



Machines help to simplify human work.  
How do machines help to make our lives  
more comfortable?

Wow, the house  
is so clean! Thank  
you, everyone.

## MACHINES AND LIFE

Machines are **tools or equipment that help us do our work easier and faster**. Let us follow the situation below.



Name other tools that can be used to prepare your scrapbook and state the uses of those tools.



## LET'S TEST

# I AM USEFUL AND FUNCTIONAL



### AIM

To state the functions of tools and to identify simple machines.

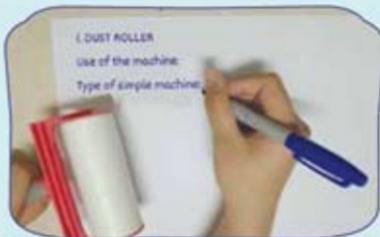
### APPARATUS AND MATERIALS

Dust roller, marker pen, tap, mechanical pencil sharpener, nail clipper, scissors, toy tractor, and A4 paper.

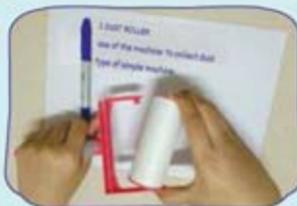
### STEPS



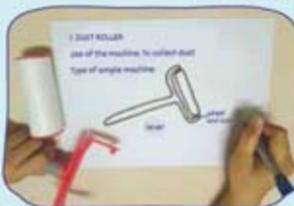
1. Observe the dust roller.



2. Identify the function of the tool and the type of simple machines in the dust roller.



3. Disassemble and reassemble the dust roller to understand its function.



4. Sketch the dust roller and label all the simple machines in it.



5. Observe other tools such as tap, mechanical pencil sharpener, nail clipper, scissors, and toy tractor. Then, repeat steps 2 to 4.



- What is the function of each tool that you have observed?
- How do the simple machines in the tool enable it to function?

### TEACHER'S NOTES

Teachers can use other tools besides the tools stated in this activity.

## COMBINATION OF FUNCTIONS IN SIMPLE MACHINES

There are several simple machines with different functions that are combined in a tool to enable it to function well. Let us understand the combination of functions in simple machines in the tools as shown below that enable them to function.

### Wheel and axle

The wheel and axle at the hand crank make this tool easier to be turned. The crank needs to turn so that the wedge can function to sharpen the pencil.



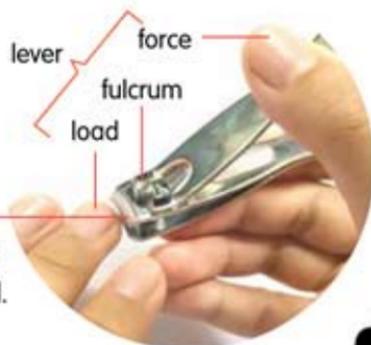
mechanical pencil sharpener

### Wedge

The wedge in the mechanical pencil sharpener allows the pencil to be sharpened.

### Lever

Nail clipper is a lever. The position of the load is at the nail whereas the position of the force is at the thumb. The fulcrum is located between the load and the force that allows the nail clipper to function.



### Wedge

The function of the wedge at the cutter is for cutting the nail.

nail clipper

Can this nail clipper function if there is no combination of lever and wedge?



## Gear

The gear in this wristwatch is used to move and turn the hands of the wristwatch.

## Screw

The screw is used to fasten the components of the wristwatch.

## Wheel and axle

The wheel and axle at the crown is for setting the wristwatch.



wristwatch

What will happen if the wristwatch has no gear and screw?

## Wedge

The wedge at the saw is used for cutting tree branches.

## Screw

The screw is used to fasten the parts of the pruning saw.

## Pulley

The pulley is used for pulling the wedge of the pruning saw.



pruning saw

Explain the combination of functions in simple machines for another tool, which ensures that the tool can function well.

## THE IMPORTANCE OF COMBINATION OF SIMPLE MACHINES

Let us observe the situations below to understand the importance of combination of simple machines in a tool.

