PELANGI

Computing

Science

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

Primary Education Smart+ Prathomsuksa

3

Lesson Plan

Chapter 1 Algorithms

Duration: 10 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicators: P3/1 Students will be able to demonstrate algorithms in work or simple problem-solving by using pictures, symbols or texts.

Introduction:

In this chapter, students will learn how to use algorithm to solve problem. They will use algorithm through writing, storytelling, drawing, using symbols and playing game.

Learning objectives:

Students will be able to:

1. Use storytelling to set algorithm.
2. Use drawings to explain algorithm.
3. Use symbols to explain algorithm.
4. Work with responsibility.

Key competencies:

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

Concepts:

- Algorithm is a problem-solving procedure. It can be demonstrated through writing, storytelling, drawing, or using symbols.

Teaching/Learning activities:

Startup:

1. Ask students to explain step by step of doing something such as
   - preparing themselves for school
   - changing into the school uniforms
   - playing the Bingo game
2. Ask students to think about the importance of the steps when they have to do something. You may use these following questions:
   - Do we need to follow the steps?
   - Can we switch or miss some steps? Why or why not?
   - What are the characteristics of a good step-by-step instructions?

Part 1 What are algorithms?

1. Explain about algorithm by using the examples on pages 1 and 2.
2. Emphasize that algorithms are the sets of step-by-step instructions to solve problems.

3. Ask students to answer the question in Figure It Out on page 2. Discuss together.

Part 2 Writing algorithms

1. Use the example on page 3 to explain how to write an algorithm. Guide them to use symbol to represent the algorithm.
2. Ask students to give more example of step-by-step instructions. Then, ask them to convert the instructions or algorithms into symbols. Lead them to share their ideas. You may assign them to work in groups.
3. Assign students to do Hands-On Activity 1 on page 4.
4. Ask students if they have played Tic-tac-toe before. Ask two volunteers to play it on the board. Ask for the rules and how to play the game.
5. Encourage students to understand the game more by playing it online. Ask them to scan the QR code in More Games on page 6.
6. Assign groups of students to do Hands-On Activity 2 on page 7. Then, ask them to share their answers and discuss in the class. You may assign this activity as individual homework.
7. Ask students if they have played Tetris before. Get a student who has played this game to explain the rules and how it is played.
8. Let them familiarize themselves with the game by playing it online. Ask them to scan the QR code in More Games on page 8.
9. Assign students to do Hands-On Activity 3 on page 9 in groups or as individual homework. Then ask them to share their answers and lead them to discuss.
10. Encourage them to discuss the question in Figure It Out on page 9.
11. Ask each group of students to select an interesting place in the school. Then, ask them to write instructions on how to reach that place from the classroom. Lastly, exchange the instructions and ask them to follow the instructions to find out if the instructions can lead them to the said places. Then, ask them these questions:
    - Did the instructions lead them to the places?
    - Are the instructions clear? Do you understand them?
    - Did you follow all the steps or did you skip some? Why?
    - What happens if you do not follow the instructions?

    If the instructions are not clear or did not lead them to the said place, ask them to improve the instructions. Then, re-write the instructions using symbols.
12. Use the example on pages 10 and 11 to explain further. Encourage them to answer the question in Figure It Out on page 10.
13. Assign students to do Hands-On Activity 4 on pages 11 and 12. Then ask them to share their ideas when they finish.
14. Assign students to do Hands-On Activity 5 on page 13. Lead them to share the answer and discuss. You may assign this activity in groups or as individual homework.

Closing:

1. Revise and lead students to discuss what they have learnt. Refer to page 14.
2. You may assign each group to create algorithms either verbally, by writing or by using symbols.
3. You may also assign each pair of students to play a game. Then, ask them to write an algorithm on how to play the game. Lastly, guide them to analyze if their algorithm is a good one or not.
4. End the lesson by asking students to do the exercise on pages 14 to 16.

Assessment:

1. Assessing students' cognitive behaviors based on Exercise on pages 14 to 16 (Learning objectives 1 to 3)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 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 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.

Chapter 2 Computer Programming

Duration: 12 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicators: P3/2 Students will be able to write a simple computer program by using computer software or multimedia, as well as to debug.

Introduction:
In this chapter, students will learn about basic computer programming through block-based software. They will also learn how to make simple codes using Scratch. They will debug by examining the instructions when the results do not turn out as expected.

Learning objectives:
Students will be able to:
1. Write step-by-step looping instructions.
2. Examine the instructions when the results do not turn out as expected (debugging).
3. Write simple codes.
4. Work in teams with responsibility.

