

Revised
Curriculum
'60

Targeting SCIENCE

- Ploysai Ohama, Ph.D.
- Mintra Singhanak
- Apinya Inraikhing

Primary
5



Work-Textbook

Active Learning

Targeting Science

P.5

Primary 5

Based on Thailand's
newly revised curriculum of B.E. 2560 (A.D. 2017)

Authors

Ploysai Ohama, Ph.D.
Mintra Singhanak
Apinya Inraikhing

Academic Inspectors (Thai version)

Asst. Prof. Karanphon Wiwanthamongkon, Ph.D.
Phenphak Phusil, Ph.D.
Wachiraporn Pattawee

Editors (English version)

Melaine Ssianjeu
Tipsuda Buakaew
Poranee Tatsanasaengsoon
Kanjana Heenpoo

KEY

First published 2020

All rights reserved

AKSORN

www.aksorn.com

Published and distributed in Thailand by:

Aksorn Charoen Tat ACT. Co., Ltd.

142 Tanao Road, Phra Nakhon, Bangkok, Thailand 10200

Tel./Fax: +66 2622 2999 (auto phone switch 20 lines)

Printed at: **Thai Romklao Co., Ltd.** Tel. +66 2903 9101-6



Name: Class: No.:

Preface

Targeting Science Work-textbook Primary 5 is written based on the B.E. 2560 (A.D. 2017) revised version of Thailand's Basic Education Core Curriculum B.E. 2551 (A.D. 2008) for the purpose of facilitating the learning of students in Science subject.

With the scientific process and 21st century skills enhancing activities, students will discover the world of Science and learn to solve various problems in effective ways. In addition, they will have opportunities to learn and engage with every step of scientific experiments and activities so that they can apply the knowledge and skills to solve problems in real world context and create innovative ideas and works.

Illustrations, graphs, tables, and other infographics contained in each unit help students to understand the content better and encourage them to read and engage with the activities. The following are the features of this book.

Indicators

Stating indicators applied in each unit



Engaging Question

Engaging students with the lessons through interesting questions

Learning Outcomes

Stating skills or knowledge that students are expected to achieve from each unit



Read and Think Along

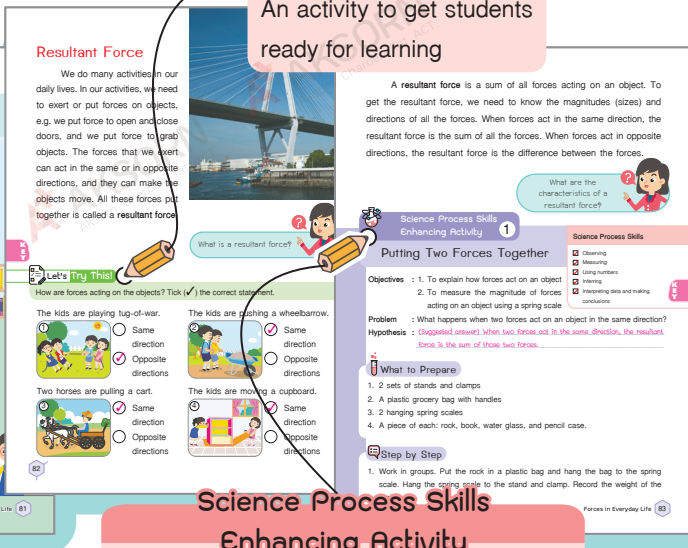
Encouraging students to learn through stories and questions

Vocabulary

Listing scientific vocabulary used in each unit

Let's Try This!

An activity to get students ready for learning



Science Process Skills Enhancing Activity

Providing opportunities for students to conduct experiments with the scientific inquiry process

Content

Developed based on the B.E. 2560 (A.D. 2017) revised version of Thailand's Basic Education Core Curriculum B.E.2551 (A.D. 2008) with creative and helpful illustrations and infographics

Fuel-up Exercise

Exercise to check if students understand what they have learned after doing the activity

Case 1

Two or more forces acting on the same object in the same direction

The resultant force is more than zero (resultant force > 0).

The object moves in the same direction as the forces.

Force 1 = 20 N
Force 2 = 30 N

Resultant force = 50 N

Finding the resultant force

Force 1 + Force 2 = the resultant force
20 N + 30 N = 50 N

The object is moved to the right by a resultant force of 50 N.

Case 3

Two forces of the same size acting on the same object in the opposite directions

The resultant force is equal to zero (resultant force = 0).

