photon

ALGORYTHMS AND SEQUENCES

www.photonrobot.com

ALGORITHMS AND SEQUENCES 1.1.1

Introduction

author: Zuzanna Olechno

1. Introduce the class to the new terms. Ask the volunteers to read the terms and explain it to the group with their own words.

2. Explain the terms and make sure that the class understands the meaning of the new terms.

3. Prepare cards with the terms for each student (you will find them in the attachment).

4. Let each student draw one term and acquaint themselves with the definition. Each student will then present the term with their own words, one by one. The rest of the class guesses what term is being described. Model a sample definition to show the children an example of the task.

Example:
definition: creating statements that will be understood by robots,
answer: programming

NEW TERMS

algorithm - a set of steps that you must follow to solve a problem

sequence - a series of statements arranged in the correct order

program - a sequence of statements written in a language understood by the robots or computers

programming - creating program

command - one instruction

interface - a place where a robot or machine are programmed

application - a tool to communicate with the robot, computer or smartphone

Materials to be cut out: cut on the dotted line

algorithm
a set of steps that must be followed to solve a problem

sequence
a series of statements arranged in the correct order

program
a sequence of statements written in languages understood by robots or computers

programming
creating program

command
one instruction

interface
a place where a robot or machine are programmed

application
a tool to communicate with the robot, computer or smartphone

ALGORITHMS AND SEQUENCES 1.2.1

Offline task

author: Zuzanna Olechno

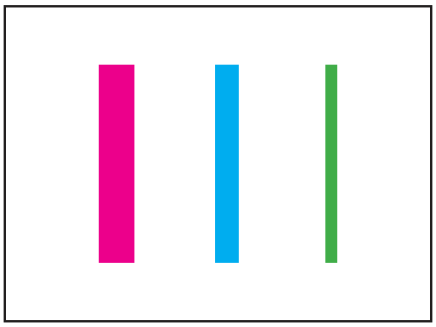
Activity 1 Offline: Program the image.

1. Ask the students to pair up.

2. Give each pair a piece of paper and markers or crayons (4 colors: blue, pink, green and red).

3. Give one student from each pair a task to perform. It is important that the other student in the pair does not see the task.

4. The goal of the activity is for one student to instruct the other to do the task presented on the worksheet. For example: Instruct your partner to draw the figure below without showing the image.



Example of a statement: In the middle of the card, draw a blue vertical line of the length of about 10 cm. This line should be of medium thickness. On the right, draw a second line - a green one, with the same length as blue, but thinner. The distance between lines should be about 5 cm. On the left side of the blue line draw a third, pink line, with the same length as the previous two. The distance between the blue and pink lines should be the same as between green and blue ones. The pink line should be the thickest of all three lines.

5. Model one example for the class. Instruct the class to begin.

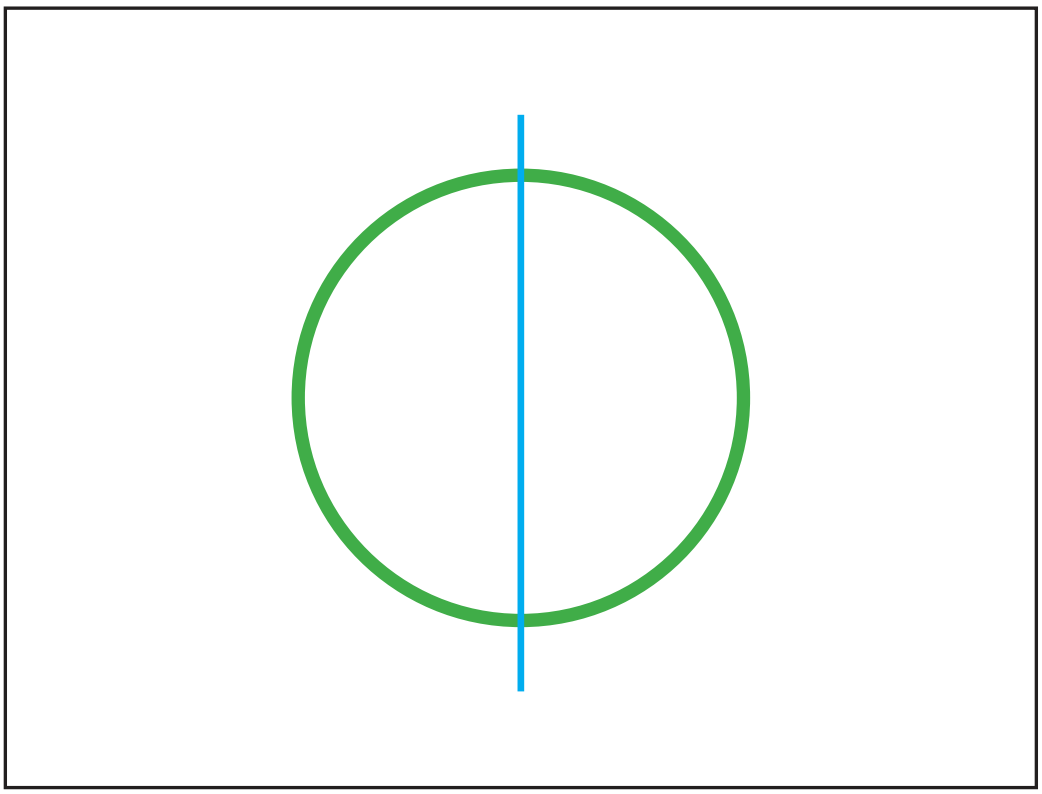
6. When the student complete the task, they turn the piece of paper over and check the correctness of the performed task.

7. If the picture does not look the same or similarly, ask the class what might be the reason. It is important for the students to see that very precise commands are needed to correctly perform this task.

WORKSHEET

name: _____ class: _____

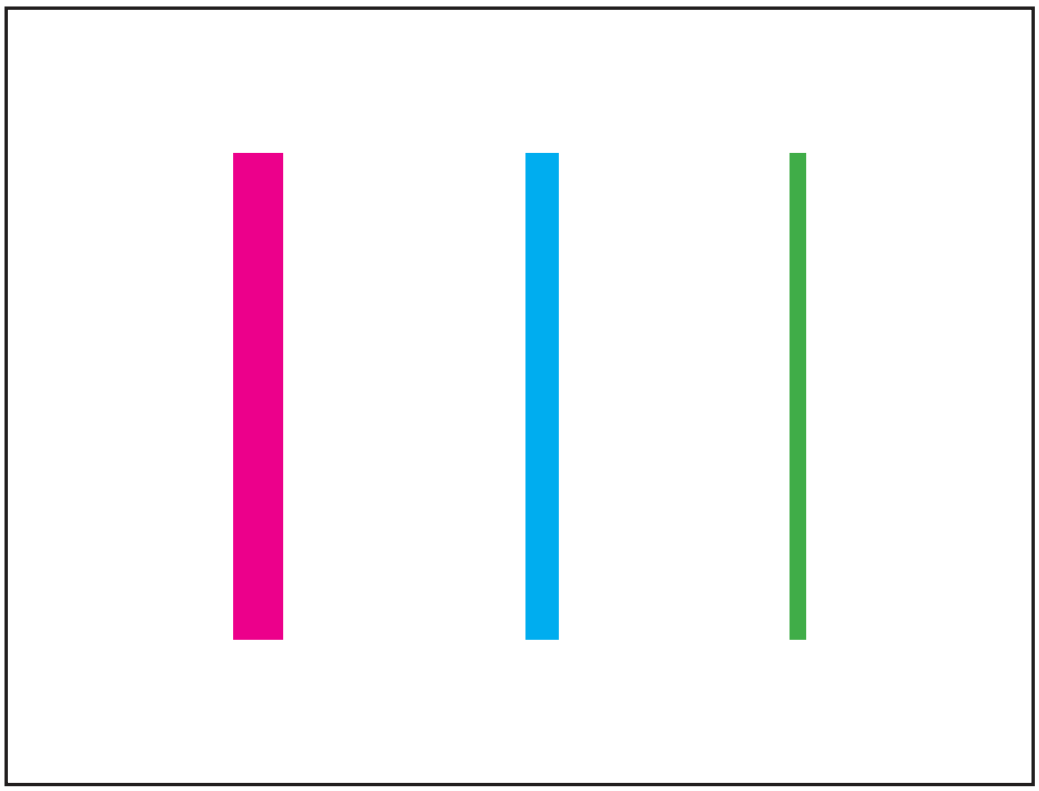
Task. Without revealing the figure below, instruct your partner to draw the image:



