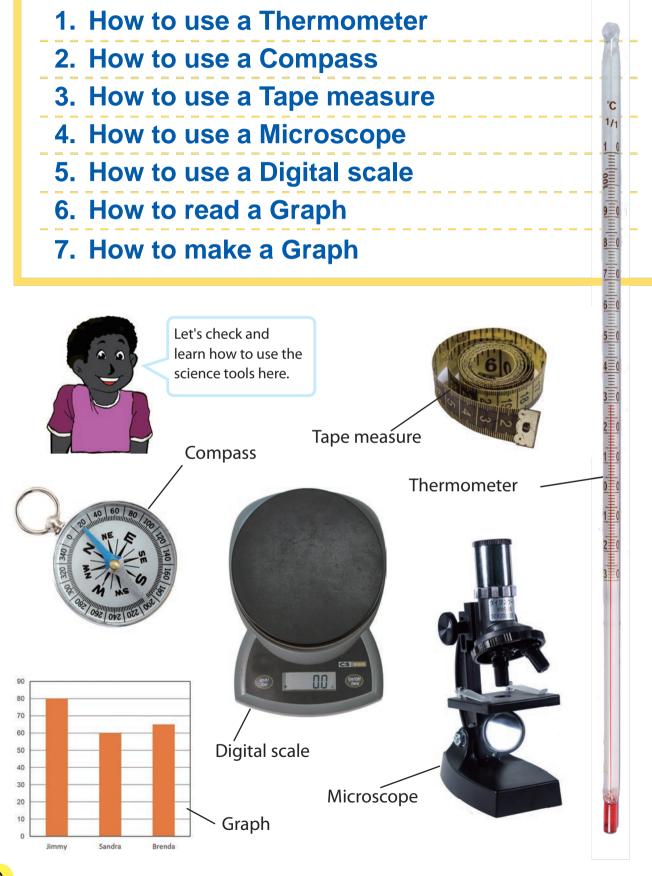
Science Tool Box



How to use a Thermometer

1. What is a thermometer?

A thermometer is an instrument used to measure temperature. A thermometer consists of a glass tube with marks on it. When the liquid in the glass tube is heated, it expands and begins to rise up the tube. Temperature is measured in degree Celsius [°C].



2. Measuring temperature

STEP 1:

Place the bulb in the place where you want to measure the temperature. Make sure that there are no bright lights or direct sunlight shining on the bulb.

Thermometer

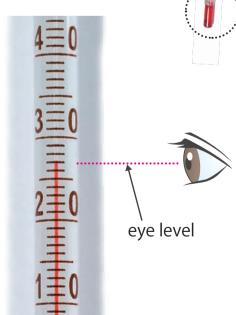
bulb

STEP 2:

Wait for a few minutes until the liquid in the tube stops moving. Position your eyes at the same level with the top of the liquid in the tube.

STEP 3:

Read the scale line that is closest to the top of the liquid. The thermometer as shown on the right shows 27 °C.



How to use a Compass

1. What is a compass?

A compass is an instrument you use for finding directions (North, South, East and West). It has a dial and a magnetic needle that always points to the north/south. This helps you to locate your position on a map and to set the direction you wish to travel.



Compass

2. Finding directions

STEP 1:

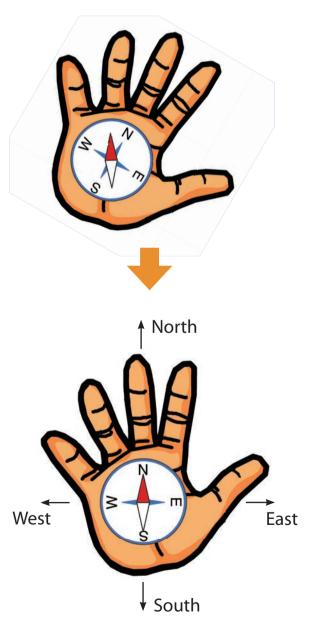
When you want to face North, place the compass flat on your palm and hold your palm in front of your chest as shown in the picture on the right.