The object will not move.

Force 1 = 40 N
Force 2 = 40 N

Resultant force = 0 N

Finding the resultant force

Force 1 - Force 2 = the resultant force
40 N - 40 N = 0 N

The resultant force is equal to zero. The object will not move.

Science Fact

Newton (N), the unit of force, is named after an English scientist Sir Isaac Newton. He was the one who discovered the theory of gravity. He also studied about forces and motion of objects.

Fuel-up Exercise 1

1. Find the resultant forces and the directions of the objects.

1. 5 N, 5 N
The resultant force is 10 N.
The object moves to the right.

2. 5 N, 7 N
The resultant force is 12 N.
The object moves to the right.

3. 6 N, 6 N
The resultant force is 12 N.
The object moves to the right.

4. 8 N, 2 N
The resultant force is 10 N.
The object moves to the right.

2. Read and answer the questions.

Bob weighed two rocks with a spring scale. First, he weighed one rock at a time. Second, he weighed the two rocks at the same time. Then, he wrote down this information.

Rock 1	Rock 2	Total	Two rocks together
1.3 N	1.5 N	2.8 N	2.8 N

1. What did he get for both times?
He got the same answer for both times. The answer from the second time is equal to the sum of the answers of the two rocks weighed separately.

2. What can Bob conclude from the experiment?
When two forces are in the same direction, they add up to give one resultant force.

Think Higher Lesson 1

Two forces act on an object in the same direction. Force 1 has a magnitude of 5 N, and Force 2 has a magnitude of 10 N. Draw a diagram showing the forces acting on the object. What is the magnitude and direction of the resultant force?

(Example)

The resultant force is
Force 1 + Force 2 = the resultant force
5 N + 10 N = 15 N
So, the resultant force is 15 N.
The object moves to the right.

2. Read and answer the questions.

During Christmas, Santa Claus has to visit all the kids. Santa Claus A uses 6 reindeers to pull his sleigh. Santa Claus B uses 8 reindeers to pull his sleigh.

1. If each reindeer exerts a force of 600 N. Will the resultant force be different for Sleigh A and Sleigh B?
They will be different. The resultant force on Sleigh A is equal to $6 \times 600 = 3,600$ N. The resultant force on Sleigh B is equal to $8 \times 600 = 4,800$ N. The difference between them is 1,200 N, so Sleigh B will move faster.

2. If each reindeer in Sleigh B exerts a force of 600 N to start moving it, how much force should each reindeer in Sleigh A exert to start moving it?
Sleigh B has 8 reindeers, each exerts 600 N to start moving it. The resultant force is $8 \times 600 = 4,800$ N. So, for Sleigh A with 6 reindeers, each one has to exert $4,800 \div 6 = 800$ N to start moving it.

Science Fact

Providing additional knowledge of science relevant to each unit

Think Higher

Exercise at the end of each lesson to enhance thinking skills and to review what have been learned

Read Think Write

Activity for evaluating students' competencies in reading, thinking, and reasoning through writing

Evaluation Section

Tool for evaluating learning achievement of students according to the indicators

O-NET Prep

Test for checking each student's understanding, evaluating his/her performance, and getting the student ready for the O-NET test

Study the picture and answer the questions.

If we want to move the car, we have to push it with a force of 80 N.

1. If two people push the car, how much force must each person exert in order to move the car?
 $80 \text{ N} \div 2 = 40 \text{ N}$

2. If one person exerts 45 N, how much force will the other person exert in order to move the car?
 $80 \text{ N} - 45 \text{ N} = 35 \text{ N}$

3. If the number of people pushing the car changes, will the size of each person change?
Yes, it will. If more people push the car, each person will exert less force. If fewer people push the car, each person will exert more force.

Perfect Your 21st Century Skills

Do the activity in groups of 3-4.

- Do a survey. Find out the activities in which resultant forces are important to.
- Draw a diagram(s) on a card paper. Decorate it nicely.
- Present and discuss your work with the class.

21 st Century Skills	Indicating Behavior	Score
Life and career skills	The student is able to set goals as a group.	
Learning and innovation skills-4Cs	The student is able to work with others and accept their opinions.	
Information, media, and technology skills	The student is able to design his/her work creatively.	
	The student is able to communicate effectively.	

