



Computing

Science

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

Primary
Education
Smart+
Prathomsuksa

4

Lesson Plan



Chapter 1 Logical Thinking

Time: 8 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P4/1 Students will be able to solve problems with logical thinking, explain work process and predict the results of uncomplicated problems.

Introduction:

In this chapter, students will understand about logical thinking. They will learn how to apply their logical thinking in order to solve the simple problems in their daily life.

Learning objectives:

Students will be able to:

1. Understand logical thinking
2. Explain the work process of logical thinking for solving simple problems
3. Predict the results of solving problems.
4. Choose the appropriate ways of solving problems.
5. Work with friends with responsibility.

Key competencies:

1. Thinking capacity
2. Problem-solving capacity
3. Capacity for applying life skills
4. Capacity for technological application

Concepts:

Logical thinking is a way of thinking in a proper or disciplined way with the application of rules and conditions to solve problems. Different ways to begin the work solving process will give different results.

Teaching/Learning activities:

Start up:

1. Ask students to recall their problem-solving lesson. You may use these following sample questions:
 - How did you solve some simple problems by using the comparing method in some games?
 - How did you use the trial and error method to solve some problems?
 - Can you explain the steps of solving problem through writing, drawing or using symbols?

Part 1 What is logical thinking?

1. Use the example on page 1 to explain the definition of logical thinking. You may give a simple problem first and assign students to solve it. Discuss how to solve it. After that, ask them to solve the example on page 1 or other complicated problems. Some students may not solve it

and some students may solve it. Lead them to discuss how to solve. For those who could not solve, make them understand the problem and the solution.

2. Assign more examples of problems to each group of students to solve. Then, lead them to discuss and explain the steps to do so.
3. Lead them to think what would happen if we do not think in a proper or disciplined manner. Refer to the question in Figure It Out on page 2.
4. Assign students to practice problem solving through logical thinking by playing games. Refer to More Games on page 3.
5. Ask students to read and understand the problem posed on page 4. Lead a discussion on how to solve it. Emphasize that we should not jump to conclusion but to understand and think thoroughly about the problem.
6. Explain more about steps of solving problem by using the example on page 4. Then, assign them to solve the problems mentioned in Figure It Out on page 4.
7. Lead them to discuss that we need to know or collect all of information given in a problem and then find out what they need to find out. Refer to page 5. Guide them to understand more about problems related to ages by referring to More Info on page 5.
8. Use the example on page 6 to practice logical thinking. Then, assign them to do Hands-On Activity 1 on page 7.
9. Suggest students to solve some riddles in order to practice their logical thinking by scanning the QR code in More Games on page 7.
10. Explain how we should sort information using logical thinking. Refer to pages 8 to 10.
11. Leads them to discuss about the results and methods of sorting information. Refer to Figure It Out on page 9.
12. Assign students to do Hands-On Activity 2 on page 11. When they have finished, ask them to show their results and discuss in class.
13. Use the example on page 12 to explain how to use logical thinking to solve more complicate problems. Remind them that they should identify all the given information first, then figure out what they want to solve and how to solve. Suggests them to use symbols to show the steps of solving.
14. Get students to read the next situation on page 13. Ask them to help Sanit to solve his problem. Then, only refer to the solution provided on pages 14 and 15.
15. Encourage students to discuss the questions posed in the Figure It Out on pages 14 and 15. Let them conclude the steps of solutions.
16. Assign them to practice more logical thinking by doing Hands-On Activity on page 16. Lead them to show their results and discuss.

Part 2 Important of logical thinking

1. Discuss in class and lead them to think about the importance of logical thinking by using the problems in previous part.
2. Use the example on page 17 to make students the importance of logical thinking.
3. Guide them to understand more about scam. Refer to More Info on page 18.

Part 3 Computational thinking and logical thinking

1. Help students to understand the components of computational thinking.
2. Lead them to understand that even in computational thinking, logical thinking is applied.
3. Use the example on pages 19 and 20 to explain further.