STEP 2:

Turn your body until the magnetic needle comes to the North sign on the dial. When the needle overlaps the North sign on the dial, you are facing North.

STEP 3:

Find other directions when you are facing North. Your right side points to East and left side points to West, and your back is facing the South when you are facing North.



How to use a Tape measure

1. What is a Tape Measure?

A tape measure is also called a measuring tape. It is a type of flexible ruler. Tape measures may be in metric (centimetres and metres) and imperial units (Inches and feet).



2. Finding the circumference around your partners head

STEP 1:

Have your partner to stand in front of you with head up straight.

STEP 2:

Hold on one end of the tape that begins with 0 and wrap the tape around your partner's head just above the top of the ears.



STEP 3:

Find the line where the tape measure begins to wrap over itself or the end of the length of the object.

STEP 4:

Record the circumference of your partner's head to the nearest centimetre.



How to use a Microscope

1. What is a Microscope?

A **microscope** is a scientific equipment that is used to see small things that cannot be seen with naked eye. Most **microscopes** use lens, which are pieces of glass or plastic, to magnify objects.

A microscope breaks easily and has to be handled with care. Keep lens clear and avoid touching. Cover the microscope when not in use.

2. Observe some sugar grains

STEP 1:

Move the mirror towards a source of light. Avoid using the sun as a light source.

STEP 2:

Put a few grains of sugar on the slide. Then put the slide containing the sugar grains on the stage of the microscope.

STEP 3:

Look through the eyepiece. Turn the adjustment knob on the side of the microscope to bring the sugar grains to focus.

STEP 4:

To increase the magnification, use the longer lens. To decrease the magnification, use the shorter lens.



How to use a Digital Scale

1. What is a Digital Scale?

A digital scale is an electrical or solar device used to measure the weight of an object or substances precisely. It consists of a platform to place the object on, a liquid crystal display (LCD) that shows the reading (weight) of the object and the switch on or off button.

Liquid Crystal Display (LCD)

Platform



2. Measuring Weight

STEP 1:

Turn your digital scale on and wait until the reading is set to 0.0 g



STEP 2:

Place whatever needs to be weighed on the scale gently. Observe the display screen on the scale. Make sure to keep the contents steady until it stops at a certain reading.



STEP 3:

Read the measurement on the scale according to the unit given, for example in grams. The weight of the object on the scale would read as 107.0 grams.



How to read and make a Bar Graph

1. What is a Bar Graph?

A bar graph helps to compare data by using bar to represent numbers. In 2.1, it shows how to read a bar graph. In 2.2, it shows how to make a bar graph to compare the weight of three students.

2.1 Reading a Bar Graph

STEP 1:

Read the title of the bar. What is the bar graph about?

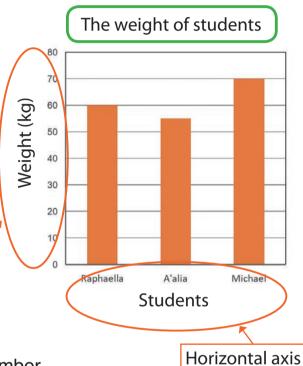
STEP 2:

Study the bottom part of the graph called the horizontal axis labeled 'Student' that shows the name of students; Michael, Raphaella and A'alia.

Vertical axis

STEP 3:

(1) Study the numbers on the left side of the graph called the vertical axis labeled 'Weight'. The number represents the weight in kilograms.



(2) The highest represented number is 80 kg. Between any two numbers example between 30 and 40 the interval amount is 10 kg.

STEP 4:

- (1) Study the bar graph. Look at the bar labeled as 'Raphaella' and move across to the vertical axis to identify the weight in numbers. The bar shows that the weight of Raphaella is 60 kg.
- (2) Read the question asked. Example: Which student is the heaviest? Compare all the heights of the bars. Follow the highest bar down to identify the name of the student on the horizontal axis. Michael is the heaviest among the students and his weight is 70 kg.