WORKSHEET

name: _____ class: _____

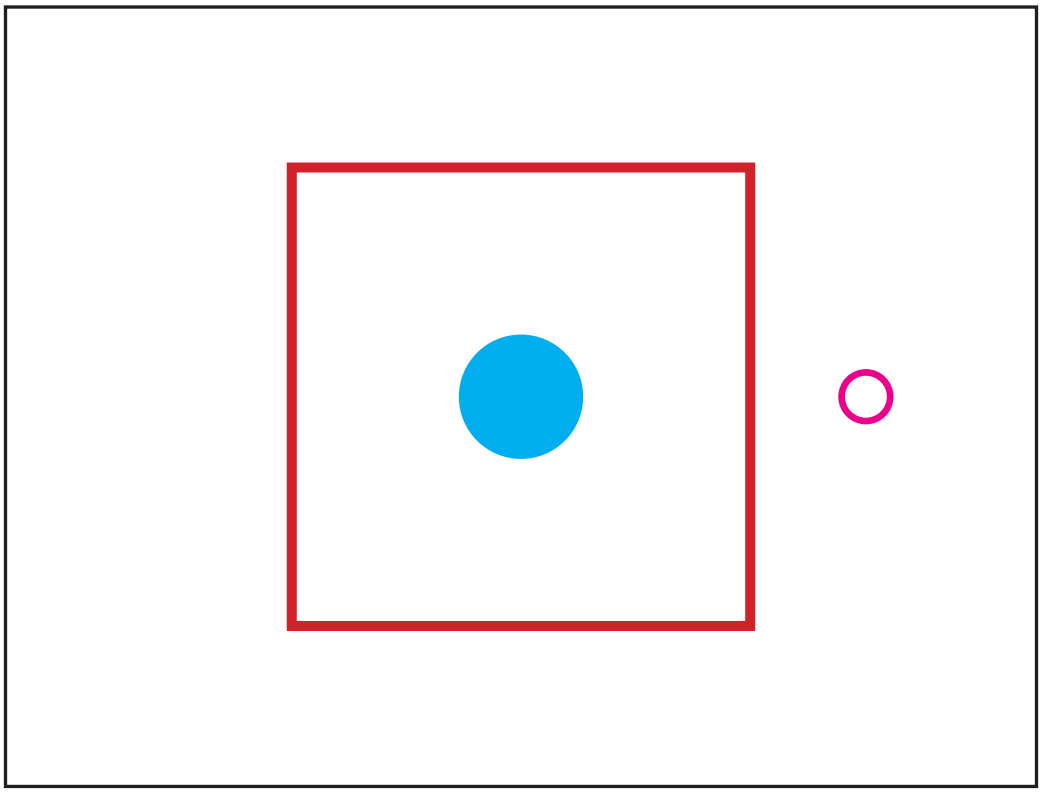
Task. Without revealing the figure below, instruct your partner to draw the image:



WORKSHEET

name: _____ class: _____

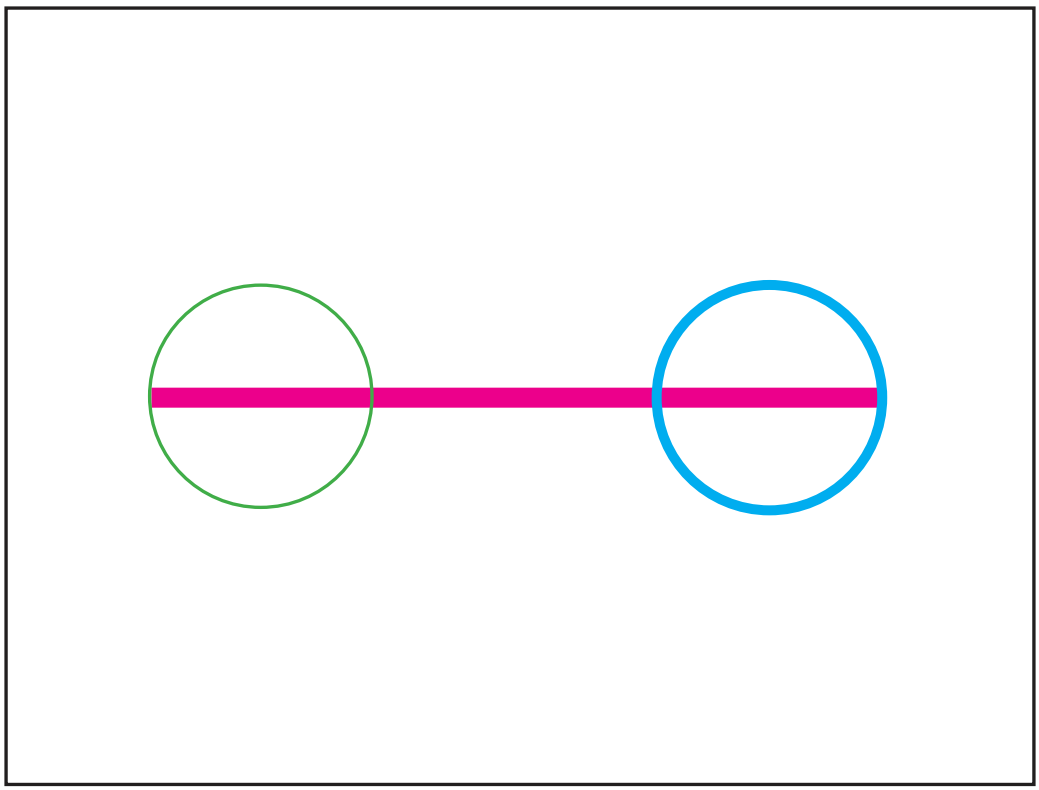
Task. Without revealing the figure below, instruct your partner to draw the image:



WORKSHEET

name: _____ class: _____

Task. Without revealing the figure below, instruct your partner to draw the image:



ALGORITHMS AND SEQUENCES 1.2.2

Offline task

author: Zuzanna Olechno

Activity 1. Offline: What's missing?

1. Pass out the Activity 1 worksheets.

2. There are incomplete sequences on the worksheets. The students task is to draw in the missing symbol to complete the sequences in tasks 1, 2 and 3.

3. After completing task 1, 2 and 3 from the worksheet, ask for volunteers to read the completed sequences so that the rest of the class can check their answers.

4. Then, instruct the students to create their own sequence.

WORKSHEET

name: _____ class: _____

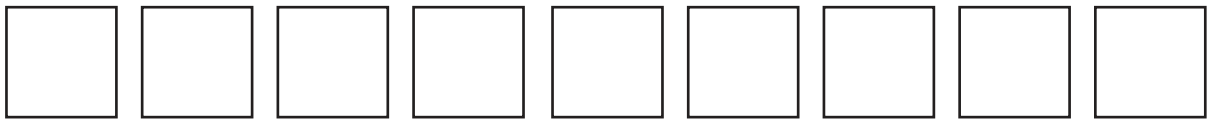
Activity 1. Complete the sequence by drawing the missing symbol in the box.

Task 1:

Task 2:

Task 3

Task 4. Create your own sequence of symbols.



ALGORITHMS AND SEQUENCES 1.3.1BA

Introduction to programming **Photon Badge**

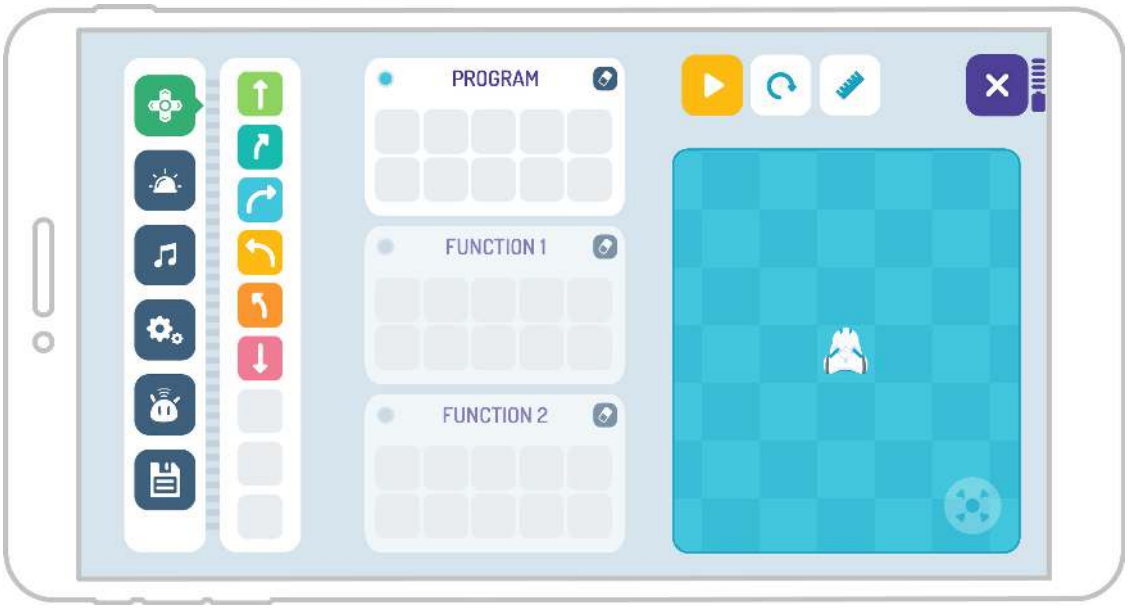
Access code:

author: Zuzanna Olechno

1. Launch the robot and Photon Edu app. If possible, project the tablet screen on a projector so that the class can see exactly what is happening on the tablet screen.