Situation 1



Situation 2

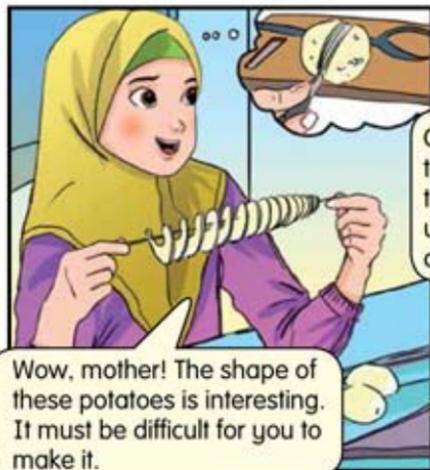


The combination of simple machines in a tool is important to ensure that it can function well. Why?



## THE IMPORTANCE OF INVENTING TOOLS WITH SUSTAINABLE CHARACTERISTICS

The use of tools in many fields help to make our jobs easier and faster in our daily life. Let us follow the story of Ana and her mother to understand the importance of inventing tools with sustainable characteristics.



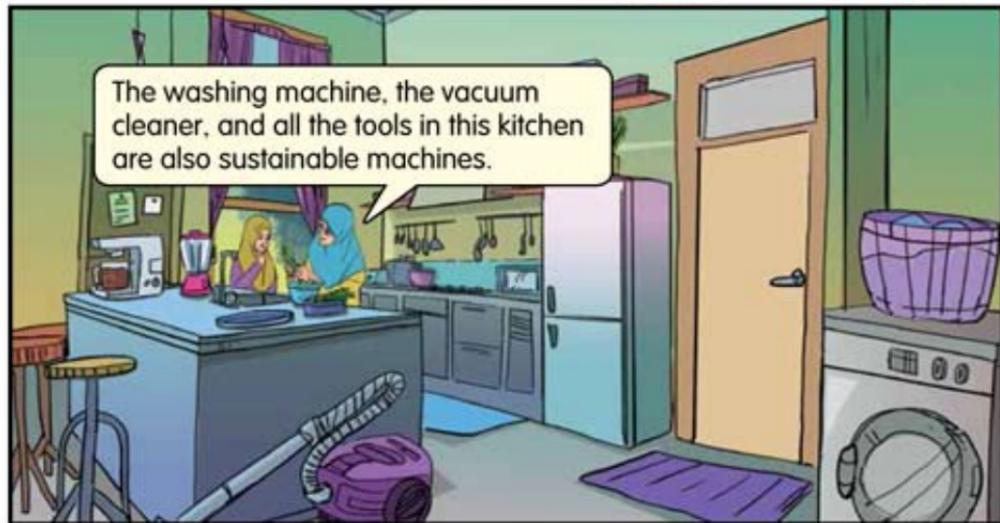
Wow, that's great! That's why you can work quickly.



Actually, this grater is a sustainable machine. This machine can simplify work, save time, and is safer to use compared to a knife. Furthermore, it is easy to clean.



The washing machine, the vacuum cleaner, and all the tools in this kitchen are also sustainable machines.

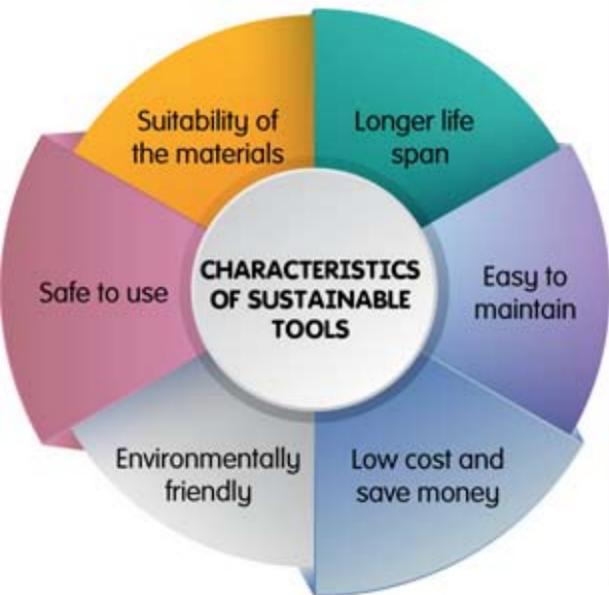


Ana, please throw away the rubbish from our waste bin into the big bin outside.

Yes, mother. Wow, what a big and heavy plastic bag! Wouldn't it be better if our waste bin is installed with wheels to make it easier for us to push it to the big bin outside of the house?

I agree, Ana. This waste bin has no characteristics of a sustainable machine.

Every tool that is invented should have sustainable characteristics. What are those characteristics?



The invention of tools with sustainable characteristics is important to make our job easier, faster, as well as save time, cost, and energy.