2.2 Making a Bar Graph

Jimmy weighs 80 kg, Sandra weighs 60 kg and Brenda weighs 65 kg. The table shows their weight in kilograms. Use the data in the table to make a bar graph showing their weights.

Student	Weight (kg)
Jimmy	80
Sandra	60
Brenda	65

STEP 1:

Title the graph. The title should help the reader understand what the graph describes.

STEP 2:

Choose a scale and mark equal intervals. The vertical scale should include the least value and the greatest value in the set of data.

STEP 3:

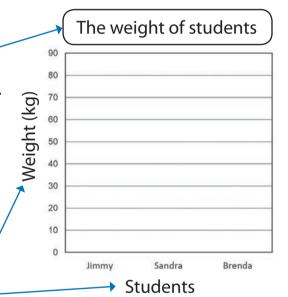
Label the vertical axis 'Weight' (kg) and horizontal axis 'Students'. Space the students' names equally.

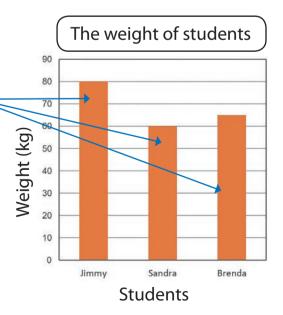
STEP 4:

Carefully draw the graph using the data. Depending on the interval you choose, some weights may appear between numbers.

STEP 5:

Check each step to make sure that the data in the table matches the bars you have made with the correct weights.





Answer of Exercise

Chapter 1. Topic 1. Page 20

Q1. (1) omnivore (2) prey (3) ecosystem (4) decomposers

Q2. (1) A (2) B

Q3. (1)

Producer	Consumer
Tomato, seaweed	Frog ,butterfly,
hibiscus	snake

(2) Different plants and animals live in different environments.

Q4. (Expected answers) Because there are decomposers that break down dead plants and animals in smaller pieces and also they decay into the ground.

Chapter 2. Topic 1. Page 34

Q1. (1) weathering (2) wind (3) landslide (4) earthquake

Q2. (1) B (2) D

Q3. (Expected answers) (1) Wind, water, ice, chemical and living things (2) Acid rain weakens the rock wall causing it to break down.

Q4. (Expected answers) 1) Shape of the mountain would change. 2) A new mountain would be formed. 3) A large bowl-shaped hole would be formed in the ground. 4) A large-shaped lake would be formed

Chapter 2. Topic 2. Page 42

Q1. (1) strata (2) sedimentary (3) flowing

Q2. (1) C (2) C

Q3. Deposition

Q4. (1) (Expected answer) Because the weight of sediments at the top part

presses the sediments at the bottom and the pressure forces turns the sediments at the bottom into sedimentary rocks.

(2) (Expected answer) Sedimentary rocks can be classified based on what they are made of.

Chapter 3. Topic 1. Page 54

Q1. (1) frictional (2) magnetic (3) gravity

Q2. (1) A (2) B

Q3. (1) Spring balance (2) newton (N) (3) (Expected answer)The difference between the two is that contact force is when two objects are physically touching each other. Whereas noncontact force is when two objects are not in contact with each other but act through the space between them.

Q4.



(The length of the arrow should be 3 cm.)

Chapter 4. Topic 1. Page 64

Q1. (1) leaves (2) tubes (3) transpiration

Q2. (1) B (2) C

Q3. (Expected answers)There are tubes through which water passes in the stem of plant to all its parts.

Q4. (Expected answers) The plant with no leaves does not release water vapur into the air. Therefore, there were no water vapour in the plastic bag and water droplets were not observed in the plastic bag.

Chapter 5. Topic 1. Page 78

- Q1. (1) stamen (2) stigma (3) fruits (4) traits
- Q2. (1) D (2) C
- Q3. (Expected answers) wind, insect and animals
- Q4. (Expected answers) The ovule in the ovary develops into the seed. As the seed in the ovary develop, it gets bigger and bigger and changes into a fruit.

