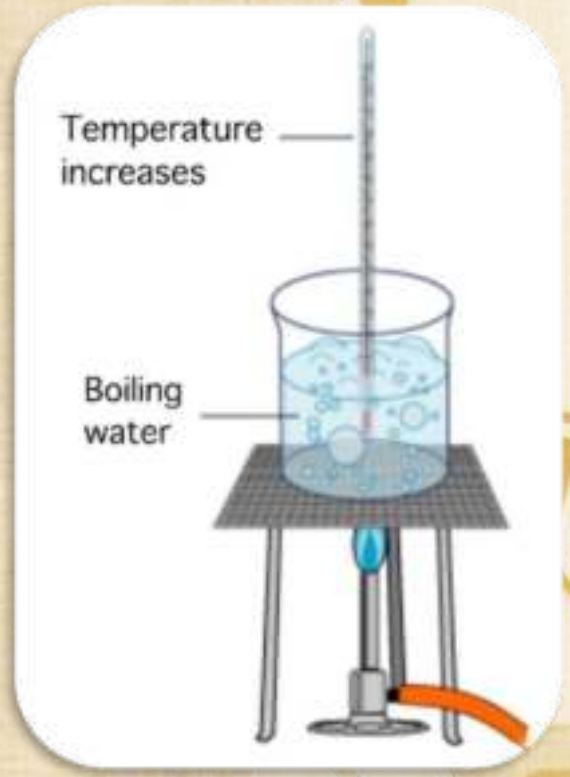
a) Predict what will happen. Draw your result in the space provided.

b) State two inferences based on your observation.

.b) The egg sinks in tap water because the density of the egg is more than the density of tap water.
The egg float in salt water because the density of the egg is less than the density of salt water.

Predicting

Predicting is making an assumption about an event based on observation and past experience or based on data obtained from other investigation.



Based on the diagram, predict what will happen when the water is heated for 30 minutes.

Prediction:
The volume of water inside the beaker reduce.
The boiling water still remain the same at 100 ^{0}C

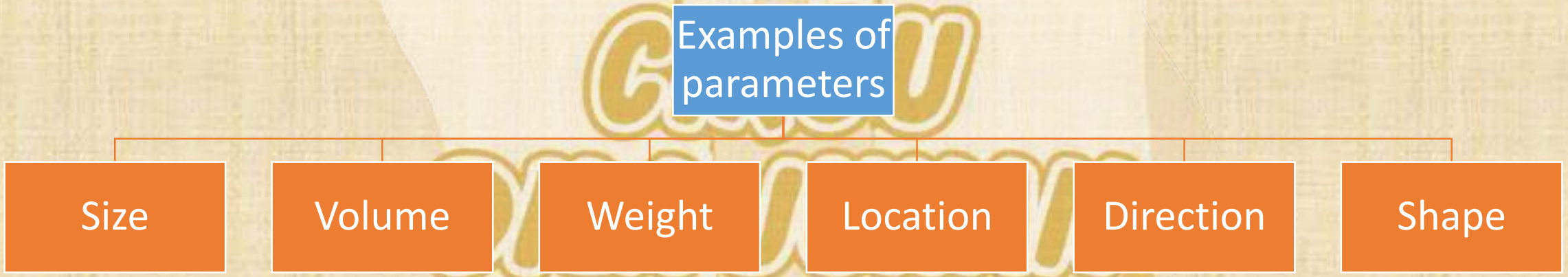
Communicating

Present ideas or information in various forms

verbally → written → graph → diagram → Mind map → formula → model → drawing

Using Space-Time Relationship

Using space-time relationship is a skill that describes changes of situations or phenomena based on the changes in parameters over time.



Using Space-Time Relationship

Relationship between space and time

As time increases, the shape of the ice becomes irregular and it decreases in size

Interpreting Data

Interpreting data is a skill to give rational description about objects, events or patterns from collected data.

Data can be in:

- Table
- Pie chart
- Bar chart
- Classification chart

Defining Operationally

Defining operationally is a skill to define a concept by stating what can be carried out and observed.

Example:

The durability of the soap bubbles can be defined operationally as the time taken for the soap bubbles to burst.

Controlling Variables

Variables are factors that can change in an investigation.

Type of variables

Manipulated variable:

A variables that is change in an investigation.

Constant variable:

Variables that remain constant.

Responding variable:

A variable that is observed in an investigation.

Example: Identify the variables in the investigation below.

The picture below shows two types of vehicles that are used by two men to travel from Penang to Selangor.

Type of vehicle	Time of traveling (hour)
Motorcycle	5
Car	4

Constant variable: The distance travel by the vehicles
Manipulated variable: The type of vehicle
Responding variable: The time of traveling (hour)

Making a Hypothesis

Making a hypothesis is a skill to make a general statement that can be tested about the relationship between the variables in an investigation.