In any industries, the use of sustainable tools can increase the quantity and quality of product manufacturing.

Industrial products can then be managed more efficiently, faster, and safer with minimal cost.

Let us continue the story of Ana and her mother.

I will buy a new waste bin sometime later.

There's no need, mother! Our waste bin works fine. Besides, this waste bin is big that its inner space can be separated into parts for recyclable materials or compost. It's just the design that needs some improvement.



Based on the characteristics of sustainable tools, help Ana to improve the design of the waste bin.



## FUN ACTIVITY

# INVENTING A SUSTAINABLE TOOL

21ST  
Century  
Learning

### APPARATUS AND MATERIALS

Marker pens, pencils, coloured pencils, A4 paper, and manila card.



### STEPS

1. Discuss several designs of waste bins.
2. Select the best design and sketch it on the manila card.
3. Discuss the improvements that can be added to the sketch.
4. Present the result of your group's discussion.



- (a) What are the importance of inventing tools with sustainable characteristics?
- (b) Relate the importance of the sustainable characteristics discussed to the design of your waste bin.



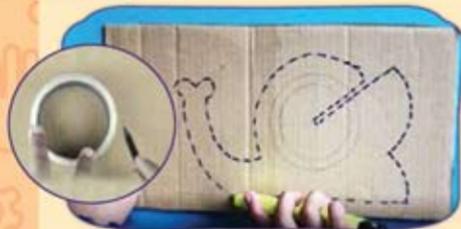
## ADHESIVE TAPE CONTAINER

Build an adhesive tape container using adhesive tape, marker pens, small knife, ruler, pencil sharpener, screwdriver, hot glue gun, cardboard, ice cream sticks, and skewer stick.



Adhesive tape container

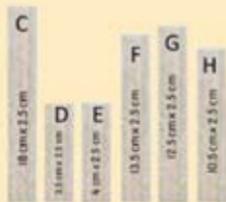
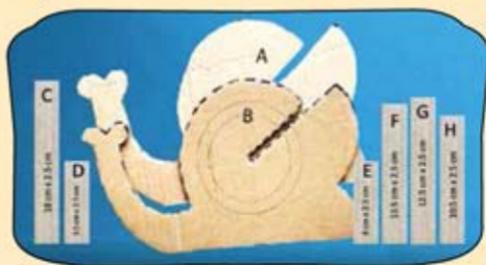
### STEPS



1. Sketch a circle on the cardboard based on the size of the adhesive tape. Then, sketch the shape around the circle as shown in the picture.



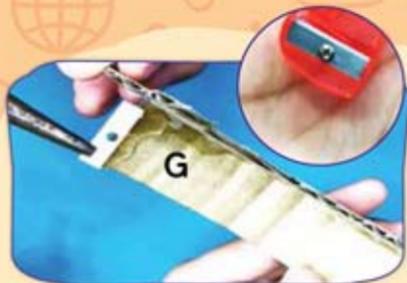
2. Cut the cardboard into two similar shapes. Label them as A and B.



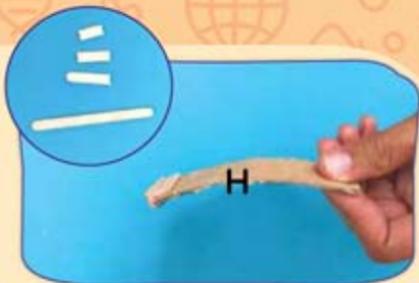
3. Measure sections C, D, E, F, G and H on the cardboard according to the measurements as shown in the pictures. Then, cut each part.



Be careful when using sharp and hot tools.



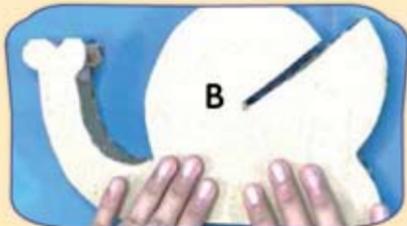
4. Unscrew the wedge from the pencil sharpener using a screwdriver. Paste it onto the end of section G.



5. Paste the ice cream sticks that have been cut into smaller pieces onto the end of section H.



6. Then, paste sections C, D, E, F, G and H onto cardboard A as shown in the picture.



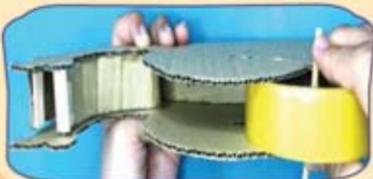
7. Combine cardboard B as shown in the picture.



