



Computing

Science

Based on the Basic Education Curriculum B.E. 2551 (Revised Edition B.E. 2560)

Primary
Education
Smart+
Prathomsuksa



Lesson Plan



Chapter 1 Logical Thinking

Duration: 8 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P6/1 Students will be able to use logical thinking to explain and design problem-solving methods in daily life.

Introduction:

In this chapter, students will understand that logical thinking is a way of thinking in a proper or disciplined manner that is based on facts and evidence. They will learn how to use logical thinking step-by-step. They will apply these steps of logical thinking to solve simple problems.

Learning objectives:

Students will be able to:

1. Explain steps of logical thinking in solving simple problems.
2. Solve problems based on logical thinking.
3. Work in team with responsibility.

Key competencies:

1. Thinking capacity
2. Problem-solving capacity
3. Capacity for technological application

Concepts:

- Logical thinking is a way of thinking in a proper or disciplined manner that is based on facts and evidence.
- There are 5 steps in problem solving with logical thinking. They are identifying the goal, identifying the information given, identifying the conditions given, identifying the logic, and identifying the solution.

Teaching/Learning activities:

Start up:

1. Start the lesson by using some problems in their daily life such as shown below.
 - How do we know which basket is the heaviest by using a balance scale?



- How do we know which is the shortest way from the classroom to the library?
2. Lead students to share their ideas in class. Do not need to answer them but tell them they will find a good answer through the following activities.

Part 1 Steps in logical thinking

1. Ask students to think of a best way to find page 47 of this book fast. Ask them to explain why their way is the best. Let them try out their ways.
2. Use the example from page 1 to explain the steps in logical thinking. Refer to page 2.
3. Ask students to identify the logic in their ways to find page 47 of this book.
4. Assign students to do Hands-On Activity 1 on page 3. Then, asks them to share their answers in the class.

Part 2 Solving simple problems with logical thinking

1. Explain how to use a flow chart to prepare algorithm of guessing a number generated by computer. Refer to page 4.
2. Then, explain the steps of logical thinking for solving the previous problem. Refer to page 5.
3. Ask them to try to play guessing numbers online in order to practice their logical thinking. Ask them to scan the QR code on page 5.
4. Assign students to do Hands-On Activity 2 on page 6. Then, ask them to share their answers and lead them to discuss.
5. Using the activity in the Start-Up (Which is the shortest way from the classroom to the library?), ask them to list the steps of logical thinking for this activity. Ask them to explain their logics.
6. Use the examples on pages 7 and 8 to explain the calculation of time taken for a journey.
7. Explain the calculation of speed. Refer to More Info on page 7.
8. Then, assign them to do Hands-On Activity 3 on page 9. Get them to discuss their answers in the class.
9. Read the riddle on page 10. Get a few students to answer it. Discuss the answers using the stps of logical thinking. Refer to page 10. Ask them if they understand the logic behind it.
10. To ensure they understand, ask them to answer the question in Figure It Out on page 10.
11. Read the riddle on page 11. Get a few students to answer it. Discuss the answers using the stps of logical thinking. Refer to page 11. Ask them if they understand the logic behind it.
12. Encourage them to watch the video on handling a tire blowout by scanning the QR code in More Videos on page 11.
13. Read the riddle on page 12. Get a few students to answer it. Discuss the answers using the stps of logical thinking. Refer to page 12. Ask them if they understand the logic behind it. You may use carry out the task by using pails or bowls to ensure they understand.
14. Carry on with the next riddle on page 13. This time let them explain using pails or bowls.
15. To ensure they understand the logics behind those riddles, ask them to do Hands-On Activity 4 on pages 14 and 15.
16. Read the riddle on page 16. Get a few students to answer it. Discuss the answers using the stps of logical thinking. Refer to page 16. Ask them if they understand the logic behind it.
17. Encourage them to read the extra information in More Info on page 16.
18. Ask them to do Hands-On Activity 5 on page 17. Lead them to discuss in the class.

19. Read the riddle on page 18. Get a few students to answer it. Discuss the answers using the steps of logical thinking. Refer to pages 18 and 19. Ask them if they understand the logic behind it.
20. To ensure they understand the logics behind those riddles, ask them to do Hands-On Activity 4 on pages 20 and 21. Lead them to discuss the answers.