Evaluation Section Unit 3

Part 1 15 points

1. Look at the picture, read, and explain about resultant force.

This hot air balloon has 8 strings joining the balloon and the basket. Each string exerts 300 N to hold up the basket. If only 4 strings are used for the same hot air balloon, how much force will each string need to exert? (2 points)

There are 8 strings, each string exerts 300 N. So, the total force is $300 \times 8 = 2,400$ N. If there are only 4 strings, each string has to exert $2,400 \div 4 = 600$ N to hold up the basket.

2. Look at the picture and answer the questions.

1. Draw a diagram to show the forces acting on the box. (3 points)

Force 1 = 2 N, Force 2 = 2 N, Force 3 = 3 N

2. Will the box move? Why? (2 points)

The box will move toward the right. Because the force to the right is greater than the force to the left.

O-NET Prep

Name: _____ Class: _____

Instructions: 1. The test is divided into 2 parts. Each has 25 points. 2. Circle the correct answer for each question.

Part 1 25 points

1. Why do water hyacinths have bulb-like stalks?
a. To store water
b. To lower water loss
c. To keep from natural enemy
d. To be lightweight and float on water

2. Which is incorrect?
a. A cactus has needle-like leaves to lose more water.
b. A lotus has hollow stems to help it float.
c. A camel has long eyelashes to keep sand from its eyes.
d. A mangrove has prop roots to support itself.

3. Which has a different relationship to the others?
a. A tiger lives in a forest.
b. A grasshopper lives in a rice field.
c. A sheep eats grass in a grass field.
d. A worm lives in the soil.

Part 2 25 points

Example: Structures and features of animals that fit in their habitats

Mudskippers live in the mangrove forest. They have strong side fins. They use their fins to swim in muddy water.

Fish live both in fresh water and in salt water. They have 5 kinds of fins: side fin, stomach fin, back fin, bottom fin, and tail fin. Fishes use their fins to move in water.

Frog are amphibians. They have webbed feet that helps them to move in water.

Polar bear live in the North Pole. They have thick fur and a lot of fat under their skin. These help them to live in very cold places.

Camels live in deserts. They have long eyelashes to keep dust and sand away from their eyes. They have humps on their backs to store fat for their energy. Their foot has two toes. They spread when it touches the ground to keep them from sinking into the sand.

Chickens live on land. They have short and strong claws for scratching and finding food. They also have a strong beak for pecking food.

24. Find and color the insect that hides in anemone.

Perfect Your 21st Century Skills

Activity focusing on implementing knowledge and enhancing the 21st century skills to create works

Interactive 3D

Making learning experiences more fun and realistic



Contents

Unit 1



Learn Like a Scientist

Lesson 1

The Scientific Process

1. The Scientific Method
2. The Science Process Skills
3. The Scientific Mind

Knowledge Summary

2

3
4
8
15
17

Unit 2



Living Things and the Environment

Lesson 1

Living Things and Their Environment

1. How Living Things Fit in Their Habitats
2. How Living Things Link to Their Environment
3. Energy Flow in the Environment
4. The Importance of the Environment