Closing:

1. Revise and lead students to discuss what they have learnt. Refer to page 21.
2. Find or create a problem and ask students to solve using logical thinking. Ask them to discuss the solution and the reason for their proposed solution.
3. End the lesson by asking students to do the exercise on pages 21 to 23.

Assessment:

1. Assessing students' cognitive behaviors based on Exercise on pages 21 to 23 (Learning objectives 1 and 2)
2. Assessing students' problem-solving skills based on the Problem-Solving Skills Rubric Score (Learning objectives 3 and 4)

Problem-Solving Skills Rubric Score

Skills	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Framing the problem	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).	Identifies information necessary to solve the problem.	Determines what prior knowledge will be useful in solving the problem.
Solution finding	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 possible solution.	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 possible solution.

3. Assessing student's affective behavior using the Affective Domain Rubric Score (Learning objective 5)

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. Help 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.

Chapter 2 Computer Programming

Time: 12 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P4/2 Students will be able to design and write a simple computer program by using computer software or multimedia, as well as to debug.

Introduction:

In this chapter, students will understand that computer programming is setting up an order of instructions for computer operations. They will understand the process of simple coding. They will design and write a simple computer program by using the computer software or multimedia, as well as do debugging.

Learning objectives:

Students will be able to:

1. Design storyboards.
2. Write a flow chart for preparation to write simple computer programs.
3. Write simple computer programs.
4. Check for errors in computer programs and solve the problem (debugging).
5. Work with efforts.

Key competencies:

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

Concepts:

- Simple design of a program can be done by using storyboards or algorithms.
- Computer programming is setting up an order of instructions for computer operations. If there is any error, we have to check each instruction and when finding the cause, we will need to debug it until the program shows the correct result.

Teaching/Learning activities:

Start up:

1. Review their understanding about designing and debugging simple coding they have learned in Prathom 3.
2. You may ask them to think about how we use that knowledge to create a storyboard or an algorithm.

Part 1 Designing the program

1. Explain that there are many types of programs that we can design such as games, animations and calculation.
2. Encourage them to scan the QR code in More Info on page 24 to know other programs that we can design and create.
3. Guide them to think of the certain aspects that we need to decide prior to designing a program. Refer to page 24.
4. Explain that we can prepare a storyboard to show what happens when the program is played.
5. Explain what and how to prepare a storyboard. Refer to pages 25 and 26.
6. Encourage them to read the extra information about storyboards in More Info on page 25.
7. Explain that instead of a storyboard, we can prepare an algorithm in the form of a flow chart which they have studied earlier to outline the program. Refer to page 26.
8. Assign students to do Hands-On Activity 1 and 2 on pages 27 and 28 to ensure that they understand and can design the storyboard and flow chart.

Part 2 Simple coding

1. Help students to recall how to write scripts for a sprite to draw a square using Scratch. Refer to Hands-On Activity 3 on page 29. Suggest them to check for errors and debug if result is not correct.
2. Explain how to write scripts to draw geometric shapes. Refer to pages 29 and 30.
3. Assign students to carry out Hands-On Activity 4 on page 30 to write a program to draw an octagon. Always remind students to run the program. If it does not give the correct results, then advise them to check for errors and debug. You may assign them to work in groups in order for them to share their ideas or help each other in checking for errors. Then, ask them to share their experiences with their class.

Part 3 Making a sprite dance to music

1. Help students to recall how to make a move by using different costumes. Encourage them to scan the QR code to have a better understanding of the expected results.
2. Explain how to insert sound or music and make the sprite dance based on your previous script. Refer to pages 32 to 34.
3. Lead students to discuss about what to do if they find problems with their programs. You may ask them to share their experience in designing, writing code and debugging.
4. Assign students to do Hands-On Activity 6 on page 35. Then ask them to share their experiences in regardless if they succeed or not.