Closing:

1. Review their understanding of solving problems by using logical thinking step by step. Refer to page 21.
2. End the lesson by asking students to do the exercise on pages 22 to 24.

Assessment:

1. Assessing students' cognitive behaviors based on Exercise on pages 22 to 24 (Learning objective 1 and 2)
2. Assessing students' affective behaviors based on the Affective Domain Rubric Score (Learning objective 3)

Affective Domain Rubric Score

Skill	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Teamwork	No judgment can be made.	Joins a group cooperatively. Listens attentively to members of the group. Contributes to the end product of the group.	Gives input and/or recommendations confidently. Respects differing points of view. Agrees on group priorities, goals and procedures.	Completes assigned tasks in a timely fashion. Helps to build a consensus. Takes an active position in group by speaking for the group. Takes responsibility for end product with other.	Takes an active position in group by assigning tasks and/or speaking for the group. Takes responsibility for end product that reflects the minority as well as the majority conclusions of the group. Encourages and acknowledges the work of other group members.
Responsibility	No judgment can be made.	Always relies on others to complete assignments.	Rarely does work. Needs constant reminders to stay on task.	Usually does the work. Seldom needs reminders to stay on task.	Always does assign work without being reminded.

3. Assessing students' logical thinking skills based on the Logical Thinking Rubric Score (Learning objectives 1 and 2)

Logical Thinking Rubric Score

Skills	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Identify the goal	No judgment can be made.	States the problem and/or stated goal(s) or objective(s).	Describes the problem and/or stated goal(s) or objective(s) in own words.	Identifies goal or necessity of solving problem.	Identifies goals or need of solving problem clearly and completely.
Identifying the information given	No judgment can be made.	Collects information which is not useful / connect to the problem.	The information needed to solve the problem was not collected.	Identifies information necessary to solve the problem/goals.	Collects all information given /prior knowledge useful for solving problem.
Identifying the condition given	No judgment can be made.	States condition unclearly.	Identifies some conditions which are not useful.	The condition needed for solving the problem was not collected.	Identifies all condition given in details.
Identify the logic	No judgment can be made.	The logics given are not clearly stated.	States some logics to explain the solution.	States all logics to explain the solution.	Clearly states the logics to explain the solution.
Identifying the solution	No judgment can be made.	Selects a solution that does not overcome the obstacle or constraint. Steps of solution are not clear.	Some steps of solution are clear. Selects a solution that overcomes the obstacle or constraint but is not the most effective solution given the options.	Steps of solution are clear. Selects the solution that is the most effective for overcoming the obstacle or constraint but does not completely explain why it is the most effective of the possible solutions.	Identifies steps of solution clearly. Selects the solution that is the most effective for overcoming the obstacle or constraint and accurately explains why it is the most effective of the possible solutions.

Chapter 2 Games in Computing

Duration: 14 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P6/2 Students will be able to design and write a simple program for problem-solving in daily life as well as debugging.

Introduction:

In this chapter, students will design computer programs that involve games. They learn to create a few games using Scratch program.

Learning objectives:

Students will be able to

1. Use Scratch program to:
 - 1.1 animate letters
 - 1.2. create a game by moving a sprite or simple maze game
 - 1.3. code a typing game
 - 1.4. check errors in instructions and debug them
2. Translate text into code for calculating.
3. Work with responsibility.
4. Work with others.

Key competencies:

1. Thinking capacity
2. Problem-solving capacity
3. Capacity for technological application

Concepts:

1. We can design a program by writing in text or drawing a flow chart.
2. The program can be written with variables, loops and condition checks.
3. When finished writing program, we must check each instruction and when we find the cause, we need to debug it until the program shows the correct result.
4. We can develop skills of finding the cause of problems by checking for errors from someone else's program.

Teaching/Learning activities:

Start up:

1. Ask students whether they play computer games. Then, ask them about those game such as
 - a. Which game do you like?
 - b. Why you like those game?
 - c. Are there any interesting parts such as the colors, actions or sprites?
2. Inform students that in this chapter, they will create their own interesting computer games.
3. Download the Scratch program before starting these following activities. Refer to A Note for Teachers on page 25.
4. You may suggest students to download the program on their own computers at home in order to practice their skills at home.