Chapter 6. Topic 1. Page 90

- Q1.(1) star (2) temperature (3) east, west (4) agriculture
- Q2. (1) D (2) A
- Q3. (1) southern cross (2) The blue star has the higher temperature.
- Q4. This occurs as a result of the Earth's spinning on its axis.

Chapter 7. Topic 1. Page 104

- Q1. (1) gravitational potential (2) kinetic (3) chemical
- Q2. (1) A (2) B
- Q3. (1) The amount of kinetic energy depends on the Speed of an object.
 - (2) The book that is on top of the table.
- Q4. (Expected answer) Ketsin observed kinetic energy in the wind (moving air) and gravitational potential energy in the coconut when it was attached to the tree and kinetic energy when the coconut fell of the tree.

Chapter 7. Topic 2. Page 110

Q1. (1) electric (2) kinetic (3) electrical

- Q2. A
- Q3. (1) (i) because it is the highest point
 (2) (iii) because it is the lowest point.
 (3) Kinetic energy of the ball increases during the fall.
- Q4.(Expected answer) Jonathan used great effort to pedal uphill because he was riding upwards against the force of gravity and was slowing down in speed the further he went uphill.

Chapter 8. Topic 1. Page 120

- Q1. (1) orbit (2) Revolution (3) phase (4) moon
- Q2. (1) D (2) C
- Q3. (i) (ii) (iii)
- Q4. (Expected answer) The phase of the moon at this time would be new moon because the shadow part of the Moon is facing the Earth.

Chapter 9. Topic 1. Page 134

- Q1. (1) electromagnet (2) magnet (3) electric current (4) rolls
- Q2. (1) A (2) C
- Q3. (1) Increases amount of electric current and number of rolls in the coil.(2) Cranes for heavy lifting, speaker, motor, etc.
- Q4. (Expected answer) He will turn on the electromagnet to lift up the metal to transfer to another place then release the metal by switching off the electromagnet.

Answer of Exercise

Chapter 10. Topic 1. Page 144

- Q1. (1) breathing (2) organ (3) respiratory (4) diaphragm
- Q2. (1) D (2) C
- Q3. (Expected answer) Lungs get bigger as diaphragm contracts and air come into our lungs as we inhale. Lungs get smaller as diaphragm relaxes and air is forced out of our lungs as we exhale.
- Q4. (Expected answer) When we breathe in, we take air into our body through our nose. The air moves into our trachea, which connects the throat to the lungs. In the chest, the trachea divides into two tubes and each of these tubes leads to one of your two lungs.

Chapter 10. Topic 2. Page 152

- Q1. (1) Heart (2) Chambers (3) Blood vessels (4) Haemoglobin
- Q2. (1) C (2) A
- Q3. (1) Platelets (2) Circulatory system is a group of organs for transporting oxygen and carbon dioxide to and from cells in our body.
- Q4. (Expected answer) The cells in her body requires oxygen so she breathes fast to take in more oxygen and heart beats quickly to send oxygen throughout her body.

Chapter 11. Topic 1. Page 166

Q1. (1) mixture (2) liquid (3) evaporation Q2. (1) B (2) C

- Q3. She should use (ii) which is the evaporation method.
- Q4. (Expected answer) Some particles of mud in the mud water are so small that they can pass through the filter. That is why the filter cannot stop all the particles of mud and the liquid after passing through the filter still contains particles of mud.

Chapter 11. Topic 2. Page 176

- Q1. (1) solution (2) properties (3) small (4) sum
- Q2. (1) B (2) B
- Q3. (1) Grains of the sand can be seen while particles of salt cannot be seen.
 - (2) Temperature of water and amount of water.
- Q4. (Expected answer) The weight of the substances does not change when it is dissolved in water.