Key competencies:
1. Thinking capacity
2. Capacity for applying life skills
3. Capacity for technological application

Concepts:
- Computer programming is the setting up of a set of instructions for computer operations.
- A loop in computing programming is a set of instructions that repeats until a certain condition is met.
- Debugging helps to correct a faulty program that does not produce expected results.
- Scratch a block-based software is used in this chapter.

Teaching/Learning activities:
Start up:

1. Review students' understanding of step-by-step instructions from the previous chapter.
2. Review their understanding of using symbols in the instructions.

Part 1 Looping

1. Ask students if they have repeated doing something until a certain criterion is met. For example, you keeping blowing balloons until you have blown up 10 balloons for a party. Tell them in computer programming, a set of instructions that are repeated until a condition is met is known as looping.
2. Further explain *looping* by using the example on pages 17 to 20.
3. Ask students to give some examples of looping activities and discuss how to write the instructions using symbols.
4. Challenge students to answer the question in Figure It Out on page 19.
5. Explain how to convert the symbols of instructions into block-based instructions. Refer to page 20.
6. Assign students to do Hands-On Activity 1 on pages 20 to 22. This activity should be done in groups so that they can help each other and share their knowledge or understanding. They should share and discuss their answers in class when they have finished. Ask them these questions:
    - Do they have to fully understand how the car move first?
    - What are the repeating steps?
    - How do they simplify the repeating instructions using the loop?
    - Where does each loop start and end?
    - What is the criterion or condition for each loop to stop?
7. Assign them to do Hands-On Activity 2 on pages 22 to 25. They should try out their instructions to see if the results are correct. If not, get them to debug. Ask students to compare and discuss their results in class. Ask them these questions:
    - Do they have to fully understand the steps in the dance first?
    - Can they identify the repeating steps?
    - Can they simplify the repeating instructions using the loop?
    - Where does each loop start and end?
    - What is the criterion or condition for each loop to stop?
8. Assign students to do Hands-On Activity 3 on pages 26 and 27 in groups. Lead them to share their results and discuss how to debug. Get them to vote for the best or creative dance move.
9. Let them know that songs have repeating lyrics too. Refer to page 28.
10. Assign students to do Hands-On Activity 4 on page 28.

Part 2 Simple coding

1. Review students' understanding and skills of using Scratch program.
2. Explain and show how to make sprite walk or run. Refer to pages 29 to 32. You should prepare the lesson by downloading the Scratch program before starting the class. Ask them to scan the QR codes available to view the results of the instructions. Give them time to practice and understand it. Encourage them to practice at home.
3. Explain that there are many different sprites and backgrounds that are available. Explain and show how to change the sprites and backgrounds. Refer to pages 33 and 34.
4. Assign students to do Hands-On Activity 5 on page 34. Encourage them to be creative. Ask them to vote for the most interesting stage.
5. Assign them to do Hands-On Activity 6 on page 35. Ask them to view how the results should be by scanning the QR code. When they have finished, ask them to share and discuss their results. Always ask them to debug their programs first. If the result is still not as expected, then ask them to get help from friends.
6. Explain that we can get the sprite to draw lines. Explain and show to do it. Refer to page 36.
7. Assign them to do Hands-On Activity 7 on page 36. Guide them to realize the error in the program and how to debug it.
8. Explain and show how to draw lines from the tip of the pencil sprite. Refer to page 37. To ensure they understand, ask the to write a script that enable the can sprite to draw lines with its foot.
9. Assign each pair of students to work on Hands-On Activity 8 and 9 on pages 38 and 39. Ask them to debug if the results are not as expected.
10. Explain that there are other different types of loop instructions. Refer to More Info on page 39.

Closing:

1. Revise and lead students to discuss what they have learnt. Refer to page 40.
2. Use these questions to discuss:
   - What is a loop in computing? Give an example with its criterion or condition.
   - What are the examples of loop activities that happen in our daily life?
   - How do we change the sprites and backgrounds in the stage?
   - How do we make the sprite walk and run? What is the difference between them?
   - How do we draw lines?
3. End the lesson by asking students to do the exercise on pages 40 and 41.

Assessment:

1. Assessing students' cognitive behavior based on the Exercises on pages 40 and 41 (Learning objective 1 to 3)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 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 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 3 Data Handling

Duration: 10 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicators: P3/4 Students will be able to collect, process and present data by using a computer software according to their purposes.

Introduction:

In this chapter, student will understand how to use Microsoft PowerPoint to present data. They will also learn how to collect data and analyze and present data. They will apply these tools to their daily learning such as preparing reports for other subjects.