Part 4 Making sprites communicate

1. Review with students the process of designing simple codes and inserting more music in the previous program.

2. Explain the steps of making sprites communicate. Refer to pages 36 to 38. Always remind to scan the QR codes to view the expected results.
3. To ensure that students can write a simple program with conversations, assign students to do Hands-On Activity 7 on pages 39 and 40.
4. Explains to students that they can compare their results by scanning the QR code given.
5. You may ask them to share their experiences and discuss in class.

Closing:

1. Revise and lead students to discuss what they have learnt. Refer to page 40.
2. Emphasize the importance of checking for the errors and debugging.
3. End the lesson by asking students to do the exercise on pages 41 and 42.

Assessment:

1. Assessing students' cognitive and psychomotor behaviors based on Exercise on pages 41 and 42. (Learning objectives 1 to 4)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 5)

Affective Domain Rubric Score

Skill	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Work with efforts	No judgment can be made.	Puts very little effort to the task and is unwilling to accept help from friends or teacher.	Puts some effort to the task and stops working when difficulty arise.	Works on task until it is completed or continues working on task when difficulty arises or solution is not immediately evident.	Works on task until it is completed. Works on task until it was completed or continues working on task when difficulty arises or solution is not immediately evident. Views the difficulties as opportunities to strengthen understanding.

Chapter 3 Data handling

Time: 12 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicator: P4/4 Student will be able to collect, evaluate and present data and information through various software to solve problems in daily life.

Introduction:

In this chapter, students will learn how to collect data by selecting the topic and preparing the equipment. They will also analyses, generate possible solutions and evaluate them by comparison and selection of the best solution. They will practice how to use storytelling, writing reports, creating posters and using presentation software for problem-solving in daily life.

Learning objectives:

Students will be able to:

1. Organize and analyze data by using Microsoft Excel.
2. Use statistical investigation to solve problems.
3. Work responsibly with friends in teams.

Key competencies:

- Communication capacity
- Problem–solving capacity
- Capacity for applying life skills
- Capacity for technological application

Concepts:

- Microsoft Excel is a spreadsheet application software. It allows us to organize and analyze data.
- We can collect data by selecting the topic and preparing the equipment.
- Data presentation can be done in many ways such as storytelling, writing reports, creating posters and using presentation software.

Teaching/Learning activities:

Start up:

1. Show students an example of data such as scores of a test. Then, ask them how they can organize the data in order to for others to understand it better. You may also ask them whether they have seen some charts in school such as charts showing the numbers of students. Ask them to give ideas on how to reorganize those charts.

Part 1 Microsoft Excel

1. Explain how we use Microsoft Excel step by step. You should start from how to open Microsoft Excel. Then, guide them to save a file, insert data, merge cells and use the sum function. Refer to pages 43 to 47. You may use some data which they are familiar with such as their scores of other subjects as an example for this concept.
2. Assign students to do Hands-On Activity 1 on page 48. You may ask them to show their answers and lead them to discuss the benefits of using Microsoft Excel to organize data.
3. Use the same example as in step 1 to explain how to insert charts.
4. You may use more examples such as shown on pages 49 and 50 in order to make sure that they understand well.
5. Assign students to do Hands-On Activity 2 on page 51. You may ask them to show their answers and analyze how to check if they are correct.

Part 2 Solving problems with statistical investigations

1. Explain that we can solve some problems by getting the data or information and then organize data. Refer to page 52.
2. Explain that we should start with planning the survey. Use the example on pages 53 and 54 to explain the steps in planning a survey. You may explain about types of data that we can get by surveying.
3. Explain the steps of collecting data and analyzing data. Refer to pages 55 to 57.
4. Explain how to present their findings. Refer to page 58.
5. Assign each group of students to do Hands-On Activity 3 on page 58. You may ask them to present their findings in class. Ask other groups of students to comment their presentation. You may suggest the relevant aspect for them to comment such as the ease to understand the findings and the appropriateness use of color and size of fonts and font types.

Closing:

1. Revise and lead students to discuss what they have learnt. Refer to page 59.
2. End the lesson by asking students to do the exercise on pages 59 and 60.