2. When connected to the robot, run the Photon Badge interface using the **access code.**

3. Explain to the class what the various symbols in the application mean:



- exit to the previous window

- a ruler allows you to set the distance of the step forward

- clearing out the program

- running the program

- saving the created program in the app memory

- category: Movement

- category: Colors

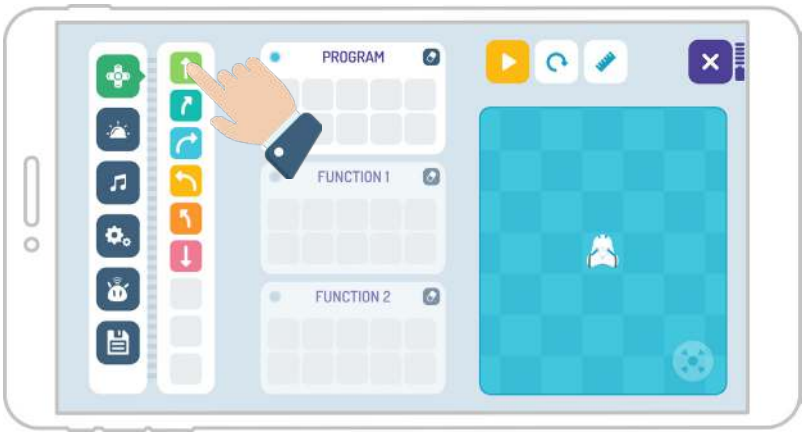
- category: Sounds

- category: Function

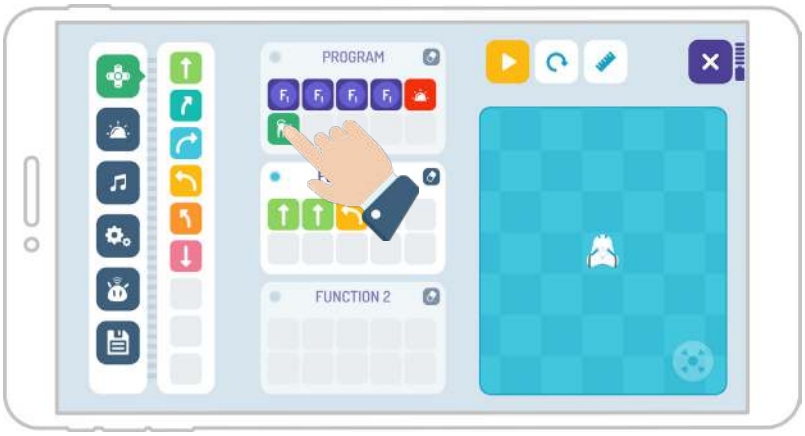
- category: Sensors

4. Explain how we program the robot.

There are 10 empty spaces in the PROGRAM window. In these spaces, you design the program for Photon. To place the selected command in the PROGRAM window, simply click it.

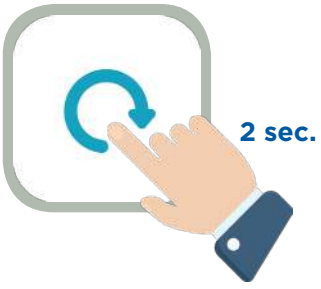


If you make a mistake when programming, you can delete the incorrect icon by clicking it.



The programs can be deleted in two ways. By holding a circular arrow for two seconds - this way you will remove all icons located in the Windows PROGRAM, FUNCTION 1 and FUNCTION 2. To remove program from only one window, click on the eraser icon in the right corner of the window.
(1) Hold the circular arrow for two seconds to remove all badges in the program, function 1 and function 2 window.
(2) Click the eraser in the right corner of a window to erase the program from that window only.

1st way:



2nd way:

5. Using the bagde interface, model how design a program, delete individual icons and run the program.

Pay attention to the icons TURN RIGHT and TURN LEFT. Emphasize that the Photon does not move sideways and rotates only in the place in which it stands. To move the robot to its right or left side, use the icons TURN RIGHT or TURN LEFT, then you should use the icon GO FORWARD.

6. Give your students Activity 1 the worksheet and cut out the directional movement icons. Each child should get: 4 forward arrows and 2 right arrows.

7. Allow students time to complete the tasks on the work cards then check the answers as a class.

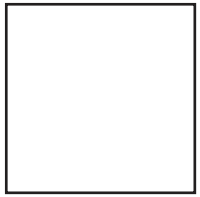
8. At the end, instruct the students to approach the tablet in turn and add one, motion command. When each student has added their icons, run the program and check out Photon's reaction.

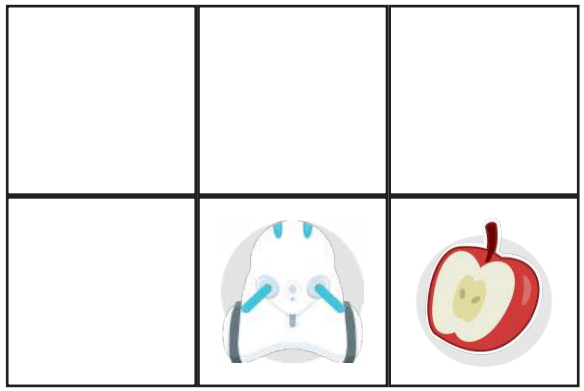
WORKSHEET

name: _____ class: _____

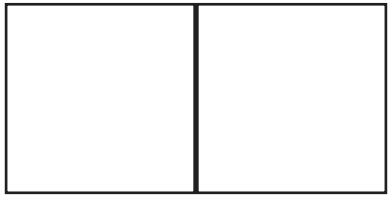
Activity 1. Which symbols can you use to move Photon towards the fruit? Paste the correct icons in the box labelled PROGRAM.

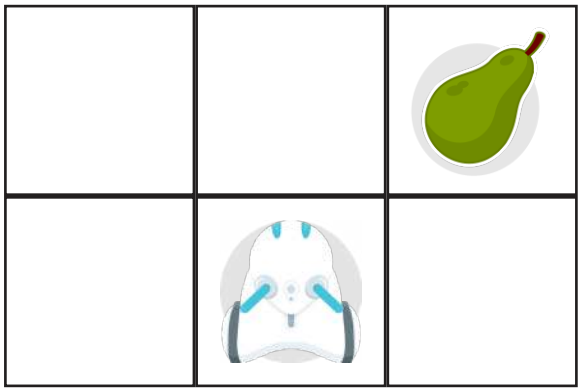
PROGRAM:



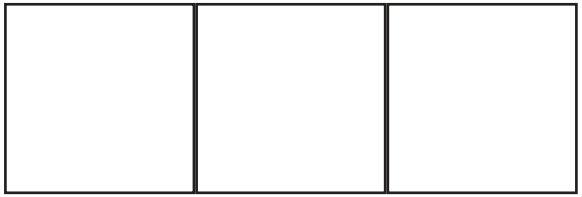


PROGRAM:



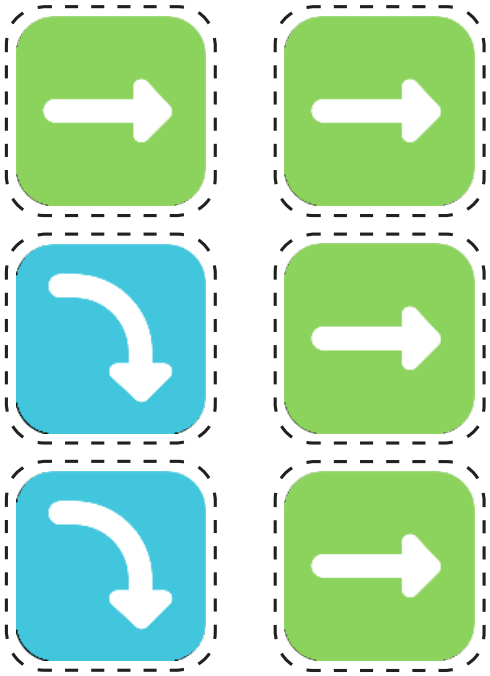


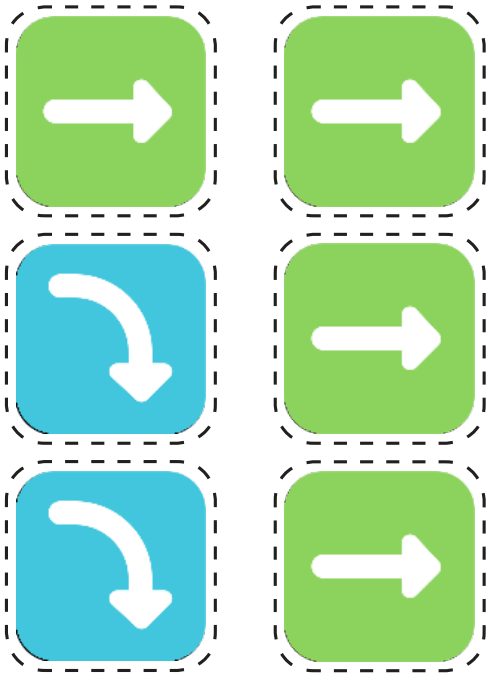
PROGRAM:

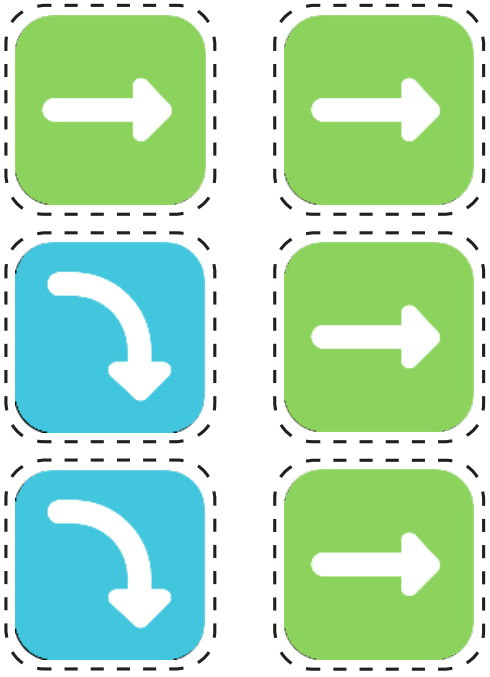


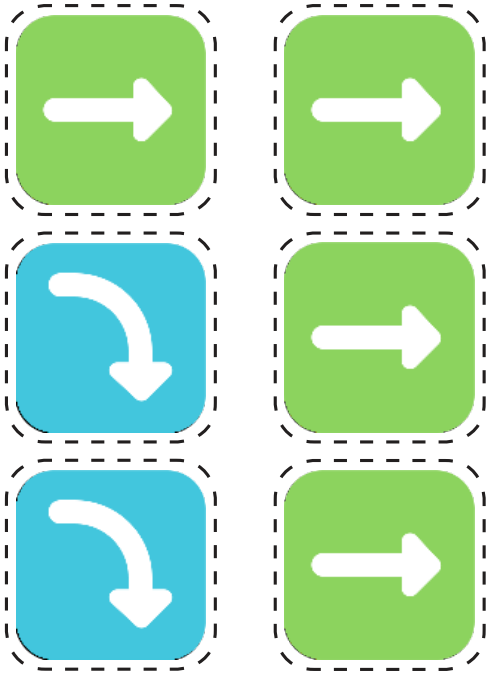
Materials to cut out:

cut on the dotted line









ALGORITHMS AND SEQUENCES 1.3.1BL

Introduction to programming **Photon Blocks**

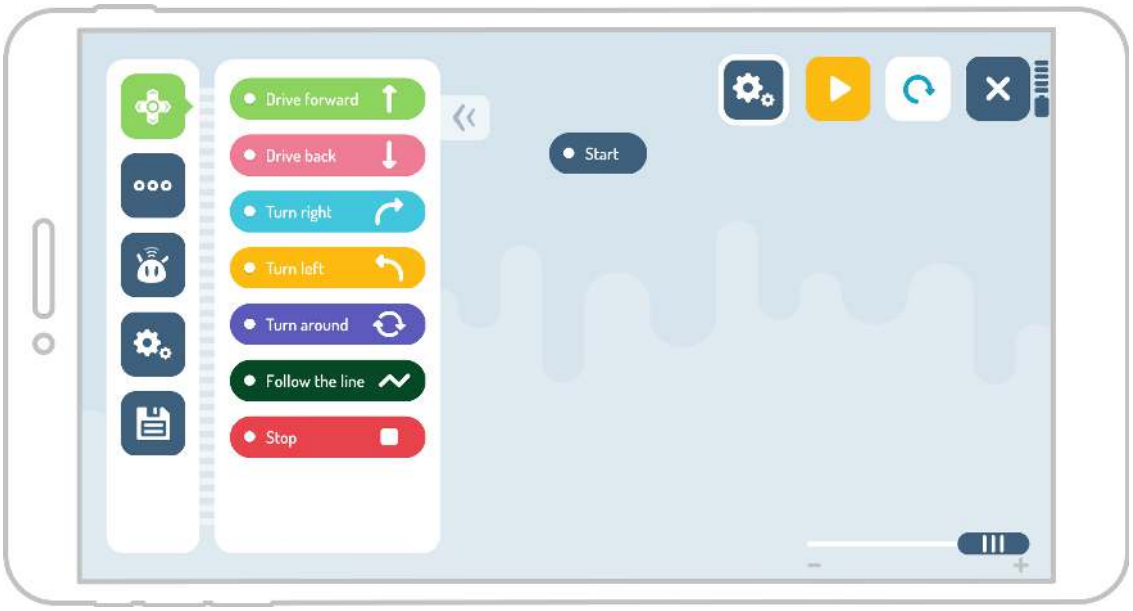
Access code:

author: Zuzanna Olechno

1. Start the robot and Photon Edu app. If possible, project the tablet screen on the projector so that the class can see exactly what is happening on the tablet screen.

2. When connected to the robot, launch the Photon Blocks interface using the **access code.**

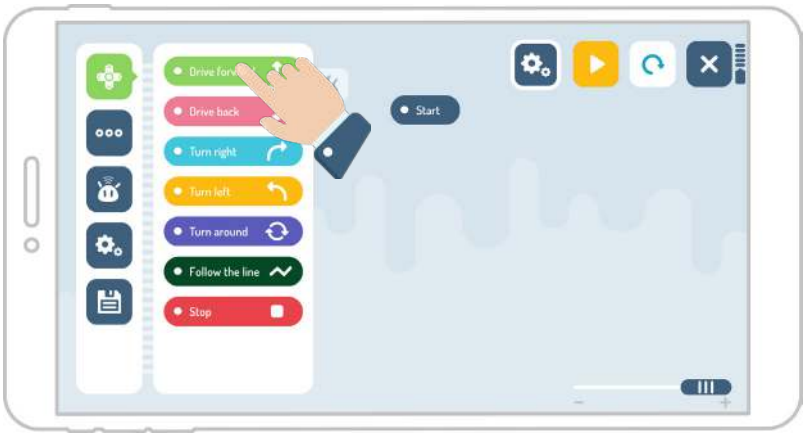
3. Explain to the class what the various symbols in the application mean:



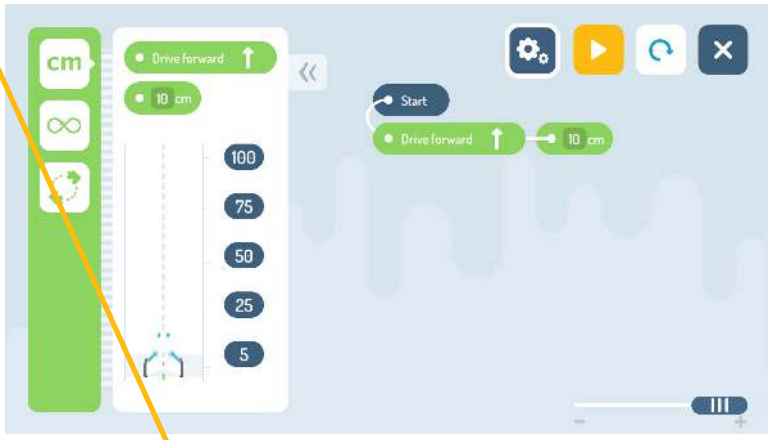
- exit to the previous window
- clearing out the program
- running the program
- a ruller allows you to set the distance of the step forward
- category: Movement
- category: Actions
- category: Sensors
- category: Function s
- saving the program

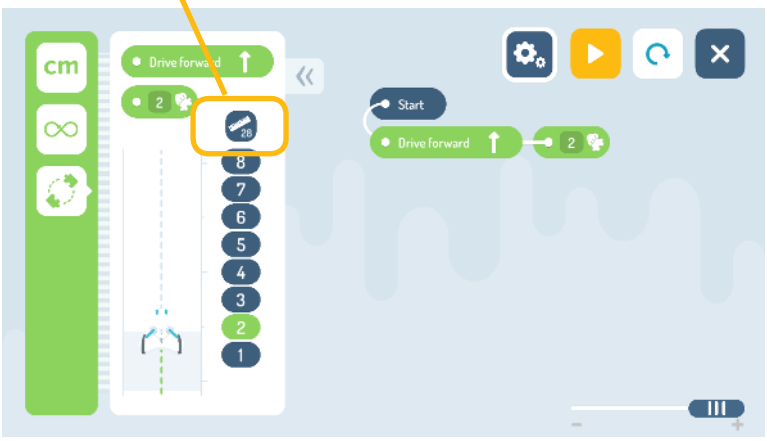
4. Explain how we program the robot.

There is a START block on the screen, then blocks should be placed underneath. Open a category and drag the blockunder START.

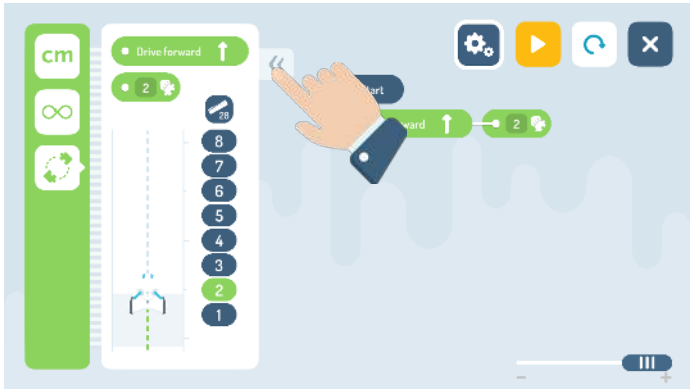


Then, set the parameters for the selected block. In the block GO FORWARD choose the amount of centimeters Photon should ride or the number of fields (if you are working on the mat). The length of a single field can be specified by using the ruler.