8. Sketch two circles according to the inner shape of the adhesive tape. Then, cut the circles out and make holes in the middle of the circles.



9. Insert a skewer stick into the middle of both circles. Then, insert the circles into the middle of the adhesive tape.



10. Next, fasten the adhesive tape to the adhesive tape container as shown in the picture.
11. Decorate your adhesive tape container.

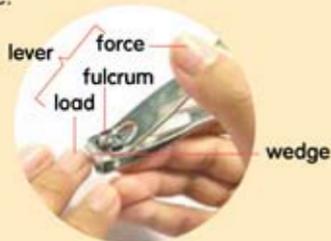


## MIND REFLECTION

1. Machines can simplify the daily work of humans.
2. The combination of simple machines in a tool with different functions enables the tool to function well. For example:



mechanical pencil sharpener



nail clipper

3. The characteristics of inventing sustainable tools are as follows:
  - suitability of the materials.
  - longer life span.
  - easy to maintain.
  - low cost and save money.
  - environmentally friendly.
  - safe to use.
4. The invention of tools with sustainable characteristics is important to make our job easier, faster, as well as save time, cost, and energy.



## MIND TEST

Answer all questions in the Science exercise book.

1. Match the tools to their correct functions.

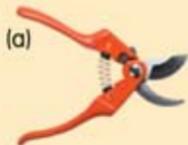
making holes

transportation

sucking dust



2. Identify the tools and simple machines as shown in the pictures below:



3. Using two examples of tools, explain the importance of the combination of simple machines in those tools.

4. Which of the following tools is more sustainable to sharpen a pencil? Explain.



mechanical  
pencil sharpener



pencil sharpener



knife

5. While lifting heavy packages to a higher place, Amir only uses a simple pulley. After a while, the rope on the pulley broke.

- (a) In your opinion, why did the rope on the pulley break?  
(b) Suggest ways for Amir to solve the problem.



6. The picture shows a tool with the combination of several types of simple machines to enable it to function well.

- (a) Identify the tool and the combination of simple machines in it.  
(b) What is the importance of the combination of functions in simple machines identified in this tool? Explain.  
(c) Name another tool that is more sustainable and has the same function as this tool.



7. The following are two tools with various uses.

- (a) Identify each tool and its sustainable characteristics.  
(b) What are the importance of inventing tools with sustainable characteristics? Describe.



# ANSWERS AND REFERENCES

## Answers

### Unit 1 Scientific Skills

#### Suggested answer for HOTS (page 5)

(Answers are based on the results of the experiment.)

#### Mind Test (pages 15–18)

- Large logs float on water because they are less dense compared to water.
  - The rate of breathing increases because the body needs more oxygen after exercises.
- The time taken by pupil A is shorter than pupil B.
  - The time taken by pupil A is less than 15 minutes.
- The number of turtles that landed from 2013 to 2015 decreased but started to increase from 2016 to 2018.
  - The number of turtles that landed on 2015 and 2016 are the lowest because the beach in State M was polluted. Because the beach in State M was destroyed due to a natural disaster and was unsuitable for turtle landings.  
(Accept all other suitable answers.)
  - 600 turtles.
- Classification features: Function of the tools

  - Stationery – pencil, hole puncher, and stapler.
  - Kitchen utensils – oven mitt, wooden ladle, and kettle.
- K and M are acidic.
  - J is alkaline, K and M are acidic, while L is neutral.
  - Alkali changes red litmus paper to blue. Alkali does not change the colour of blue litmus paper.

Lime juice and vinegar      Lime water and soap
- The size and height of the sapling increase with the number of days.
- Jupiter.
  - The planet's position from the Sun.
    - The time taken by the planet to revolve completely around the Sun.
  - As the distance of the planet from the Sun increases, the time taken for the planet to revolve around the Sun also increases.
  - The time taken for Planet R to revolve around the Sun is longer because the orbit size of Planet R is larger than the orbit size of the Earth.

### Unit 2 Humans

#### Suggested answer for HOTS (page 25)

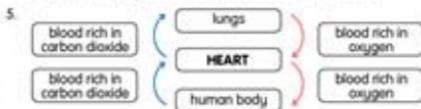
The hand has 27 bones. More bones means that there are more joints between the hand bones that enable flexibility of the hands to perform various tasks such as gripping, holding, squeezing, pinching, pulling, pushing, and others.