Part 1 Animating letters

1. Help students to recall their experience using the Scratch program when they were in Prathom 5 such as how to design and write a simple computer program with logical thinking as well as debugging.
2. Ask them to create a simple program using thier knowledge from Prathom 5. Ask students which part of the game that they prefer to make more interesting, Then, suggest them that they should animate the letters.
3. Explain how to change the colors of the letters. Refer to page 26. Assign them to work in pairs so that they can help each other. They can scan the QR codes to understand better.
4. Then, guide them to spin the sprite, play a sound, change the size of the sprite and glide the sprite. Refer to page 27. Ask them scan the QR codes to understand the outcomes better.
5. Assign students to do Hands-On Activity 1 on page 28. Ask them to present their work and lead them to share their opinions. They can scan the QR codes to understand better.

Part 2 Chasing games

1. Guide students to create a computer game by moving a sprite using the arrow keys to chase another sprite that move randomly. Refer to pages 29 and 30.
2. Encourage students to challenge themselves by answering the question in Figure It Out on page 29. Discuss their answers.
3. Assign students to do Hands-On Activity 2 individually or in pairs on pages 30 and 31. They can scan the QR codes to understand better.

Part 3 Maze games

1. Show students a maze game and let them play for a while. Then ask them if the game is fun.
2. Explain how to create a simple maze game. Refer to pages 31 to 33. Ask them work in pairs and suggest them to help each other.

3. Reiterate the need to debug if they find errors.
4. Assign students to do Hands-On Activity 3 on page 34. They can scan the QR codes to understand better. Suggest them to debug if they find some errors. Then, ask them show their games and lead them to discuss. Which game is the most interesting one? Why? Are there any other way to make them better?

Part 4 Typing games

1. Ask students whether we can create some letters in computer games by using Scratch program.
2. Explain how create a simple typing game with Scratch step by step. Refer to pages 35 to 37.
3. Assign students to do Hands-On Activity 4 on pages 38 and 39. They can scan the QR codes to understand better. Do not forget to remind them to debug if they find some errors.

Part 5 Calculating activities

1. Explain the highest common factors (HCF) as it is also taught in the subject of Mathematics. Refer to page 41.
2. Tell students that we can solve HCF problems by creating a computer program and they are going to learn it.
3. Explain the steps to create the codes or prepare the programming. Refer to pages 41 and 42. They can scan the QR codes to understand the supposed outcomes better.
4. Explain the lowest common multiple of two numbers (LCM) as it is also taught in the subject of Mathematics. Refer to page 41.
5. Explain the steps to create the codes or prepare the programming. Refer to page 44.
6. Assign students to do Hands-On Activity 5 on page 45. They can scan the QR codes to understand the expected outcome better. Discuss.

Closing:

1. Revise and lead them to discuss what they have learnt in each part. Refer to page 46. You may discuss with them using their works from the Hands-On Activities.
2. You may assign each group to make a problem for another group to design and write code in order to practice more skills. Then, ask them to show their works in class.
3. End the lesson by asking students to do the exercise on pages 46 and 47.

Assessment:

1. Assessing students' cognitive behaviors based on the Exercise on pages 46 and 47 (Learning objectives 1 and 2)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objectives 3 and 4)

Affective Domain Rubric Score

Skill	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Teamwork	No judgment can be made.	Joins a group cooperatively. Listens attentively to members of the group. Contributes to the end product of the group.	Gives input and/or recommendations confidently. Respects differing points of view. Agrees on group priorities, goals and procedures.	Completes assigned tasks in a timely fashion. Helps to build a consensus. Takes an active position in group by speaking for the group. Takes responsibility for end product with other.	Takes an active position in group by assigning tasks and/or speaking for the group. Takes responsibility for end product that reflects the minority as well as the majority conclusions of the group. Encourages and acknowledges the work of other group members.
Responsibility	No judgment can be made.	Always relies on other to complete assignments.	Rarely does work. Needs constant reminders to stay on task.	Usually does the work. Seldom needs reminders to stay on task.	Always does assign work without being reminded.