Learning objectives:

Students will be able to:

1. Choose topics and preparing collecting data.
2. Organize and analyze data by using the comparison, classifying, calculation or summarizing functions.
3. Choose appropriate presentation method by using various software program such as Microsoft Excel, Microsoft Word, or Microsoft Paint or Microsoft PowerPoint.
4. Work in groups with responsibility.

Key competencies:

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

Concepts:

- Process of collection data composes of data collection, data processing and data presentation.
- First, data collection starts from choosing the topic and preparing related equipment for taking notes.
- Data processing is way of analysis data which can be done by comparison, classification, sequencing and others.
- Data presentation includes storytelling, writing a report and creating charts or posters.

Teaching/Learning activities:

Start up:

1. Show students some presentations using Microsoft PowerPoint program. Then, ask these following sample questions (the answers will depend on their experiences):
   - Have you ever seen this type of presentation?
   - Do you know which program we use to have this presentation?
   - When we compare the data presentation done with Microsoft PowerPoint and data presentation done on paper, which one is interesting? Why?

Part 1 Microsoft PowerPoint

1. Explain that the computer software that is used in the start-up activity is Microsoft PowerPoint. It is a presentation graphic software which lets us create engaging presentation slides.
2. Explain and demonstrate how to use Microsoft PowerPoint step by step. Refer to page 42 to 49.
3. Assign student to do Hands-On Activity 1 on page 49. Them asks them show their results in class.
4. You may assign one more activity in order to make them understand all steps better. Assign each group of students to select their own topic of presentation. Once they have finish, ask them to present their work in the class. Lead them to give comments to highlight the good and weak points of the presentations. Besides that, encourage them to give suggestions to improve the presentations.

Part 2 Collection, analysis and presentation of data

1. We need to collect data first in order to present the data. There are a few ways to do it. We can use a questionnaire, interview people and observe people's behaviors. Explain how we can do so. Refer to pages 50 and 51.
2. Explain more about questionnaires. Refer to More Info on page 50. You may show them more varieties of questionnaires which we can use in our daily life.
3. Get students to carry out Hands-On Activity 2 on page 51. What method do most of the students choose? Why?
4. Demonstrate how we can organize and analyze data. Guide them to make simple table to organize data. Refer to page 52.
5. Guide students to analyze data by comparing, classifying, calculating, or summarizing the data. Refer to page 52.
6. Ask students what they know about pictograms. Give them some data and ask them to present the data in a pictogram. Refer to page 53.

7. Inform students that there are many types of charts to present data besides pictograms. Encourage them to read the information in More Info on page 53. You may explain further about the other charts such as pie charts, line charts and bar charts.
8. Explain how to present data by using posters. Refer to page 54.
9. Show them a report. Ask them to compare data presentation using a report and a pictogram. What are the differences?
10. Explain the steps in preparing a report. Refer to page 55.
11. Encourage them to scan the QR code on page 54 to know how to write a good report.
12. Inform students that they can use various software program such as Microsoft excel, Microsoft word, or Microsoft paint or Microsoft PowerPoint to present their data either by making posters, charts or reports. Refer to page 56.
13. To increase their understanding, assign each group of students to do Hands-On Activity 3 and 4 on page 57. Ask them to share their work and explain how to they did step by step. Then, ask other groups to comment their friends' works.

Closing:

1. Revise and lead them to discuss what they have learnt. Refer to page 57.
2. Use these following questions to discuss:
   - What is the use of Microsoft PowerPoint?
   - How do you make the slides more interesting?
   - How do we collect data?
   - How can we analyze data? Why do we need to analyze data?
   - How do we present data?
   - Is it better to use computer software to present data? Why?
3. End the lesson by asking students to do the exercise on page 58.

Assessment:

1. Assessing students' cognitive behavior based on Exercise on page 58. (Learning objectives 1 to 3)
2. Assessing students' affective behavior based on the Affective Domain Rubric Score (Learning objective 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 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

Duration: 10 hours

STAND 4: Technology

Standard: Sc. 4.2

Indicators: P3/3 Students will be able to use the Internet for knowledge acquisition.
P3/5 Students will be able to use information technology safely and comply with the practices when using the Internet.