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Lesson 2

Genetic Traits of Living Things

Genetic Inheritance of Living Things

Think Higher: Lesson 2

Perfect Your 21st Century Skills

Evaluation Section Unit 2

18

19
20
27
34
43
49
51
52
53
69
71
72

KEY

Unit 3



Forces in Everyday Life

Lesson 1

A Resultant Force

A Resultant Force

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Lesson 2

Friction Force

Friction Force

Think Higher: Lesson 2

Perfect Your 21st Century Skills

Evaluation Section Unit 3

80

81
82
92
93
94
95
105
106
107

Unit 4



Sounds around Us

Lesson 1

Sounds and Hearing

1. Medium of Sound
2. Characteristics of Sound
3. Noise Pollution

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Evaluation Section Unit 4

112

113
114
121
130
137
138
139



Unit 5

Changes

Lesson 1

Physical Changes

1. The Changes of the State of Matter
2. The Dissolution of Substances in Water

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Lesson 2

Chemical Changes

Chemical Changes in Substances

Think Higher: Lesson 2

Perfect Your 21st Century Skills

Lesson 3

Reversible and Irreversible Changes

Reversible and Irreversible Changes in Substances

Think Higher: Lesson 3

Perfect Your 21st Century Skills

Evaluation Section Unit 5

144

145

146

154

160

162

163

164

171

172

173

174

180

181

182



Unit 6

Water Sources and the Weather

Lesson 1

Water Sources around Us and Their Uses

Water Sources and Water Conservation

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Lesson 2

Weather Phenomena

1. Cloud, Fog, Dew, and Frost
2. Precipitation
3. The Water Cycle

Think Higher: Lesson 2

Perfect Your 21st Century Skills

Evaluation Section Unit 6

186

187

188

199

200

201

202

212

218

226

227

228

KEY



Unit 7

The Stars and Planets in the Sky

Lesson 1

Stars and Planets in the Sky

1. Stars and Planets
2. Constellations in the sky

Think Higher: Lesson 1

Perfect Your 21st Century Skills

Evaluation Section Unit 7

234

235

236

242

254

255

256

O-NET Prep
Bibliography

258

273

Learn Like a Scientist

Science is the study of all the things around us. We study the things around us by using a step-by-step action to find answers to what we want to know. These actions and steps are called the **scientific process**.

The scientific process is grouped into 3 types: the scientific method, the science process skills, and the scientific mind.



Lesson 1 The Scientific Process

Learning outcomes

- Describe and apply the scientific method in searching for knowledge.
- Describe and apply the various science process skills in searching for knowledge.



Read and Think Along

Uh! What type of herb can keep mosquitoes away best?

My mom told me that kaffir lime scent can chase away mosquitoes.

Let us find out which one is better.

But lemongrass smells stronger than kaffir lime; it could chase away mosquitoes better.

Did the kids in this picture use the scientific process? How?

KEY

1 The Scientific Method

To learn like scientists, we observe the things around us to help find answers to what we want to know. This is called the **scientific method**. There are 5 steps to it: ask a question, make a hypothesis, gather information, study the information, and draw a conclusion.



Can we find a problem by observing the things around us?



KEY



Let's Try This!

Fill in the blanks using steps of the scientific method.

1. To grow morning glory, Jake has to know the right soil to use. So, Jake has to ask a question.



2. Mary gathers information about types of butterflies by reading books, searching the Internet and observing butterflies with a magnifying glass.



The **scientific method** is a way to learn science using steps-by-step actions. It is important for scientists to learn how to observe and find answers to the things they want to know. There are 5 steps in this method:



1 Ask a question

In this step, we ask questions or identify problems from observing things around us. We should observe carefully, using all five senses.



2 Make a hypothesis

In this step, we guess answers to our questions. We guess from what we know.



3 Gather information

In this step, we find answers to our questions. We observe more, explore, do experiments, create models, and then write down the data we get.



4 Study the information we gathered

In this step, we describe the information we got or try to explain the meaning of the results we got.



5 Draw a conclusion

In this step, we make a summary of all the information and results. We check if they match the hypothesis we made. This knowledge is used in our everyday life or used as guide for other studies in the future.

Example The use of the scientific method

Keng and his friends want to know the best type of soil to grow Chinese kale. Together, they used the scientific method to find the answer as shown:

Step 1 They identified the problem.

What type of soil can grow Chinese kale best?

Step 2 They made a hypothesis.

I think Chinese kale grows better in loam than clay and sandy soils.



Step 3 They gathered information.

Keng and his friends did an experiment to gather information. They planted Chinese kale seeds in 3 plant pots; each pot had a different soil: clay in Pot 1, loam in Pot 2 and sandy soil in Pot 3. They watered each pot equally and wrote down how they grow for 25 days.

The Chinese kale in Pot 2 is taller than the ones in Pot 1 and Pot 3.

Observing the Chinese kales			
Day	clay soil	loam soil	sandy soil

Step 5 They made a conclusion.

Step 4 They studied the information.

I read on the Internet that Chinese kale is a vegetable that grows well in loam soil.

We saw from our experiment that the Chinese kale in loam soil is taller than the others in clay soil and sandy soil.

Loam soil is the best soil for growing Chinese kale.

Growing Chinese kale for 25 days



2 The Science Process Skills

The science process skills are important when we study science. When we study things step-by-step, we can correctly find out the answers to our questions. These skills show the steps in our thinking which makes us understand science better and help us learn well.



How do science process skills help us study science?



KEY

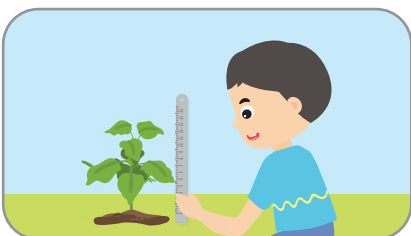


Let's Try This!