Chapter 3 Searching for Information Efficiently

Duration: 9 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P6/3 Students will be able to use the Internet in search of information efficiently.

Introduction:

Searching for information efficiently means the ability to find the wanted information quickly from many different reliable sources and the information from each source must be in accord. In this chapter, students will learn how to search for information efficiently. They will learn and practice how to use advanced searching techniques.

Learning objectives:

Students will be able to:

1. Give examples of software or search engines available on the Internet.
2. Use correct keywords or search terms in search engines.
3. List the search results.
4. Use some advanced search techniques.
5. Sort search results by using date and time.
6. Evaluate the online information by verifying its purpose, authority, accuracy and objectivity.
7. Work with others responsibly.

Key competencies:

1. Communication capacity
2. Capacity for applying life skills
3. Capacity for technological application

Concepts:

- Searching for information efficiently means the ability to find the wanted information quickly from many different reliable sources and the information from each source must be in accord.
- There are advanced searching techniques such as using operators and specifying the forms of information or types of files.

Teaching/Learning activities:

Start up:

1. Ask students about their usage of Internet with these following questions:
 - a. Have you ever used the Internet?
 - b. What search engine have you used before? Is it good a search engine?
 - c. What are your purposes of using the Internet?
 - d. Can we trust every information found on the Internet? Why or why not?

Part 1 Search engines

1. Show students some search engines such as Google, Yahoo, Bing and others. Then, ask their experience of using the search engines. Are the search engines you used good? Why or why not?
2. Explain about search engines. Refer to pages 48 and 49.
3. Explain how to use the correct keywords or search terms in search engines. Refer to page 49 and 50.
4. Ask them to search for some information on the Internet using their own keywords. Lead them to discuss about the good, correct and appropriate keywords by comparing the search results of their friends.
5. Explain how to use the advanced search techniques. Refer to pages 51 and 52.
6. Ask them to search for some special information using the advanced search techniques. Lead them to discuss about the techniques by comparing the search results of their friends.
7. Lead students to discuss other features of search engines that allow the sorting of the search results by date and time. Refer pages 52 and 53.
8. Ask them to do Hands-On Activity 1 on page 53.

Part 2 Evaluating information reliability

1. Show students an online advertisement that poses doubts. Then, lead them to discuss how why we need to evaluate information. What happens if we accept whatever information found on the Internet? How will it bring harms?
2. Explain how to evaluate information found online. Give them more examples to evaluate the information reliability. You may use these following interesting simple activities:
 - a. role plays
 - b. assigns each group to find some information online, then give it to another group to check it reliability.

Closing:

1. Ask each group to make a poster to remind them about evaluating information reliability and then paste it on the class.
2. Revise and lead them to discuss what they have learnt. Refer to page 55.
3. End the lesson by asking students to do the Exercises on page 55 and 56.

Assessment:

1. Assessing students' cognitive behavior based on Exercises on page 55 and 56 (Learning objectives 1 to 6)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 7)

Affective Domain Rubric Score

Skill	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Work with others	No judgment can be made.	Works in pair or joins a group cooperatively. Listens attentively to members of the group. Contributes to the end product of the group.	Gives input and/or recommendations confidently. Respects differing points of view. Agrees on group priorities, goals and procedures.	Completes assigned tasks in a timely fashion. Helps to build a consensus. Takes an active position in group by speaking for the group. Takes responsibility for end product with other.	Takes an active position in group by assigning tasks and/or speaking for the group. Takes responsibility for end product that reflects the minority as well as the majority conclusions of the group. Encourages and acknowledges the work of other group members.
Responsibility	No judgment can be made.	Always relies on other to complete assignments.	Rarely does work. Needs constant reminders to stay on task.	Usually does the work. Seldom needs reminders to stay on task.	Always does assign work without being reminded

Chapter 4 Safe Use of Information and Communication Technology

Duration: 9 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P6/4 Students will be able to use information technology safely when working with others, with awareness of their rights, duties and other people's rights. Also, they will be able to inform the person involved when finding inappropriate information or person.

Introduction:

In this chapter, student will learn about Internet addiction, how to use the Internet wisely. They will understand malware and how to install anti-malware software in order to keep the computer working effectively. They will have enough knowledge to choose, download and install appropriate software.