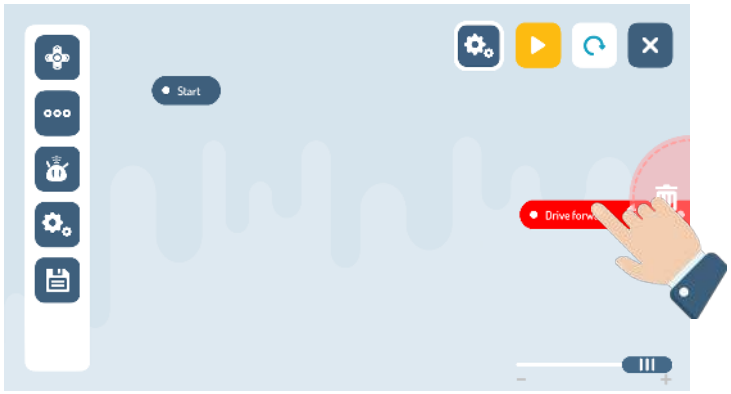




After setting all parameters, close the category and add a new block.



If you make a mistake, remove the block by dragging it to the trash located on the right side of the screen.



5. Using the Blocks Interface, model how to design a program, delete the blocks, and run the program.

Pay attention to the icons of TURN RIGHT and TURN LEFT. Emphasize that the Photon does not move sideways and rotates only in the place in which it stands. To move the robot to its right or left, use the icons TURN RIGHT or TURN LEFT, then use GO FORWARD.

6. Give your children the worksheet and blocks to cut out. Each child should get: 4 forward arrows and 2 right arrows.

7. After completing the task, ask for volunteers to read the completed sequences so that the rest of the class can check their answers.

8. At the endinstruct students to approach the tablet one by one in order to add one movement command. When each student has added their icon, run the program and check out Photon's reaction.

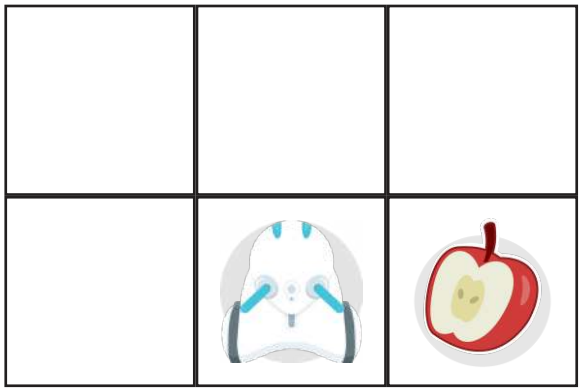
WORKSHEET

name: _____ class: _____

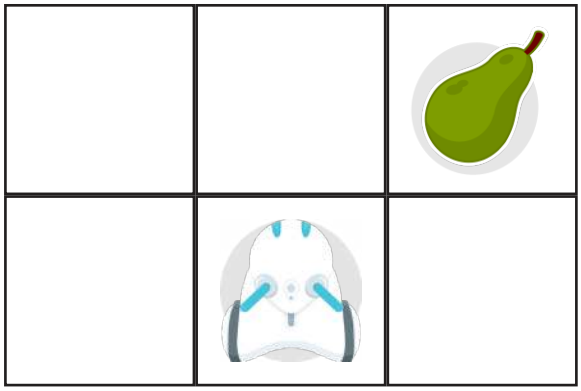
Activity 1 Which symbols can you use to move Photon to the fruit? Put the correct blocks under START

Task 1.

Task 2.

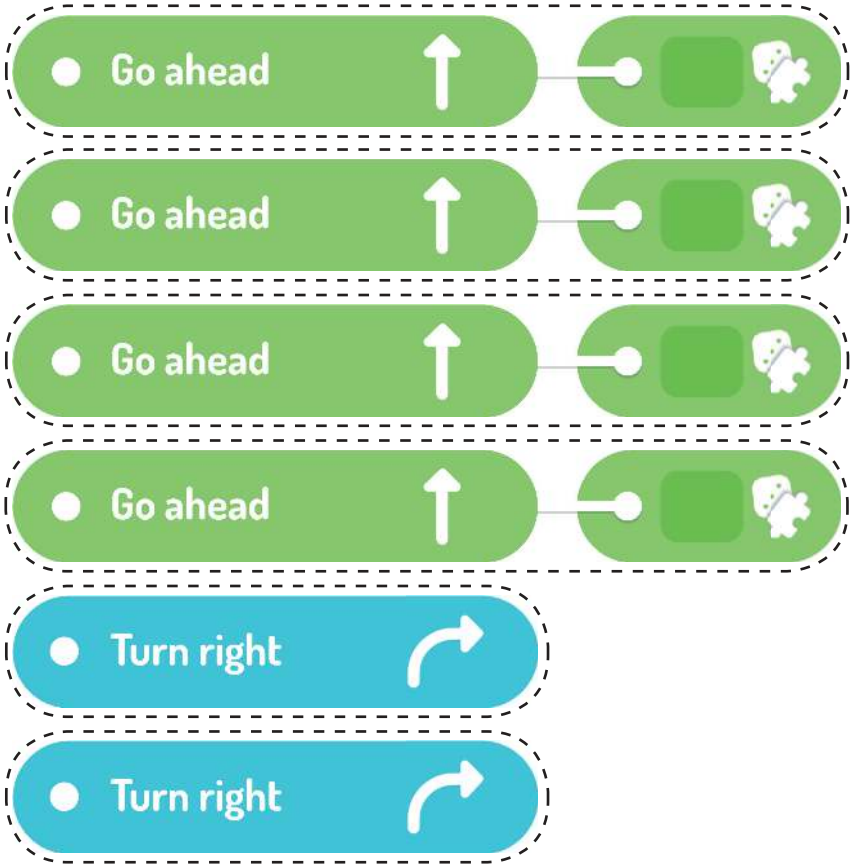


Task 3.

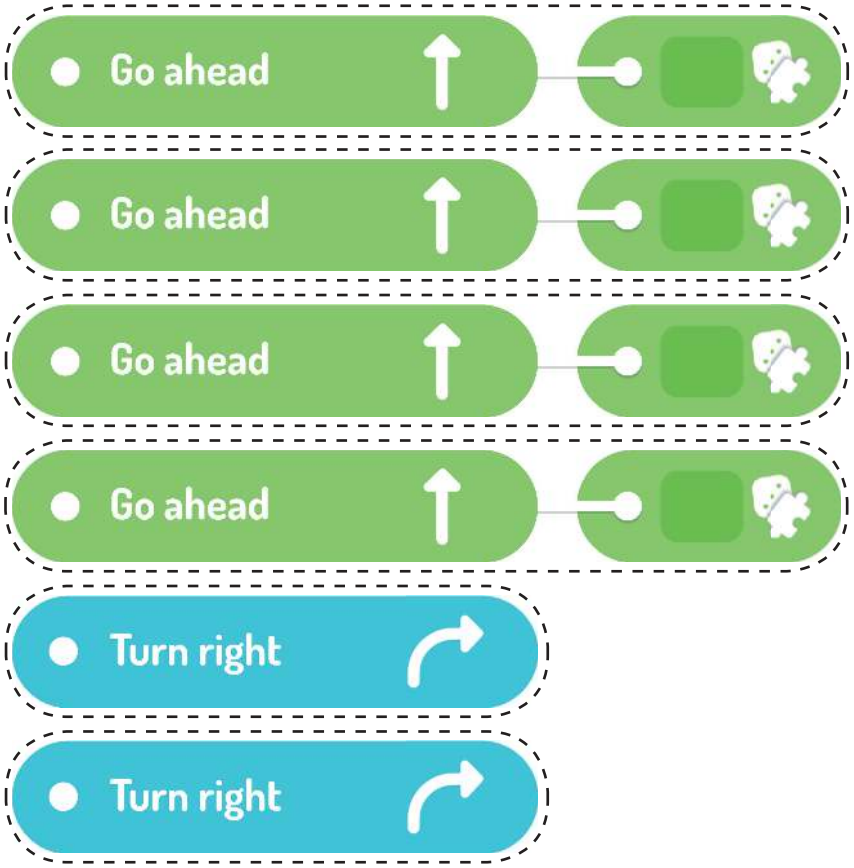


Start

Materials to cut out: cut on the dotted line



Materials to cut out: cut on the dotted line



© 2018 Photon Entertainment sp. z o.o. All rights reserved.
More materials available at edu.photonrobot.pl

ALGORITHMS AND SEQUENCES 1.3.1CO

Introduction to programming **Photon Code**

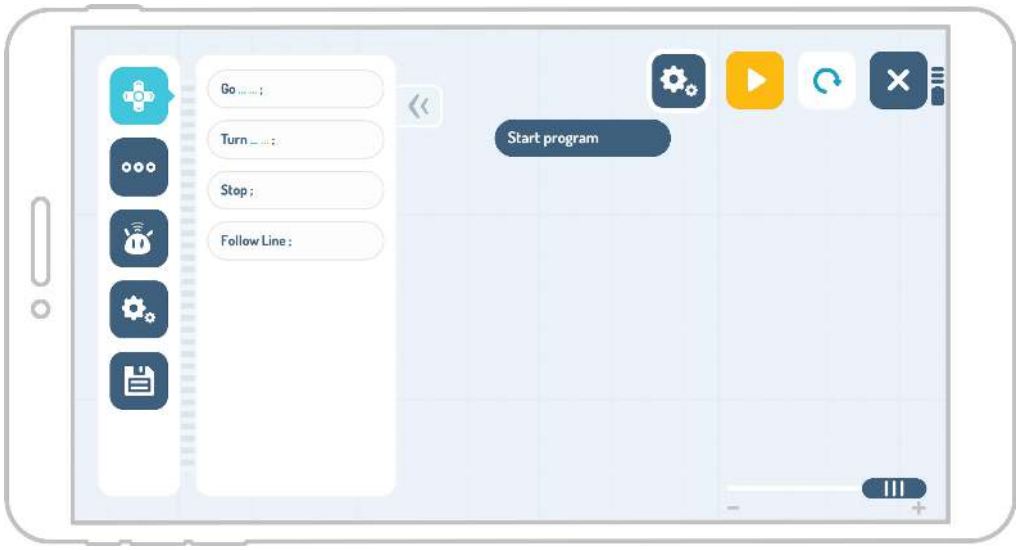
Access code:

author: Zuzanna Olechno

1. Start the robot and Photon Edu app. If possible, project the tablet screen on the projector so that the class can see exactly what is happening on the tablet screen.

