

FORM 2 SCIENCE 2022

STRANDS	SUB-STRANDS
8.0: SCIENCE SKILLS	<ul style="list-style-type: none">• Laboratory Safety/ Equipment• Science Skills
8.1: LIVING WORLD	<ul style="list-style-type: none">• Cell• Disease• Micro- organisms• Plant in Tonga• Animal in Tonga• Respiratory System• Digestive System
8.2: PHYSICAL WORLD	<ul style="list-style-type: none">• Energy• Force
8.3: MATERIAL WORLD	<ul style="list-style-type: none">• Mass• Volume• Density• Physical and Chemical change
8.4: PLANET EARTH AND BEYOND	<ul style="list-style-type: none">• Moon• Tide• Stars• Soil

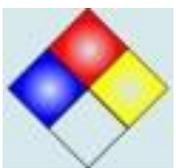
UNIT 8.0: LABORATORY SAFETY, EQUIPMENT AND SCIENCE SKILLS

Major Learning outcome for UNIT 8.0:

After this UNIT students should be able to:

- I. Explain some laboratory safety rules.
- II. Identify and properly manipulate the lab equipment they are going to use.
- III. Demonstrate and apply some important scientific skills.

PART 1: LABORATORY SAFETY SYMBOLS

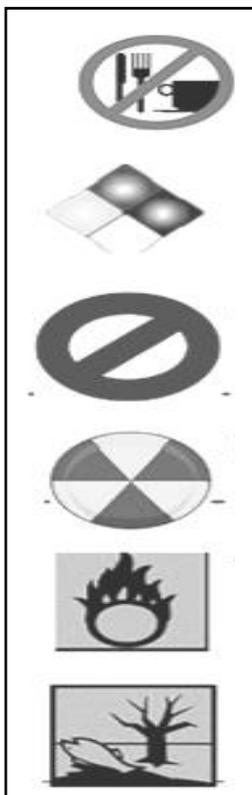
<p>First Aid Kit (Naunau Faito'o)</p> 	<p>Fire Extinguisher (Hina tamate afi)</p> 	<p>Flammable Sign (Me'a fakatupu vela)</p> 	<p>Electrical Hazard (Fakatu'utāmaki faka-'uhila)</p> 
<p>Corrosive Materials (Huhu'a te ne keikeina e sino)</p> 	<p>Toxic Materials Sign (Ngaahi me'a kona)</p> 	<p>Recycling Sign (Ngaahi Me'a ke toe faka-'aonga'i)</p> 	<p>Toxic Chemical (Kemikale kona)</p> 
<p>No open flames (tapu ha afi pē)</p> 	<p>Environment Hazard (fakatu'utāmaki ki he 'ātakai)</p> 	<p>Biohazard Sign (fakatu'utāmaki ki ha me'a mo'ui)</p> 	<p>Explosive Materials (Ngaahi me'a 'oku pahū-ngofua)</p> 
<p>Radioactive Sign (Ngaahi me'a faka'atomi)</p> 	<p>Chemistry Hazard (fakatu'utāmaki faka - kemikale)</p> 	<p>Non-potable water (Vai 'ikai fe'unga ki he inu)</p> 	<p>Combustible Materials (Ngaahi me'a 'oku vela ngofua)</p> 
<p>Prohibition sign (faka'ilonga tapu)</p> 		<p>No eating & drinking sign (Tapu kai & inu)</p> 	

ACTIVITY 1 : Laboratory Safety Symbols.

A. Write each letter in COLUMN B in front of its correct match in COLUMN A.

COLUMN A		COLUMN B	
	Toxic Chemical	(A)	
	Explosive Materials	(B)	
	First Aid Kit	(C)	
	No open flames	(D)	
	Biohazard Sign	(E)	

B. Name the following Laboratory Safety Symbols



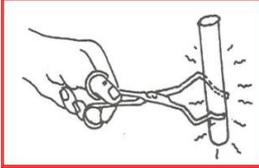
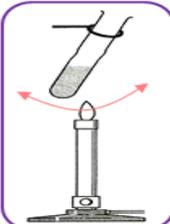
PART 2: LABORATORY SAFETY RULES

General Laboratory Safety Rules:

1).	Do not enter the lab (laboratory) without the teacher's permission	
2)	Bare feet are not allowed in the laboratory at all time. Always wear proper shoes in the laboratory	
3).	Never carry out activities or experiments that are not permitted by your teacher.	
4).	Read and follow exactly the directions for an activity or experiment. If in doubt, ask the teacher.	
5).	Do not touch or handle any equipment in the laboratory without the teacher's supervision.	
6).	Be careful not to spill any materials in the lab. If a spill occurs, inform your teacher immediately.	
7).	If you spill (hua'i) any chemicals on yourself, wash it off immediately under running water. Let the teacher know right away.	