Introduction:

In this chapter, students will learn about the Internet and use the Internet for knowledge acquisition. They will realize and practice how to use the Internet safely. They will understand the advantages and disadvantages of using information technology and communication and apply the knowledge in their daily life

Learning objectives:

Students will be able to:

1. use web browsers to read documents on web pages
2. tell ways of using the Internet safely
3. work in teams

Key competencies:

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

Concepts:

- The Internet is a massive network that makes communication more convenient and rapid and is regarded as a source of knowledge facilitating learning and living.
- A web browser is a program used for reading documents on webpage.
- A digital citizenship is the idea of people using information and communication technology appropriately and responsibly.
- There are advantages and disadvantages of using information technology and communication.

Teaching/Learning activities:

Start up:

1. Ask students about their experiences of using the Internet. Use these questions:
    - Have you ever used the Internet?
    - How do you access the Internet?
    - How often do you use the Internet?
    - Did you use the Internet alone or under the supervision of your parents or other adults?
    - What did you do if you found inappropriate contents from the Internet?
2. Ask students to collect, analyze and present data on how we use the Internet in our daily life. Let students realize that we can apply our knowledge from previous. Ask them to discuss results in class.

Part 1 Digital citizenship

1. Explain about digital citizens and digital citizenship. Refer to pages 59 and 60.
2. Lead students to discuss why digital citizenship is important and how they can be good digital citizens as they are very young people. Refer to Figure It Out on page 60.
3. To gauge students' understanding, ask them to do the Hands-On Activity 1 on page 61. Then, leads them to discuss with these questions:
    - Have you ever done as what are listed in the table?
    - Do you know anyone who is a good digital citizen? How do they feel?
    - Are you proud of yourself when you act as a good digital citizen?
4. Explain more about how to protect personal data, stay safe online, and balance our time. Refer to page 62. You may use various teaching methods for this topic such as
    - using real examples in newspapers to discuss.
    - using questions to lead them to discuss.
    - giving each group of students a situation to discuss.
    - think-pair-share activities for active learning strategies.
    - asking students to share their family agreement of using the Internet.
5. Assign students to do Hands-On Activity 2 on page 63. Then, asks them to share their answers.
6. Explain about digital footprints and how to manage it. Refer to page 64.
7. Assign students to do Hands-On Activity 3 on page 64. Then, asks them to share their ideas in class when they have finished.
8. Lead students to discuss about situation mentioned in Figure it Out on page 64.
9. Explain about respecting copyright of others when they are using the Internet. Refer to page 65. Then, give them more information and examples of copyright. Refer to More Info on page 65.
10. Assign students to do Hands-On Activity 4 on page 65. Then, asks them to share their answers and discuss in class.

11. Ask students to scan the QR code on in more Videos on page 65 and watch the video at home. Then, discuss about it the following day.
12. Explain about cyberbullying and digital etiquette. Refer to page 66. You may use real stories from the Internet or the newspaper for students to discuss.
13. Assign students to do Hands-On Activity 5 on page 66. Discuss their conclusion in class.

Part 2 Information and Communication Technology

1. Explain what information and communication technology (ICT) is and how we use it. Refer to pages 67 and 68.
2. Let students watch the video by scanning the QR code in More Videos on page 67 for further understanding.
3. Lead students to discuss the uses of ICT and then assign them to do Hands-On Activity 6 on page 68. Ask them to collect, analyze and present their answers. Remind them of what they have learned in the previous chapter.
4. Lead students discuss how ICT impact our daily life. Refer to pages 69 and 70.
5. Give them some ideas of new jobs created due to ICT. Refer to More Info on page 70.
6. Ask students to search for information of interesting topics such as origami, cooking or history by using any web browsers. Ask them to share their results and explain their searching process. Then, discuss about the advantage and disadvantage of ICT.
7. Explain and give more examples of the disadvantages of using ICT. Refer to pages 71 and 72. You may discuss with students first, and then let them watch the by scanning the QR code in More Videos page 71. After that, lead them to discuss and conclude about disadvantages of ICT.
8. Challenge each group to discuss and find solutions to the questions posed in Figure It Out on page 72. Ask them to share their answers when they have finished.
9. Lead students to discuss how the negative impacts caused by ICT. Ask them to present their answers using ICT. Refer to Hands-On Activity 7 on page 73.

Closing:

1. Revise and lead them to discuss what they have learnt. Refer to page 73.
2. Lead students to discuss and brainstorm about good digital citizenship until they can conclude what they should do as a good digital citizen.
3. Lead students to conclude about the advantages and disadvantages of ICT.
4. End the lesson by asking students to do the exercise on page 74.

Assessment:

1. Assessing students' cognitive behavior based on Exercise on page 74. (Learning objectives 1 and 2)
2. Assessing students' affective behavior 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.