#### MIND TEST (pages 46–48)

- Skull.
  - Backbone.
  - Rib.
  - Hand bone.



- Joints allow movement and flexibility of the body.
- Pumps blood to the lungs and the whole body.
  - Transports blood throughout the body.
  - Transports oxygen, nutrients, water, and waste products.



- nutrients.
  - waste products.

#### 7. Situation A

When choking on food, the digestive system is disrupted at the oesophagus. Food trapped in the oesophagus will prevent air from entering the trachea. This will make breathing difficult and disrupt the respiratory system.

#### Situation B

A fractured bone disrupts the skeletal system. At the same time, the arm will be swollen because the blood flow in the blood circulatory system is disrupted.

#### Situation C

When the heart fails to function, the blood circulatory system is unable to transport blood containing oxygen, nutrients, and water to the whole body. At the same time, all other systems in the body will also fail to function because there is no oxygen and nutrients needed for the systems to function efficiently.

- The habit of eating foods that are high in cholesterol disrupts the blood circulatory system because blood vessels become narrow due to the formation of plaque from the excessive cholesterol in the body.
- Not smoking.
  - Exercise. (Accept any suitable answers.)

### Unit 3 Animals

#### Suggested answer for HOTS (page 53)

Thick and hard skin can protect the animals from being gripped or hurt when attacked by the enemies.

#### Suggested answer for HOTS (page 54)

Pufferfish often become prey because their predators are not aware of the sharp spines on the pufferfish's bodies before they inflate due to the threat. Pufferfish are also natural prey to sharks and sea snakes. Humans also eat pufferfish as an exotic delicacy after the poison is removed.

#### Suggested answer for HOTS (page 57)

Predators have their own specific characteristics to protect themselves. Snakes and spiders have venom that can kill their enemies and prey. Eagles have sharp beaks and claws while lions have sharp canines and claws to tear away the meat of their enemies and prey.

#### Suggested answer for HOTS (page 59)

The thick layer of fat acts as a heat insulator while the thick fur traps heat in the body. These specific characteristics help to protect the animals from extreme cold weather.

#### Suggested answer for HOTS (page 65)

Eggs that are not taken care of by their parents have specific characteristics to protect themselves. Mosquitoes lay a lot of tiny eggs that are hidden in the water. Turtles lay a large number of eggs at the beach of night before burying them in the sand.

### Mind Test (pages 91–92)

- C.
- (a) Porcupine: sharp spines.  
(b) Tortoise: hard shell.  
(c) Scorpion: venomous sting.  
(d) Moth: patterns that resemble fake eyes on its wings.

3.



- (a) Carry their young in their mouths.  
(b) Carry their young in their pouches.  
(c) Attack enemies that disturb their young.
- (a) The cat failed to catch the lizard because it only managed to catch the lizard's detached tail.  
(b) Detaching its tail.  
(c) The lizard detached its tail to deceive the cat.  
(d) Octopus.
- Producers are living things that make their own food such as plants.
  - Food chain is the food relationship among living things.
  - Food web is a combination of several food chains.

- (a)  $K \rightarrow L \rightarrow O$   
 $K \rightarrow N \rightarrow O$   
 $K \rightarrow M \rightarrow N \rightarrow O$   
 $K \rightarrow J \rightarrow N \rightarrow O$   
(Accept any three answers).

(b) One.

(c) Population N and O are reduced because of the reduced food source.

(d) Main source of energy: the sunlight.

Producer: K.

Consumers: J, L, M, N and O.

(e) • K is a plant.

- L is a herbivore.
- N is an omnivore.
- O is a carnivore.

(f) Food relationship among living things is important to ensure the balance of the nature.

### Unit 4: Plants

#### Suggested answer for HOTS (page 108)

Dispersal by wind enables seeds to be dispersed far away from their parent trees due to the seeds' specific characteristics such as small, lightweight, winged, and have fine hair.

#### Suggested answer for HOTS (page 110)

The specific characteristics of durians are sweet smell, attractive colour, and edible flesh enable them to attract animals and humans to disperse their seeds.

### Mind Test (pages 113–114)

- (a) Yam plant: produces latex.  
(b) Citronella plant: bad smell.  
(c) Poison ivy plant: fine hairs.
- (a) Specific characteristics: flexible stems and split leaves.  
(b) Specific characteristics: thick bark on the stems.
- (a) Okra seed: explosive mechanism.  
(b) Burr mallow seed: animals and humans.  
(c) Dandelion seed: wind.  
(d) Lotus seed: water.