8).	NO eating or drinking or chewing gum is allowed in the laboratory at all time.	
9).	Dispose (<i>hiko mo fakama'a</i>) of all material according to the teacher's instructions. Never empty materials into the sink or trash can.	
10).	Playing or running is not allowed in the lab at any time.	
11).	Wash your hands before and after each experiment.	

Heating and Fire Safety:

12).	When doing an experiment, do not heat any container which is more than half filled.	
13).	Always use a clamp or tongs when handling hot containers.	
14).	Always be careful with fire. Open flame must be kept well away from flammable material.	
15).	When heating substances in a test tube, move the tube back and forth over the flame, and also point it away from you and others.	

Chemical Safety:

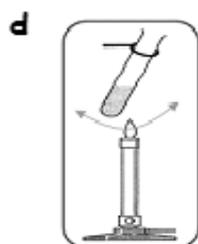
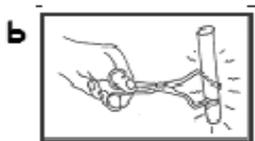
- 16) Never touch, taste, or smell, any questionable (*fakaveiveiua*) chemicals in the laboratory without the teacher's permission.
- 17) Only as instructed by the teacher, gently wave your hand over the opening of a container toward your nose. Do not inhale fumes directly from the container.
- 18) Keep all lids to chemicals closed.
- 19) Dispose of all chemicals as instructed by your teacher.
- 20) Never eat or drink from any laboratory glassware.



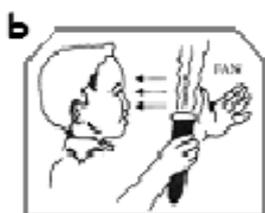
ACTIVITY 2: LABORATORY SAFETY RULES

1. Describe the **laboratory rules** associated with each symbol.

i. HEATING AND FIRE SAFETY:



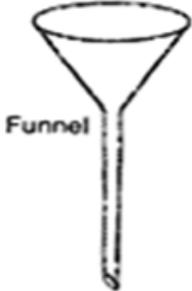
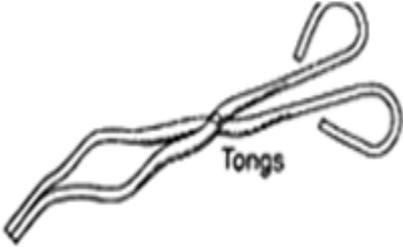
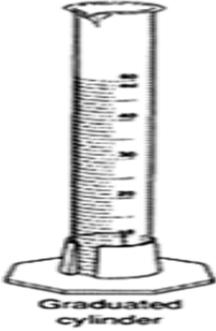
ii. CHEMICAL SAFETY

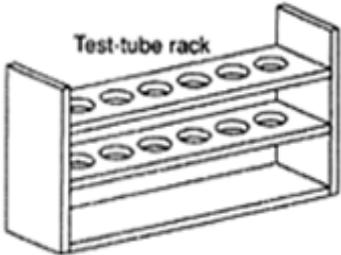


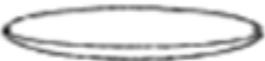
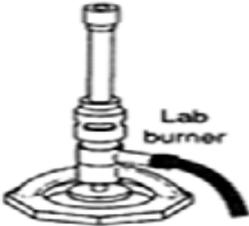
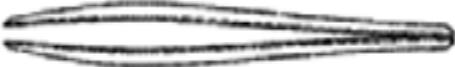
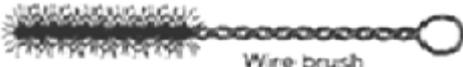
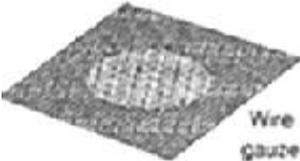
iii. GENERAL LABORATORY SAFETY RULES.