Glossary

Anther is the male reproductive part that produces and stores pollen grains. 70
Artery is the blood vessel that carries blood away from the heart 148
Atrium is a heart chamber that receives blood from the body or the lungs.
Axis is an imaginary line at which a body rotates
Aveoli are the millions of tiny balloon-like air sacs in the lungs
Bacteria are single – celled organisms that are not a plant or an animal. 18
Blood vessels are tubes that the blood flows through to get to the different
parts of our body 148
Breathing is the process of taking air in and out of the body
Capillaries are the smaller and tiny vessels that connects the arteries
and veins 148
Carnivore is an animal that eats only animals
Cell is the basic structure that makes up all living things 148
Chambers are the spaces consist two atriums and two ventricles
of the heart 146
Chemical energy are energy stored in foods, batteries and fuels 100
Circulatory system is a network of organs that transport oxygen and
nutrients to and carbon dioxide from the cells
throughout our body
Constellation is a group of stars that form a particular pattern
Consumers are animals that consume other plants and animals
in a food chain
Contact forces are forces that take place when two objects are physically
interacting with each other by touching
Decomposer are organisms that break down dead animals and plants.
Deposition is the dropping of sediments moved by water, wind and ice. 30
Diaphragm are is a muscle that helps to makes our lungs larger and
smaller as we breathe air in and out

Glossary

Direction is the way or path something moves
Dissolve is to become broken up or absorbed by a liquid until it cannot be
seen to form a mixture 168
Earthquake is a sudden of movement of Earth's surface often causing
severe damage 32
Ecosystem is a community of living things and non-living thing interacting
together to support each other
<i>Electromagnet</i> is a type of magnet in which magnetic field is produced by
an electric current flowing a coil
<i>Erosion</i> Is the movement of sediments from one place to another caused
by wind, running water etc
Evaporation method is a way for separating a solid from a liquid in
a mixture by evaporating the liquid substance 164
Fertilisation is the joining of the male reproductive cell and the egg cell. 74
<i>Filament</i> is the stalk that holds up the anther
Filtration is the method for separating a solid from a liquid by
using a filter 162
Food chain the path of food energy from plants to animals11
Gravitational potential energy is the energy stored in an object depending
on its height from the ground 98
Gravity is a non-contact force that attracts objects towards each other. 50
Haemoglobin are the red colour particles that are contained in the
red blood cells to carry oxygen 150
Heart are is a muscle about the size of our fist that is located within our rib
cage to the left of the chest
Herbivore is an animal that eats only plants
Heredity is the process through which traits are passed on from parents
to young organisms 76
Kinetic energy is the energy of a moving object
Landslide is the rapid downhill movement of large amount of
rock and soil 32

Lungs are the main organs of the respiratory system in most animals
living on land
Magnitude of force is the amount of force. 52
Mass is a measurement of the amount of matter in an object
Microscope is an instrument that is used to observe very small things
that cannot be seen with our naked eyes 147
Mixture is a matter that is made up of two or more substances that are
combined physically 158
Moon phases is the changes in the amount of the lit areas of the moon
that can be seen from the earth
Newton (N) is the unit of force. 51
Non-contact forces are forces that take place when two objects are not
in contact with each other but act through the space
between them48
Omnivore is an animal that eats both plants and animals
Orbit is an orbit is a path that an object takes in space around
another object 116
Organ is a part of the body that has a specific form and function 140
Ovary is the female reproductive part that produces and contains
the eggs 70
Ovule is the structure that gives rise to and contains the female
reproductive cells
Pistil is the female reproductive part of a flower
Plasma is the component of blood which is consist of liquid
<i>Platelets</i> are tiny cells of blood that help blood clot in order to stop bleeding,
to heal cuts and other injuries 150
Point of application is the location at which a force is applied
to an object52
Pollen grains are microscopic structures that carry the male reproductive
cell of plants 70