- (a) Edible flesh and attractive colour of the fruit.  
(b) Animals and humans.
- (a) Water: coconut.  
(b) Animals and humans: rambutan. (Accept any suitable answers.)  
(c) Explosive mechanism: balsam seed.  
(d) Animals and humans: burr mallow seed.  
(e) Wind: angsana fruit.

### Unit 5: Electricity

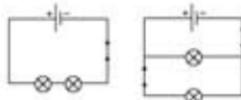
#### Suggested answer for HOTS (page 124)

The bulbs that are arranged in the parallel circuit will light up brighter than the bulbs that are arranged in the series circuit even though there are more bulbs in the parallel circuit. The brightness of the bulbs in the parallel circuit is the same even though the number of bulbs increases because the amount of electricity that flows in every path is the same. Whereas, the brightness of the bulbs in the series circuit decreases if the number of bulbs increases because all of the bulbs share the same amount of electricity in one path.

### Mind Test (pages 142–144)

- Sources of electrical energy are solar cells, dry cells, dynamos, accumulators, generators as well as power plants that use wind, waves, and hydroelectric.

2. (a)



(b) The bulbs in the parallel circuit are brighter because the parallel circuit has more than one path for the electric current to flow. Therefore, the total amount of electricity that flows through each path is the same.

(c)

Circuit	Series	Parallel
Arrangement of bulb	Arranged in a chain	Arranged in several branches parallel to each other

- (a) Number of dry cell.  
(b) Bulbs in Circuit C → bulbs in Circuit B → bulbs in Circuit A.  
(c) There is no difference because a parallel circuit has more than one path for the electric current to flow and has the same amount of electrical energy that flows through each path.
- Increase the number of dry cells.
  - Decrease the number of bulbs.
- (a) All bulbs do not light up.  
(b) All bulbs do not light up.  
(c) Only bulbs M<sub>1</sub>, M<sub>2</sub>, and M<sub>3</sub> light up. Bulb M<sub>4</sub> does not light up.
- Switch off electrical appliances when not in use.
  - Switch off the lights when sleeping.
  - Use a fan to cool the room.
  - Replace fluorescent lamps with LED lamps or compact fluorescent lamps.
- (a) The pupil can get electrocuted.  
(b) Touch switches or electrical appliances with dry hands.  
(c)
  - The switch must be turned off before removing the plug from the socket.
  - Connect only one plug to one socket.

## Unit 6 Heat

### Suggested answer for HOTS (page 149)

- (a) Food thermometer: measures temperature of food being cooked.  
 (b) Clinical thermometer: measures body temperature of humans.

### MIND TEST (page 162)

- (a) Heat is a form of transferable energy due to the difference in temperature.  
 (b) Temperature is the degree of hotness or coldness of a material.
- (a) 0°C. (b) 100°C.
- (a) Ravi's keys gain heat from the surrounding.  
 (b) Ana put the bottle of hot milk in a container filled with tap water to allow it to lose heat to the environment.
- (a) Decrease. (b) Increase.  
 (c) 100°C. (d) At the 25th minute.  
 (e) At the 15th minute. (f) When water gains heat, its temperature increases and when water loses heat, its temperature decreases.

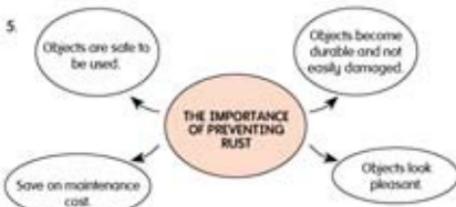
## Unit 7 Rusting

### Suggested answer for HOTS (page 172)

The spoons that are used in our houses do not rust because they are plated with stainless steel.

### Mind Test (pages 175–176)

- (a) Iron rod rusts while plastic and wooden rods do not rust.  
 (b) Objects made of iron will rust.
- (a) The objects are rusty.  
 (b) Reddish-brown colour, rough surface, brittle.  
 (c) Presence of water and air cause the object to rust.
- The rust on the bicycle chain that is made of iron can be prevented by applying oil or grease to prevent the chain from being exposed to water and air.
- (a) The needles in test tubes A and D are rusted because they are exposed to water and air.  
 (b) The needles in test tubes B and C are not rusted because they are not exposed to water and air.  
 (c) Objects made of iron rust when they are exposed to water and air.