2. When connected to the robot, launch the Photon Code interface using the **access code**.

3. Explain to children what the various symbols in the application mean:



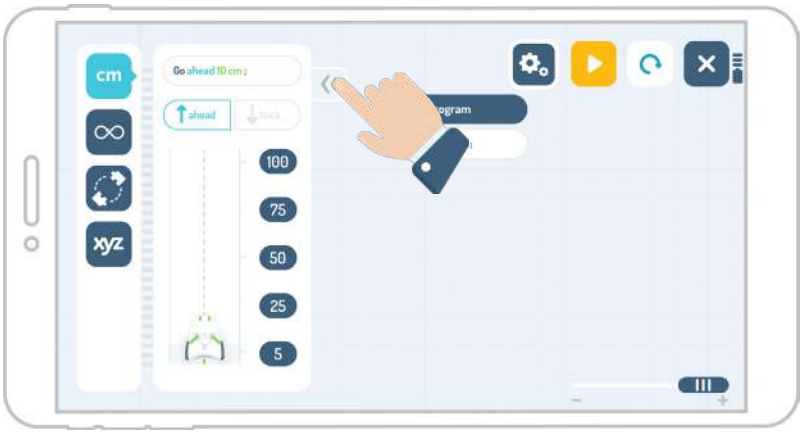
- exit to the previous window
- clearing out the program
- running the program
- category Movement
- category: Actions
- category: Sensors
- category: Function
- saving program

4. Explain how we program the robot.

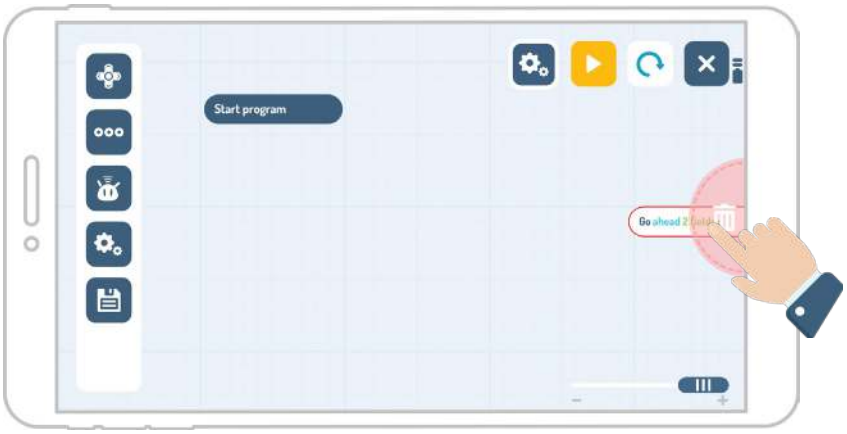
There is a START PROGRAM block on the screen, and the program blocks should be placed under it. Open a category, choose a block and drag the block under START.

Then, set the parameters for the selected block. In the block GO, select whether the robot has to go forward or backward. Then, select the number of centimeters Photon should go or the number of fields (if you are working on the mat).

After setting all parameters, close the category and add a new block.



If you make a mistake, remove the block by dragging it to the trash located on the right side of the screen.



5. Using the Photon Code Interface, model how to design a program, delete individual blocks, and run the program.

Direct the students attention to the icons of TURN RIGHT and TURN LEFT. Emphasize that Photon does not move sideways and it rotates only in the place in which it stands. To move the robot to the right or left, use the icons TURN RIGHT or TURN LEFT, then use GO FORWARD.

6. Pass out the worksheet and blocks to cut out. Each student should get: 4 go blocks and 2 turn blocks.

7. Once the class completes the task, go over the correct answers together.

8. At the end, instruct the students to approach the tablet one by one and add one movement command. When each student has added their icon, run the program and check out Photon's reaction.

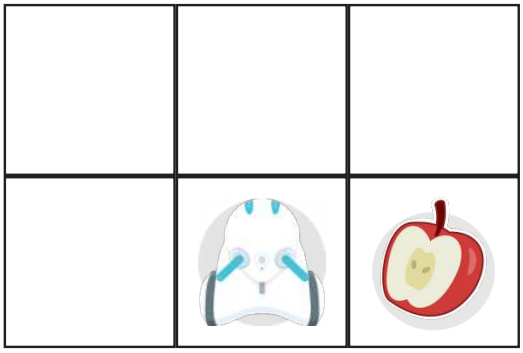
WORKSHEET

name: _____ class: _____

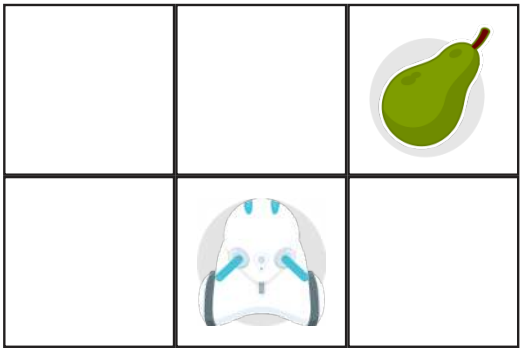
Activity 1. Which symbols can you use to move Photon to the fruit? Paste the correct blocks under START and complete the command on the block..

Task 1.

Task 2.



Task 3.



Materials to cut out:

cut on the dotted line

Go .... ;

Go .... ;

Go .... ;

Go .... ;

Turn .... ;

Turn .... ;

Go .... ;

Go .... ;

Go .... ;

Go .... ;

Turn .... ;

Turn .... ;

Go .... ;

Go .... ;

Go .... ;

Go .... ;

Turn .... ;

Turn .... ;

Go .... ;

Go .... ;

Go .... ;

Go .... ;

Turn .... ;

Turn .... ;

ALGORITHMS AND SEQUENCES 1.4.1BA

Activity **Photon Badge**

Access code: 

author: Zuzanna Olechno

1. Divide the class into groups of 4. Give each team a Photon, a tablet (with the Photon Edu application) and an educational mat.

2. Pass out the worksheets and movement icons from the Photon Badge application (children need to cut out the icons). Their task is to arrange the program for Photon by using the cut icons. Each person of the team programs their part of the program, which will create one long program.

3. After installation of the program, the teams turn on Photon and lauch the Photon Edu application (use **access code**). Students should connect the tablet to Photon and test their program. This is a good time to make changes, if necessary.

4. When the team is sure that their program is correctl, instruct students to raise thair hands.

5. Check the program.

* In cases when there is only one robot in the class, give children the following parts of the program to design:
option 1: Program Photon so that he moves to the apple in the pink section.
option 2: Program Photon so that he moves to the pear in the pink section,
option 3: Program Photon so that he moves to the lemon in the pink section,
option 4: Program Photon so that he moves to the grapes in pink section,
option 5: Program Photon so that he moves to the apple in the blue section,
option 6: Program Photon so that he moves to the pears in the blue section,
option 7: Program Photon so that he moves to the lemon in the blue section,
option 8: Program Photon so that he moves to the grapes in the blue section,

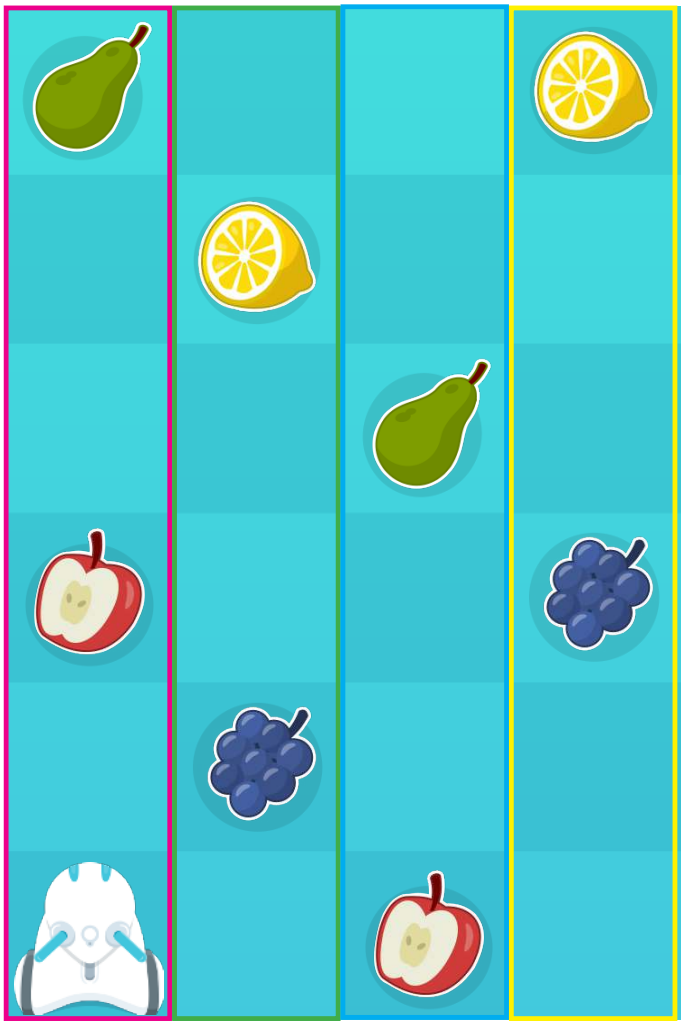
Then, Instruct each student to transfer the program to a Tablet and run the program to check for accuracy.