Look at the pictures and fill in the blanks using a science process skill.



- Nont uses a magnifying glass to study the petals of a rose.
- Nont is observing the rose.



- Keng uses a ruler to find the height of an eggplant in his backyard.
- Keng is measuring the eggplant.



- The sky turned dark, so Kaewsai thought that it could rain.
- Kaewsai was predicting that it could rain.

The science process skills are tools that scientists use to search for knowledge, answer questions, and solve problems. There are 14 skills that are sorted into 2 groups:

The 8 basic science process skills



Observing



Classifying



Measuring



Organizing data and
Communicating



Using space/time
relationships



Predicting



Inferring



Using numbers

KEY



The 6 integrated science process skills



Identifying and controlling variables



Interpreting data and making conclusions



Experimenting



Defining operationally



Formulating hypotheses



Modeling

KEY

(Reference: The Manual for The Basic Science Education: Primary Level, The Institute for the Promotion of Teaching Science and Technology, Ministry of Education, 2018)



1. Organizing data and communicating

When we gather data from experiment, we need to put it into simple ways for other people to understand it better. This means that we can share the data using diagrams, charts, tables, graphs, equations, or essays.

Example Organizing data and communicating

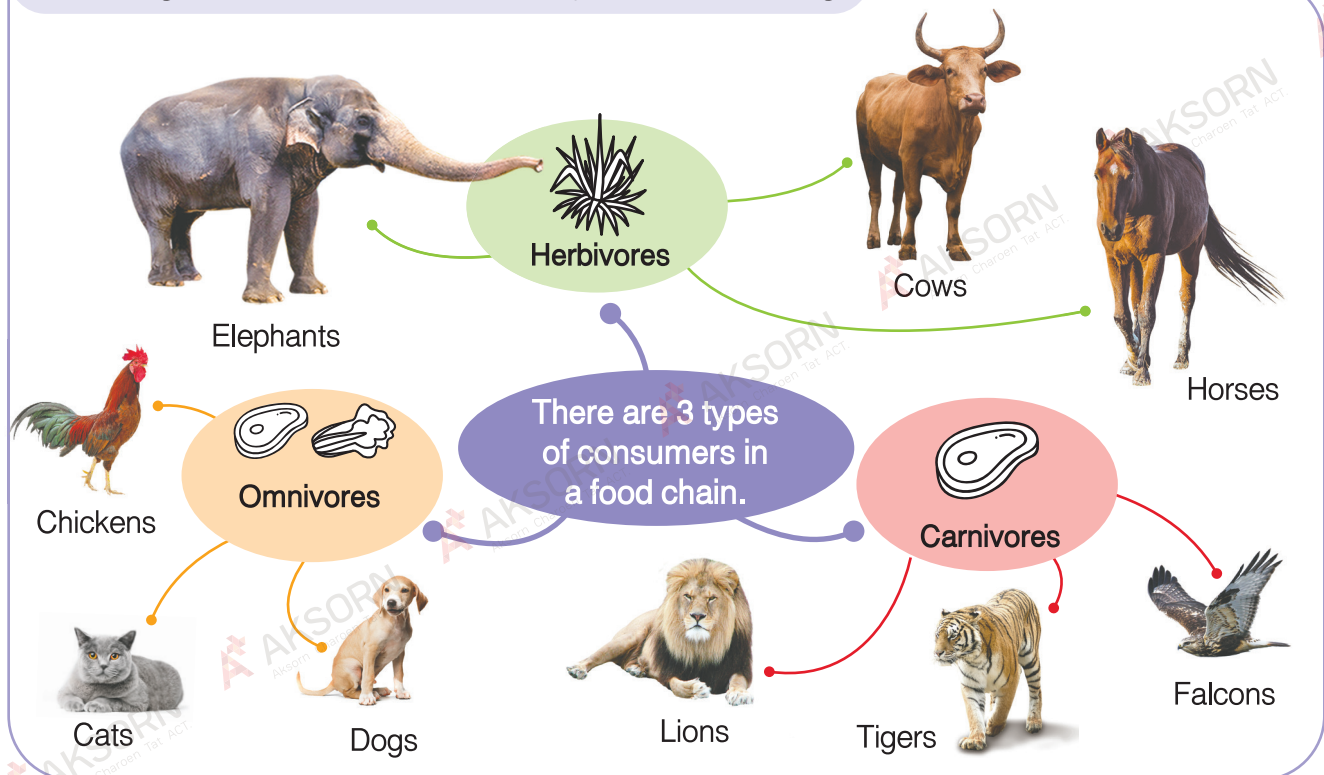
Mike searched for information about consumers in a food chain from different sources. He made a record as follows:

Mike's record

There are three types of consumers in a food chain. They are herbivores (e.g. cows, elephants, horses); carnivores (e.g. tigers, lions, falcons); and omnivores (e.g. dogs, cats, chickens).