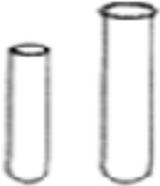


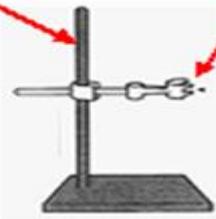
PART 3: LABORATORY EQUIPMENTS

EQUIPMENT	NAME OF EQUIPMENT	FUNCTION
 <p>Thermomete</p>	THERMOMETRE	<ul style="list-style-type: none"> - Measure temperature or how cold or hot something is.
 <p>Funnel</p>	FUNNEL	<ul style="list-style-type: none"> - A funnel is used to transfer liquids from one container to another without spilling.
 <p>Tongs</p>	TONGS	<ul style="list-style-type: none"> - Hold heated objects in the lab
 <p>Graduated cylinder</p>	GRADUATED CYLINDER	<ul style="list-style-type: none"> - Measure accurate volume of liquid. Graduated cylinder and a measuring cylinder can accurately measure volume than beaker.

 <p>Test-tube rack</p>	<p>TEST TUBE RACK</p>	<ul style="list-style-type: none"> - Handling test tubes or for test tubes storage.
 <p>Wash bottle</p>	<p>WASH BOTTLE</p>	<ul style="list-style-type: none"> - Rinse laboratory glassware such as beakers, test-tube etc.
 <p>Spatula</p>	<p>SPATULA</p>	<ul style="list-style-type: none"> - Use to take small quantities of solid chemicals or powder.
 <p>Mortar and pestle</p>	<p>MORTAR AND PESTLE</p>	<ul style="list-style-type: none"> - Grind and mix substances. / crush solid substances into powder.
 <p>Crucible and cover</p>	<p>CRUCIBLE</p>	<ul style="list-style-type: none"> - Hold substances for heating. The container can withstand very high temperature.

 <p>Watch glass</p>	<p>WATCH GLASS</p>	<ul style="list-style-type: none"> - Concave dishes that can be used to hold solid while weighing,
 <p>Erlenmeyer flask</p>	<p>ERLENMEYER FLASK</p>	<ul style="list-style-type: none"> - Measure, mix and store liquids. It has less chance of spilling than a beaker.
 <p>Lab burner</p>	<p>BUNSEN BURNER</p>	<ul style="list-style-type: none"> - Heating in the laboratory.
 <p>Forceps</p>	<p>FORCEPS</p>	<ul style="list-style-type: none"> - Pick up small items.
 <p>Wire brush</p>	<p>WIRE BRUSH</p>	<ul style="list-style-type: none"> - Cleaning equipment
 <p>Wire gauze</p>	<p>GAUZE WIRE</p>	<ul style="list-style-type: none"> - Support containers during heating.
 <p>Safety goggles</p>	<p>SAFETY GOGGLES</p>	<ul style="list-style-type: none"> - Protect the eyes from splashes of chemicals, dust etc in the lab.

 <p>Evaporating dish</p>	<p>EVAPORATING DISH</p>	<ul style="list-style-type: none"> - To evaporate excess water from a solid.
 <p>Beaker</p>	<p>BEAKER</p>	<ul style="list-style-type: none"> - Hold liquid or solution and can also be a container used to heat liquid or solution.
 <p>Test tubes</p>	<p>TEST TUBE</p>	<ul style="list-style-type: none"> - Mix or heat small quantities of solid or liquids.
 <p>Dropper</p>	<p>DROPPER</p>	<ul style="list-style-type: none"> - Distribute or used to add small amount of liquid
 <p>Test tube holder</p>	<p>TEST TUBE HOLDER</p>	<ul style="list-style-type: none"> - Hold the test tube when it is hot.