WORKSHEET

name: _____ class: _____

Activity 1 Goal: Program Photon to collect all the fruit. Change the color of Photons antennae when a piece of fruit is collected.

Directions: Split the task up to 4 different programs taht when combined, creates one large program. Each program will correlate to one of the colored rectangles shown below.



After designing the program, test it and check for accuracy. If you notice an error, correct it. When you are ready, call the teacher to check your solution.

PROGRAM 1

PROGRAM 2

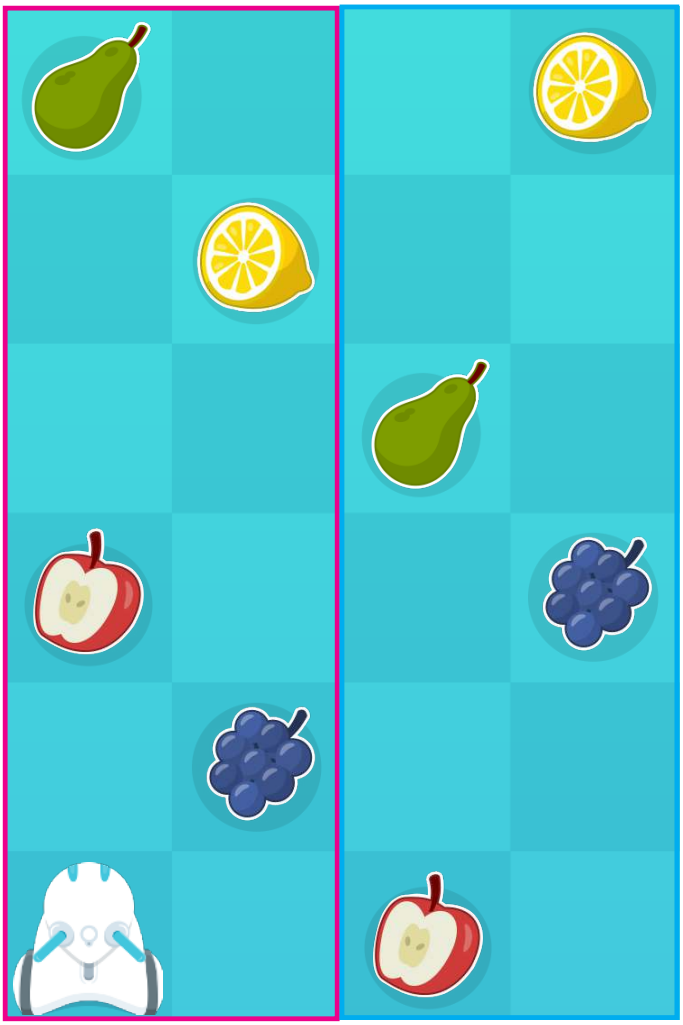
PROGRAM 3

PROGRAM 4

WORKSHEET

name: _____ class: _____

Activity 1 Program Photon to complete the task assigned by your teacher. Program Photon's antennae to change colors once he raches the piece of fruit that you were assigned.



PROGRAM

Materials to cut out:

cut on the dotted line

ALGORITHMS AND SEQUENCES 1.4.1BL

Activity **Photon Blocks**

Access code:

author: Zuzanna Olechno

1. Divide the class into groups of four. Give each team a Photon and a tablet (with the Photon Edu application) and an educational mat.

2. Pass out the worksheets. Their task is to find 3 solutions to the same task while working in the Photon Blocks Interface (when you run the application, use the **access code**).

3. Let each team draw **1 goal card** and **1 guideline card.**

Goal card: this is the square Photon need to move to.
Guideline card: this is a condition that the programmer must fulfill when leading Photon to the goal, for example, if the student drew the goal: forest (C3), and the guidelines are 3 moons, the robot's route should end in the C3 field. Along the way, Photon should pass exactly 3 fields marked with the moon.

4. Using the mat, worksheet, block cards and application, students should create their solutions and test them out!

WORKSHEET

name: _____ class: _____

Activity 1 Draw one goal card and one guideline card from each file. Then, working on the mat and using the Photon Blocks, plan 3 different solutions for your tasks. Write down everything in the sections labelled Solution 1, Solution 2 and Solution 3.

Paste the 2 cards you drew below

GOAL

GUIDELINES

Educational mat:

Solution 1

Solution 2

Solution 3

Conclusions:

1. Which solution included the shortest path?

2. Which solution included the longest path?

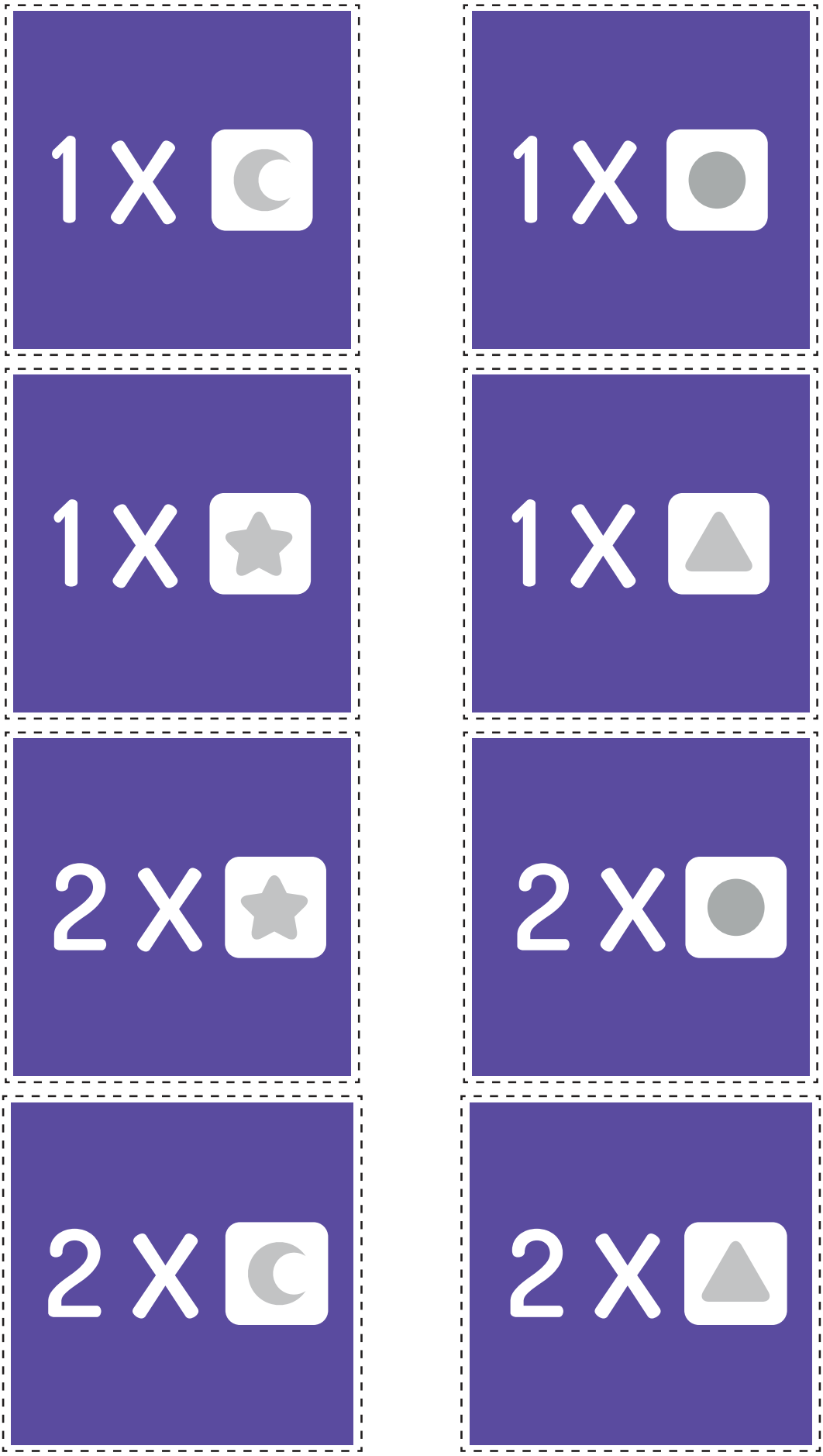
3. Which solution caused the biggest problem?