KEY

Mike organized his data for easy understanding.



2. Modeling

This is to create models as a way to explain the things that we study. We show and describe our results in different ways, e.g. pictures, graphs, messages, motion pictures, for others to understand it easily.

We also use models to describe or explain how ideas, objects, or things are linked.

Example Different types of modeling

A model of an aquatic ecosystem



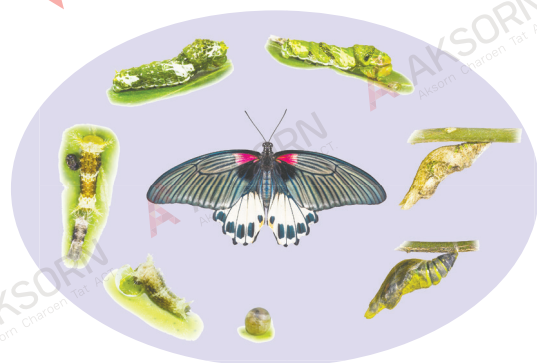
A model of a frog's skeleton



A model of a volcanic eruption



A model of a butterfly's life cycle



A model of the traveling of sound through a medium



A model of a plant's growth



3. Using space/time relationships

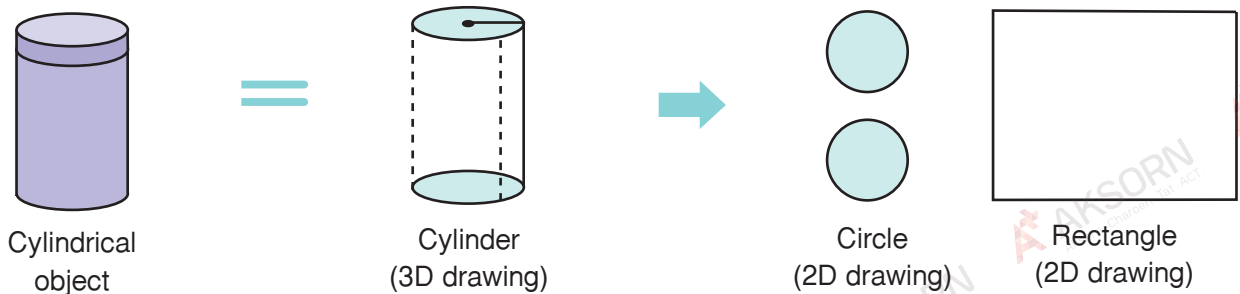
This is to find the relationships between one-dimensional (1D), two-dimensional (2D), and three-dimensional (3D) objects. It is to find shapes, sizes, positions, and directions of moving objects at different times.

The **space** of an object is the space that the object fills up and has the same shape as the object. The space of an object is given in 3 ways: width, length, and height. There are 2 types of space relationship:

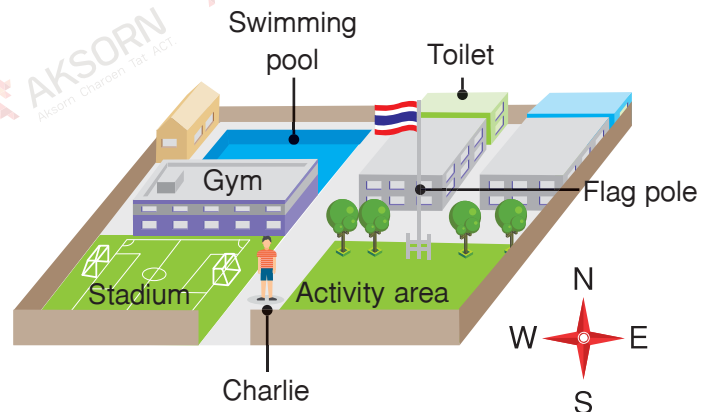
1. Space-space relationship

This is the relationship between the spaces filled by objects.

- **A relationship between 2D object and 3D object.** This is to find or draw a 2D and 3D objects, e.g.