Learning objectives:

Students will be able to:

1. Give examples of ways of using information and communication technology safely.
2. State the negative effects of Internet addiction.
3. Give examples of ways to overcome Internet addiction.
4. Describe types of malware.
5. Detect malware.
6. State how to protect computers from malware.
7. Work with others responsibly.

Key competencies:

1. Communication capacity
2. Capacity for applying life skills
3. Capacity for technological application

Concepts:

- There are many dangers when using the Internet.
- There are many negative effects of being addicted to the Internet and there are ways to overcome it.
- We can protect computers from malware by setting a password and installing anti-malware software.
- We should never install any software from unknown sources.

Teaching/Learning activities:

Start up:

1. Let students watch news/ DO clip of Internet addiction and then lead them to discuss
 - What happened?
 - Why did it happen?
 - Have you heard of Internet addiction?
 - What is Internet addiction in their understanding?

Part 1 Internet addition

1. Use the clip VDO/news from the start-up activity to explain about Internet addiction.
2. Assign each group read the story in Hands-On Activity 1 on page 58. When they have finished, lead them to discuss the questions posed in groups. Then, asks them to share in class.
3. You may use VDO clip from More Videos on page 58 to discuss more about Internet addiction. Refer to page 59 too.
4. Explain the types of Internet addiction. Refer to page 59. Ask students to think about the type of Internet addiction for the cases used in the start-up activity, Hands-On Activity 1 and More Videos.
5. Let students check and evaluate themselves about Internet addiction. Refer to page 60. Then lead them to discuss in group and share the answers.
6. Encourage them to brainstorm to answer the question in Figure It Out on page 60.
7. Assign each group think and share their ideas about the negative effects of Internet addiction and ways to overcome Internet addiction. Then conclude in groups and share their conclusions in class. Add on by referring to page 61 to 64.
8. Encourage them to read the extra information in More Info on page 61.
9. Encourage to know more the common abbreviations used on the Internet by scanning the QR code in More Video on page 62.
10. Assigns each group to do Hands-On Activity 3 on page 64. You may suggest them to present by using verity presentation method in order to make it more interesting such as role playing.

Part 2 Malware

1. Explain about malware and the types of malware. Refer to page 65.
2. Challenge each group to think about the differences between a computer virus and a computer worm. Then, asks them to share the answers. Refer to Figure It Out on page 65.
3. Ask students about their experience in detecting malware and ways to protect computers from malware. Let them share their experience in groups.
4. Watch the video on what to do if our computers are affected by malware by scanning the QR code in More Vidoes on page 66.
5. Explains more about protecting computers from malware. Refer to page 67 and 68.
6. Assign each group to discuss about using password for prevention of malware and share in class. Assign students to share the ideas with their family about using passwords. Refer to Hands-On Activity 4 on page 68.

Part 3 Installation of malware from unknown sources

1. Explain about the problems of installing software from unknown sources. Refer to page 69.
2. Explain more about downloading and installing software safely. Refer to page 70.
3. Assign each group to read the story in Hands-On Activity 5 on page 71. Then, ask them to discuss the questions posed in class.

Closing:

1. Revise and lead them to discuss what they have learnt. Refer to page 71.
2. Assign each group to create a poster of how to overcome Internet addiction
3. End the lesson by asking students to do the exercise on pages 72 and 73.

Assessment:

1. Assessing students' cognitive behavior based on the Exercises on pages 72 and 73 (Learning objectives 1 to 6)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 7)

Affective Domain Rubric Score

Skill	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Teamwork	No judgment can be made.	Joins a group cooperatively. Listens attentively to members of the group. Contributes to the end product of the group.	Gives input and/or recommendations confidently. Respects differing points of view. Agrees on group priorities, goals and procedures.	Completes assigned tasks in a timely fashion. Helps to build a consensus. Takes an active position in group by speaking for the group. Takes responsibility for end product with other.	Takes an active position in group by assigning tasks and/or speaking for the group. Takes responsibility for end product that reflects the minority as well as the majority conclusions of the group. Encourages and acknowledges the work of other group members.