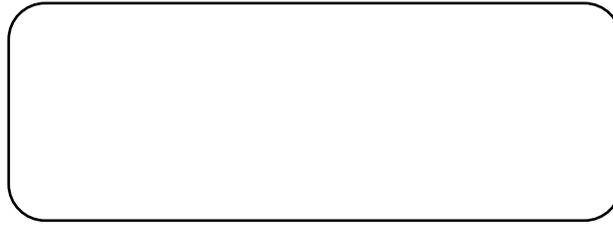
<p style="text-align: center;">Tripod</p> 	<p>TRIPOD</p>	<ul style="list-style-type: none"> - Hold heated container above the flame.
<p style="text-align: center;">Stirring rod</p> 	<p>STIRRING ROD</p>	<ul style="list-style-type: none"> - Stir liquid in a container
<p style="text-align: center;">Retort stand and clamp</p> 	<p>RETORT STAND AND CLAMP</p>	<ul style="list-style-type: none"> - Hold burettes, test tubes, or pipettes during experiment.
<p style="text-align: center;">Conical flask</p> 	<p>CONICAL FLASK</p>	<ul style="list-style-type: none"> - Hold liquid or solution and can also be a container used to heat liquid or solution. The narrowed neck makes it different from a beaker so that solution will not spilled.
<p style="text-align: center;">Spirit burner</p> 	<p>SPIRIT BURNER</p>	<ul style="list-style-type: none"> - Use for heating in the labs.

ACTIVITY 3: LABORATORY EQUIPMENTS

a) *Complete these by writing the missing name, drawing of the equipment and describe the usage of each piece of equipment.*

<p style="text-align: center;">Stirring rod</p> <div style="border: 1px solid black; border-radius: 15px; height: 60px; width: 100%;"></div> <p>Use: _____ _____ _____</p>
<p style="text-align: center;">Equipment Name: _____</p> <div style="border: 1px solid black; border-radius: 15px; height: 60px; width: 100%;"></div> <p>Use: Hold heated objects in the lab.</p>
<p style="text-align: center;">Equipment Name: _____</p> <div style="border: 1px solid black; border-radius: 15px; height: 60px; width: 100%; text-align: center;"></div> <p>Use: _____ _____ _____</p>

Tripod



Use: _____

Equipment Name: _____



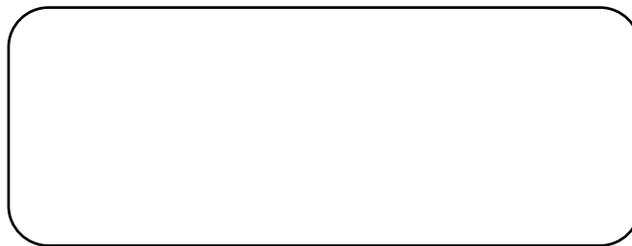
Use: Distribute or used to add small amount of liquid.

Gauze Mat



Use: _____

Equipment Name: _____



Use: Heating in the Laboratory

SCIENCE METHODS

- Scientific method is a step by step method of solving problems.

TITLE: A statement describing or defining the problem to be investigated.

AIM: Usually, this is a statement (*hypothesis*) to check whether the problem investigated is correct or not. 'eg, to see if light is needed for plant growth.

MATERIALS: Tools or equipment required for the experiment.

METHOD: It is a step-by-step way or procedure of doing the experiment or investigation.

RESULT: This includes all the observations during the experiment. It includes diagrams, tables, graphs and data.

CONCLUSION: It is an explanation mainly to verify the AIM and that verification is devised from the observation and results obtained.

FAIR TEST OR CONTROLLED EXPERIMENT

- This is an experiment where all the variables are alike (keep constant) except the variable or the condition being tested.
- Only one variable is tested at a time.

Example:

- If we will find out if the ***amount of water is needed for the growth of plants.***
- All the other variables will be kept constant such as the amount of light, amount of soil, the size of the container so that they will not affect the result.
- The condition being tested is the "amount of water"

VARIABLE: the condition or the variable being tested eg, amount of water.

EXPERIMENTAL GROUP: is exposed to the variable tested. Ie water

CONTROL GROUP: raised under normal conditions without the variable, i.e without water.

- The 'control' is used to compare the results whether with or without the variable being tested will affect the result of the experiment.
- If it will affect the result of the experiment then we can conclude that water is needed for plant growth. If there will be no effect of water on the growth of plants than we can conclude that water is NOT needed for plant growth

INDENDENT VARIABLE: variables that do not depend on each other such as height of students and their names.

DEPENDENT VARIABLE: variables that depend on each other. Eg, amount of water and the height of plants.