Assessment:

1. Assessing students' cognitive behavior based on the Exercise on page 59. (Learning objective 1)
2. Assessing students' problem-solving skills based on the Problem-Solving Skills Rubric Score (Learning objective 2)
3. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 3)

Problem-Solving Skills Rubric Score

Skills	No judgement can be made 0	Need improvement 1	Partially proficient 2	Proficient 3	Advanced 4
Framing the problem	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 information necessary to solve the problem.	Determine what prior knowledge will be useful in solving the problem.
Solution finding	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 possible solution.	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.

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 others.	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.

Chapter 4 Information and Communication Technology

Time: 8 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicators: P4/3 Students will be able to use the Internet for knowledge acquisition and evaluate information reliability.

P4/5 Students will be able to carefully use information technology 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, students will use keywords to find information. They will consider and compare the content when getting the information from websites. They will choose the information that are in accord, as well.

Learning objectives:

Students will be able to:

1. Set keywords to find information.
2. Use search engines to find online information.
3. Consider and compare the content when getting the information from websites.
4. Give examples of the characteristic of good digital citizens.
5. Work responsibility in teams.

Key competencies:

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

Concepts:

- Short and accurate keywords help us find online information that we need quickly and accurately.
- Online Information reliability can be considered from the types of websites (government sectors, news agencies, organizations), authors, publication dates and reference sources.

Teaching/Learning activities:

Start up:

1. Ask students for their experience of
 - using the Internet
 - searching online information,
 - using keywords and setting their keywords.

Part 1 Searching for information online

1. Review students' understanding of the Internet that they have learned in Prathom3 The Internet is a computer networks which connect to other computers. Refer to page 61.
2. Explain about search engines which is the software to help us to search for online information. Ask students to share their experience of using search engines.
3. Give them more examples of other search engines. Refer to page 62.
4. Lead students to discuss the advantages and disadvantages of each search engine according to their experiences.
5. Ask students to show how to use and set their keywords for searching online information.
6. Explain about setting keywords and give them more examples of good keywords. Refer to page 63.
7. assign students to do Hands-On Activity 1 on page 63. You may ask them to share their answers and lead them to discuss.
8. Explain more about using images and voices to search for online information. Refer to More Info on page 63.
9. Give them an example of online information and ask them whether this information is reliable. How do they judge? What are their criteria? You may lead them to discuss about this topic by using their experience.
10. Explain more about the criteria used to check the reliability of sources. Scan the QR code in More Videos on page 64 and let them watch the video.
11. Explain more about the reliability of information sources. Refer to pages 65 and 66.
12. Lead students to discuss whether Wikipedia is a reliable source of information. Refer to Figure It Out on page 66.
13. Assign students to do Hands-On Activity 2 on page 67. When they have finished, ask other groups to comment on their friend's works.
14. Explain more about URL. Refer to More Info on page 67.

Part 2 Digital rights, responsibilities and etiquette

1. Ask students for their experience of digital rights, responsibilities and etiquette.
2. Teacher assigns students to do Hands-On Activity 3 on page 68. When they have finished, lead them to discuss their answers.
3. Explain more about digital citizens and digital rights. Refer to page 68.
4. Assign students to do Hands-On Activity 4 on page 69. Then, lead them to discuss their answers.
5. Explain the 3 levels of digital responsibilities. Refer to pages 70 and 71.
6. Explain about digital etiquette. Refer to pages 72 and 73.
7. Let them watch the video to understand digital etiquette better by scanning the QR code in More Videos on page 72.
8. Assign students to do Hands-On Activity 5 on page 73. Then, lead them to discuss their answers. Give them more information on digital etiquette. Refer to More Info on page 73.

Closing:

1. Review their understanding of using the Internet. For more understanding, use some examples in daily news for this activity. Refer to page 74.
2. End the lesson by asking students to do the exercise on pages 74 and 75.

Assessment:

1. Assessing students' cognitive behavior based on the Exercise on pages 74 and 75 (Learning objectives 1 to 4)
2. Assessing students' affective behaviors based on the Affective Domain Rubric Score (Learning objective 5)

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. Listen 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 others.	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