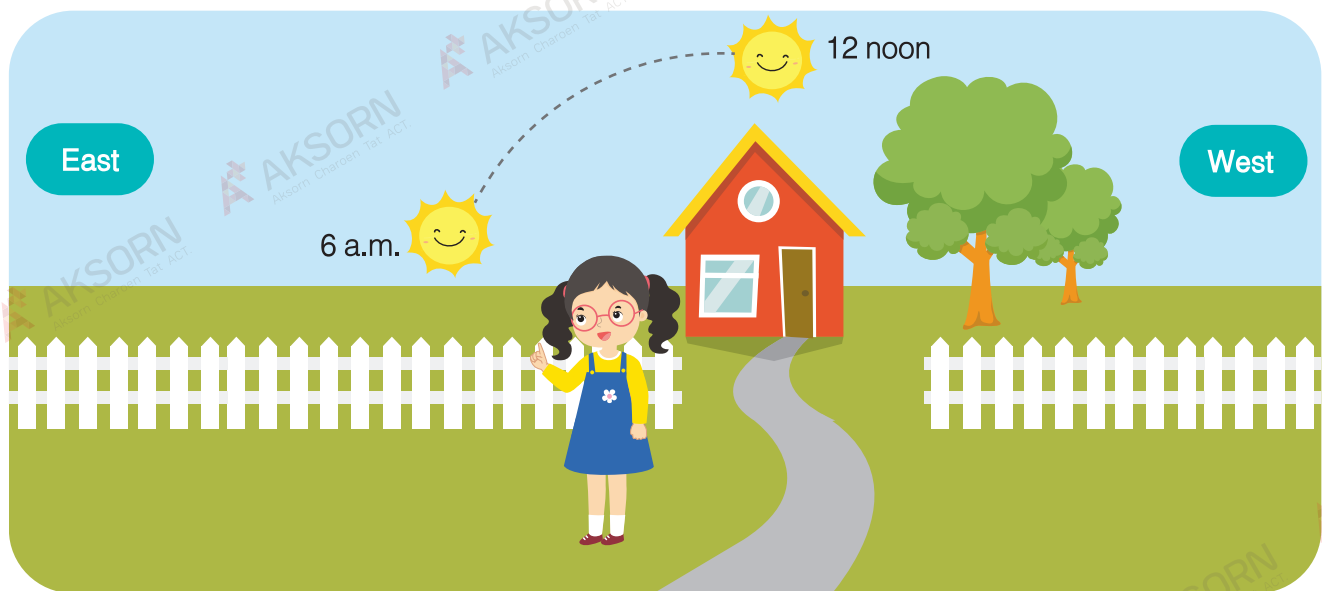
- **A relationship between the positions of two objects.** This is to find the position and direction of an object when compared to other objects. For example, Charlie can say that the gym is to the west of the flag pole.



2. Space-time relationship

This is the relationship between the spaces filled by objects at a given time.

- **A relationship between an object's position and time.** This is to find the position of a moving object as time goes by. For example, at 6 a.m., the Sun rises in the East. After 6 hours, the Sun changes its position. It is now right above Jane's house at 12 noon.



- **A relationship between an object's shape and time.** This is to find the changes in the shape or amount of an object as time passes. For example, when we leave ice cubes at a room temperature for 30 minutes, the ice will melt and change in size or form.



3 The Scientific Mind

When we learn science using the scientific process, we will think like scientists. So, we should use the scientific method to learn and answer questions. Also, we have to use the science process skills all the time, as this will help us to know more and think like scientists.



What is a scientific mind?

KEY



Let's Try This!

Look at the picture and fill in the blanks using the science process skills.



1. Who has a scientific mind?

Ploy, Keng, May, and Kaewsai

Reason: They pay attention and work as a team.

2. Who does not have a scientific mind?

Tom and Nont

Reason: They do not pay attention.

3. What are the traits of a person with a scientific mind?

They are disciplined and eager to learn.

A **scientific mind** is the traits of a person who studies science through the scientific process. A person with a **scientific mind** is careful, eager to learn, honest, patient, responsible, reasonable, curious, work with others, kind, and open-minded.