Answer key

- **If the (MV) higher, the (RV) lower**
- **If the (MV) increase, the (RV) decrease (hypothesis text book)**
- **The higher (MV) the lower the (RV)**
- **The bigger (MV) the smaller the (RV)**
- **The longer (MV) the shorter the (RV)**
- **The more (MV) the least the (RV)**
- **The wider (MV) the more the (RV)**
- **When (MV) increase, the (RV) decrease (conclusion text book)**
- **Different (MV) give different (RV)**

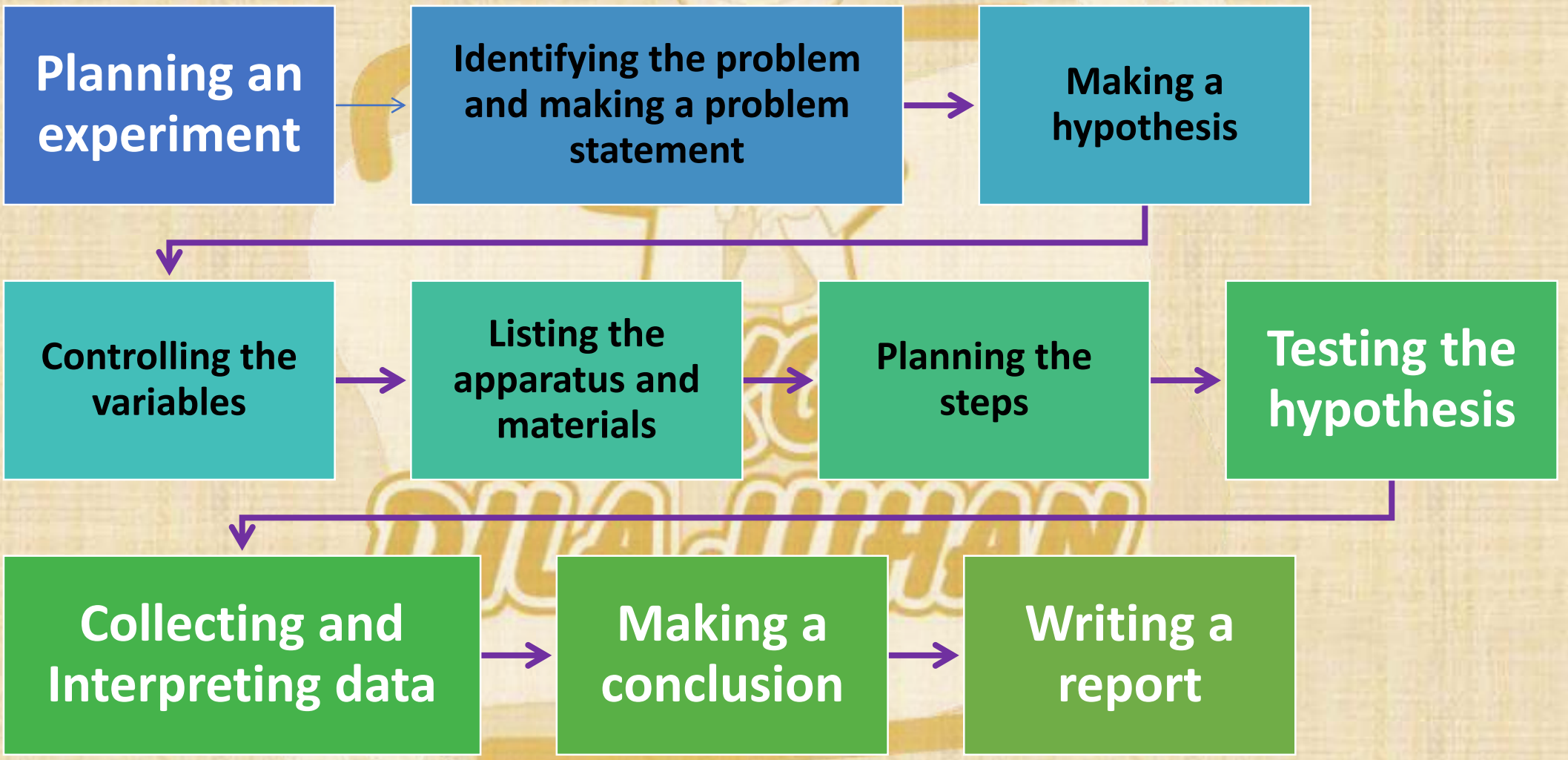
Experimenting

Experimenting is a skill to plan and conduct an investigation to test a hypothesis by collecting and interpreting data to make conclusions from the investigation.

Planning an experiment

- Determine the control variables
- Determine apparatus and materials needed
- Determine method of collecting data
- Determine method of analyzing data

Experimenting



Manipulative skills

Practiced when conducting the experiment

- Using and handling apparatus and material correctly
- Handling specimens correctly and carefully
- Sketching specimen, science apparatus and materials correctly
- Cleaning apparatus and materials correctly
- Storing science apparatus and substance correctly and safely

Science process skills

- Observing
- Classifying
- Measuring and using numbers
- Making inferences
- Predicting
- Communicating

- Using space and time relationship
- Interpreting data
- Defining operationally
- Controlling variables
- Formulating / making hypothesis
- Experimenting