Glossary

Pollen tube is the tube through which sperm from the pollen reaches	
the egg cells and fertilises the plant to form seeds	74
Pollination is the transfer of pollen grains from the anther to the stigma	
of a flower.	71
Predator is an animal that hunts and eats other animals	12
Prey is an animal that is hunted and eaten by other animals	12
Producers are living things that produce their own food	12
Red cells are the red disc shaped cells in the blood containing	
haemoglobin to carry oxygen from the lungs to	
all parts of the body	150
Respiratory system is a group of organs in our body that enables us to	
breathe	140
Revolution is the movement of an object in a circular or elliptical course	
around another.	116
Rotation is the action of rotating on an axis or centre.	116
Sedimentary rocks are rocks that are formed from layers of sediments ca	.II
strata, usually at the bottom of rivers, lakes and ocean	า.
	39
Sediments are the materials that are carried by water or wind and	
deposited on the surface of the land or the seabed and may	
in time become into rocks.	26
Solution is a mixture where one or more substances are dissolved evenly	
into another substance.	168
Stamen is the male reproductive part of a flower	70
Star is a giant ball of hot gases	84
Stigma is the female reproductive part where pollen grains fall on	70
Strata is the horizontal layers of sediment.	36
Style is the long stalk that connects the stigma to the ovary.	70
Substance is a matter that is made of only one kind of matter	158
Trachea is is the tube that which connects the throat to the lungs	140

<i>Transpiration</i> is the process of plants losing water from the leaves into the	
air in the form of water vapour6	2
Vein is the blood vessel that carries blood back to the heart	8
Ventricle is a chamber that pumps blood to the lungs or the body 14	6
Volcano is an opening (usually on a mountain) on the Earth's surface	
which explodes to allow hot magma, volcanic gas and ash to	
escape 3	2
Weathering is a process where rock is broken down into smaller pieces	
over time	6
Weight is a force caused by gravity 5	5
White cells are blood cells for our body's immune system to defend the body	/
against bacteria, viruses and other infectious diseases 15	0











Casuarina White gum













Big vine

















Galip nut



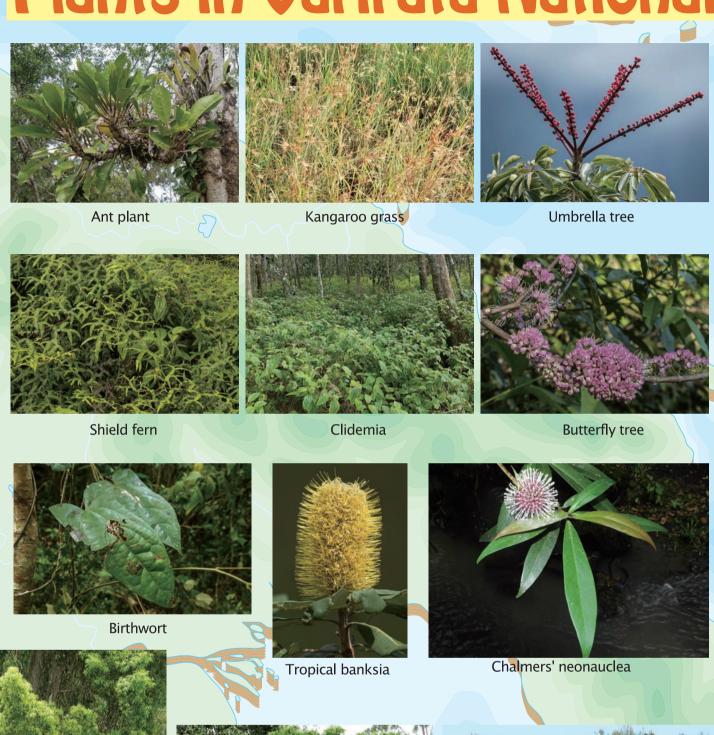
Cycas palm

Varirata National Park

Plants found nationwide



Plants in Varirata National





Brown pine

198



Sumac



Gymnostoma

Park in PNG

Varirata National Park is PNG's first national park. It is on state land on the Sogeri Plateau, 48 km east of Port Moresby city. The park has scenic views with beautiful rainforests and savannah grasslands. It is inhabited by some unique plants and animals.



Melastome



Pandanus



Common pitcher plant



Semecarpus



Water chestnut



Papuan oak



Bottlebrush orchid



Cycad



Tropical mistletoe



Spiked pepper



Hyacinth orchid



Planchonia



East New Guinea fig

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