Example Characteristics of a person with a scientific mind

Being eager to learn



Being curious



Being open-minded



Being able to work with others



Being willing to share knowledge with others

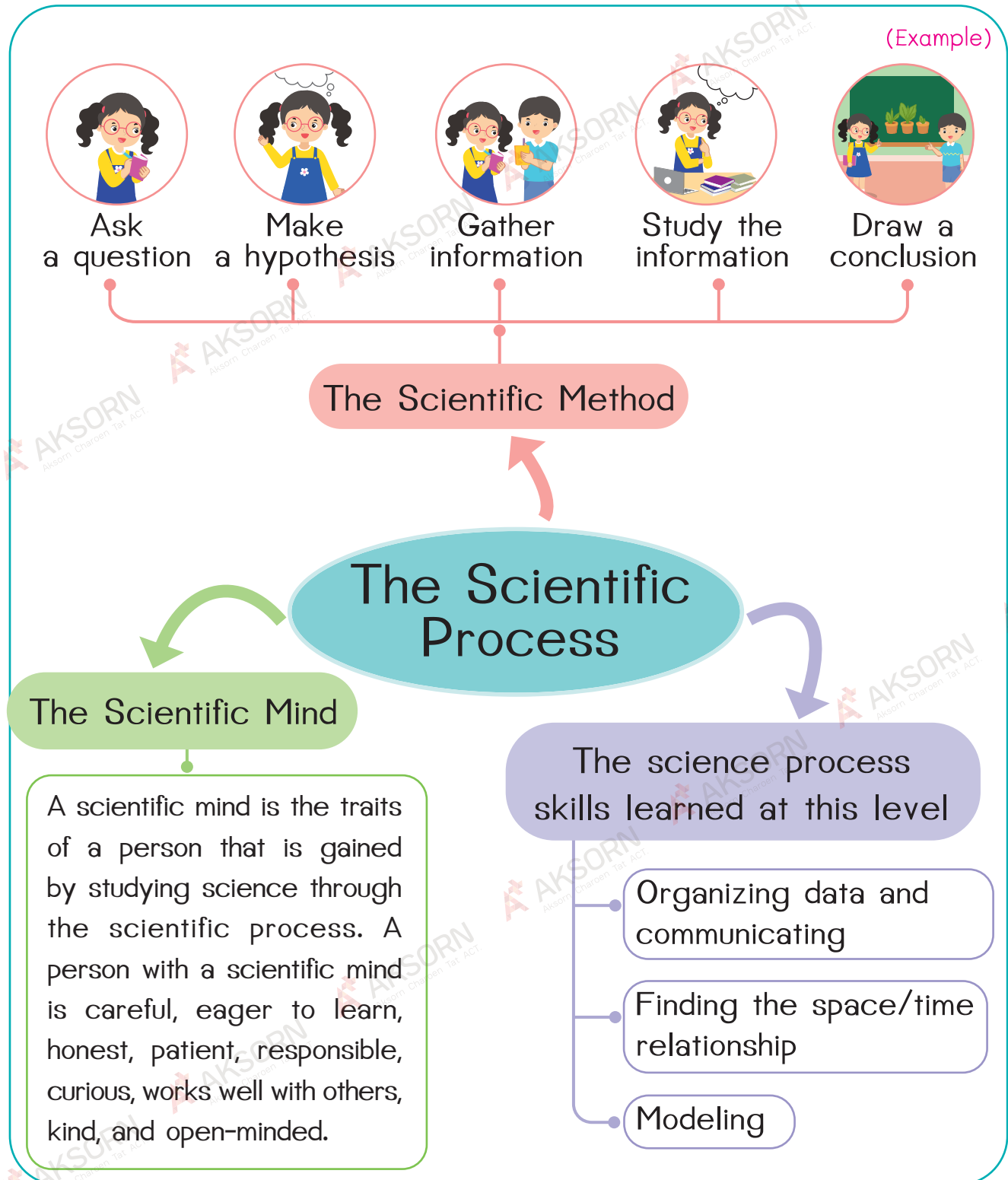


Being responsible





Draw a mind map, a diagram, or summarize what you have learned about the scientific process.



KEY

Active Learning

Targeting Science Primary 1-6
Content, Activities, Exercises and Evaluation Section



Covering all the content based on the B.E. 2560 (A.D. 2017) revised version of Thailand's Basic Education Core Curriculum B.E. 2551 (A.D. 2008)



Packed with active learning activities to engage the students in the learning process which helps enhance their thinking skills



Including different exercises to practice the science process skills and problem solving skill of students



Providing evaluation section to reflect students' competence on what they have learned, both knowledge and skills