(Accept any other types of thinking map.)

## Unit 8 Matter

### Suggested answer for HOTS (page 187)

When Mr Borhan gets out of his car, the water vapour from outside of the car hits the cooler surface of the lenses. The condensation process occurs when water vapour loses heat to the glasses and becomes water droplets.

### Suggested answer for HOTS (page 193)

Natural water cycle supplies water for crops, as well as food and water for humans and animals.

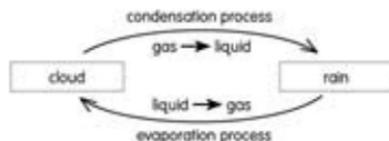
### Suggested answer for HOTS (page 194)

If the water evaporated from the surface of the Earth does not fall as rain, there would be very little water on the Earth, a lengthy drought, and plants would die. Then, animals and humans would also die.

### MIND TEST (pages 197–198)

- (Accept the pupils' answers regarding matter in solid, liquid, and gas states)
- 
- (a) Water has a fixed mass and volume as well as occupy space. Water has no fixed shape.  
 (b) Ice has fixed shape, mass, and volume. Ice also occupies space.
- (a) (i) Solid and liquid.  
 (ii) Ice undergoes melting process to become water.  
 (b) (i) Liquid → gas.  
 (ii) Boiling process.  
 (iii) The liquid gains heat and becomes gas.
- (a) Melting process: solid → liquid.  
 (b) Evaporation process: liquid → gas.  
 (c) Condensation process: gas → liquid.  
 (d) Boiling process: liquid → gas.  
 (e) Freezing process: liquid → solid.
- (a) Liquid → gas.  
 (b) Evaporation process.  
 (c) This process occurs when the water gains heat and becomes water vapour.

7.



## Unit 9 Phases of the Moon and Constellations

### Suggested answer for HOTS (page 205)

If the Moon emits its own light, it will always shine and the phases of the Moon will not happen because they depend on how much surface of the Moon is lit up by the Sun as it revolves around the Earth.

### MIND TEST (page 216)

- (a) Phases of the Moon.  
 (b) This phenomenon occurs because the Moon revolves around the Earth.
- 
- (d) Observation: Half-moon.  
 Reason: Half-moon occurs when half of the Moon that is lit up faces the Earth.
- (e) The full moon phase occurs in the month of Ramadan because a full moon always appears on the 14th, 15th or 16th of each lunar month.
- (a) Shows the direction of north.  
 (b) Orion, Southern Cross, and Scorpion constellations.

## Suggested answer for HOTS (page 222)

The screw cannot function because it functions as a fastener for two parts of an object. Without the spiral or thread grooves, it would be difficult to tighten or remove the screw.

## Mind Test (pages 229–230)

making holes

for transportation

sucking dust



- Pruning shears – lever, screw, and wedge.
  - Doorknob – lever, wheel and axle.
  - Bottle cap – lever and screw.
- Example 1:**  
A bicycle has screws, wheels and axles as well as gears for it to function efficiently. Screws are used to fasten the different parts of the bicycle. The wheels and axles are used to ease the movement of the bicycle while the gears help to change the bicycle's speed.  
(Accept any suitable answers.)

**Example 2:**  
A mechanical pencil sharpener has wheel and axle as well as a wedge. Wheel and axle are used to rotate the handle. The wedge is used to sharpen the pencil.  
(Accept any suitable answers.)
- The mechanical pencil sharpener is more sustainable because the combination of wheel and axle as well as a wedge enables it to function better, easier, and safer to use.
- The rope on the pulley broke because the load is heavier than the size of the rope and the number of pulleys used.
  - Use a bigger rope or increase the number of pulleys so that a smaller force is needed to lift the load.
- Hand drill - wedge, screw, wheel and axle.
  - Without screws, the hand drill cannot be assembled. The wheel and axle enable the handle to be rotated easier for the wedge to function. The wedge is used to make holes. The combination of simple machines in the hand drill make it work efficiently.
  - Electric drill. (Accept any suitable answers.)
- Ploughing machine – saves time, cost, and energy.  
Aeroplane – saves time and energy.
  - Sustainable tools are important in making work easier and saving time, cost, and labour. Sustainable tools also increase the quality of life as they last longer, technologically advanced, and environmentally friendly.

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