Materials to cut out:

cut on the dotted line

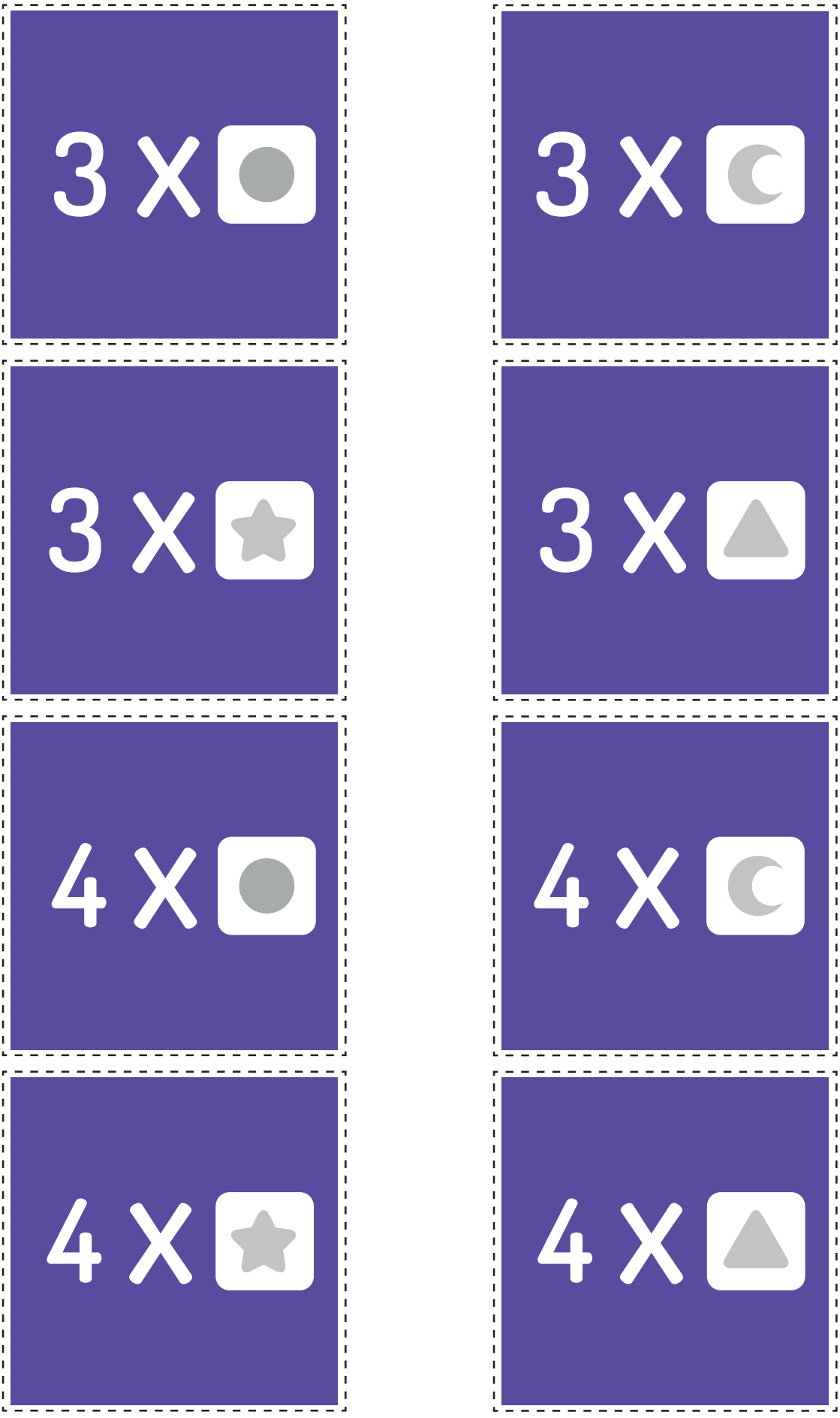
Materials to cut out:

cut on the dotted line



Materials to cut out:

cut on the dotted line



ALGORITHMS AND SEQUENCES 1.4.1CO

Activity **Photon Code**

Access Code:

author: Zuzanna Olechno

1. Divide the class into groups of four. Give each team a Photon and a tablet (with the Photon Edu application) and an educational mat.

2. Pass out the worksheets. Their task is to find 3 solutions to the same task while working in the Photon Blocks Interface (when you run the application, use the **access code**).

3. Let each team draw **1 goal card** and **1 guideline card.**

Goal card: this is the square Photon need to move to.
Guideline card: this is a condition that the programmer must fulfill when leading Photon to the goal, for example, if the student drew the goal: forest (C3), and the guidelines are 3 moons, the robot's route should end in the C3 field. Along the way, Photon should pass exactly 3 fields marked with the moon.

4. Using the mat, worksheet, block cards and application, students should create their solutions and test them out!

WORKSHEET

name: _____ class: _____

Activity 1 Draw one goal card and one guideline card. Then working on the mat and using the Photon Code, plan 3 different solutions for your tasks. Write down everything in the sections labelled Solution 1, Solution 2, Solution and Solution 3.

Paste the 2 cards you drew below:

GOAL

GUIDELINES

Educational mat:

Solution 1

Solution 2

Solution 3

Conclusions:

1. Which solution included the shortest path?

2. Which solution included the longest path?

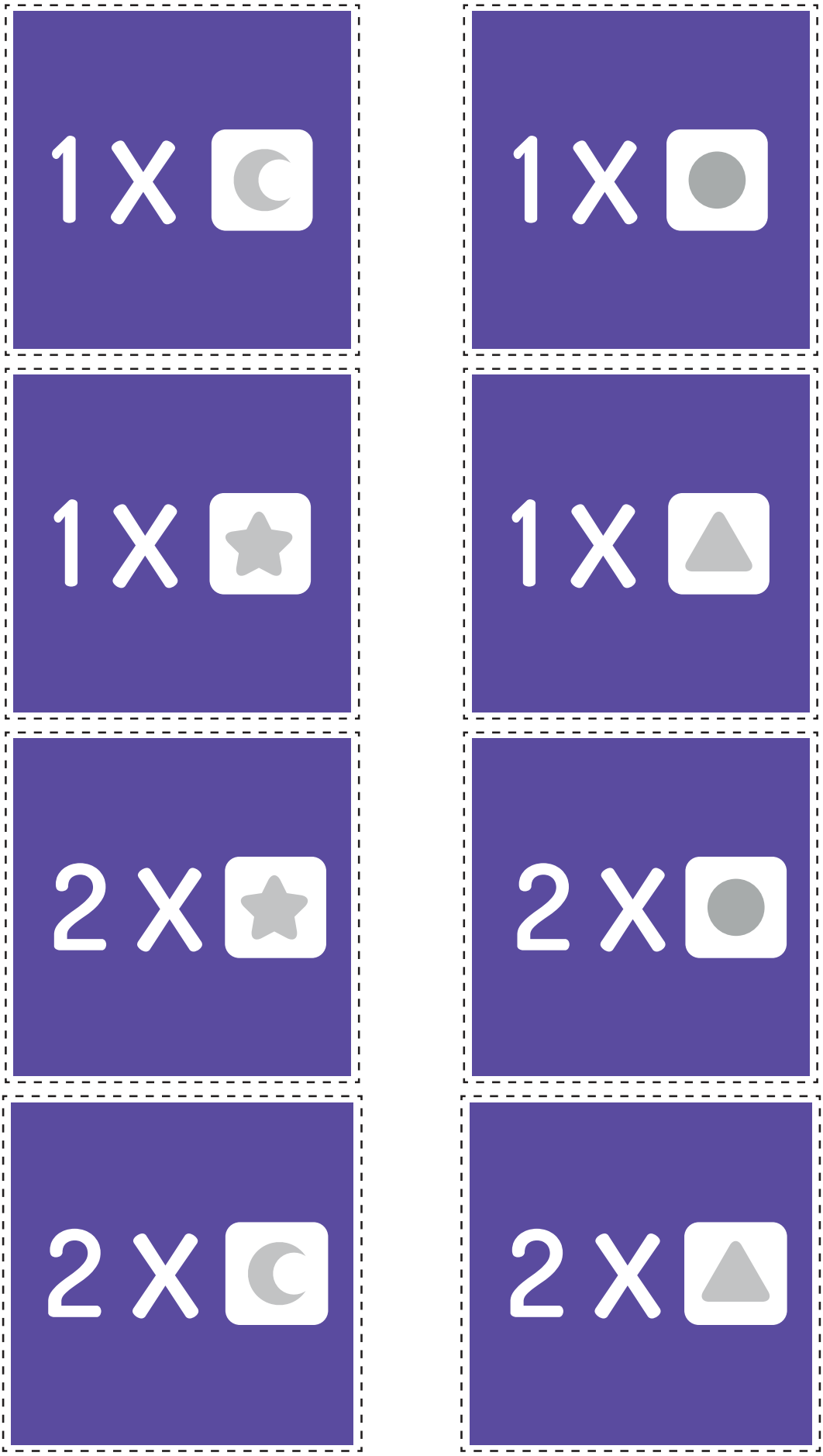
3. Which solution caused the biggest problem?

Materials to cut out:

cut on the dotted line

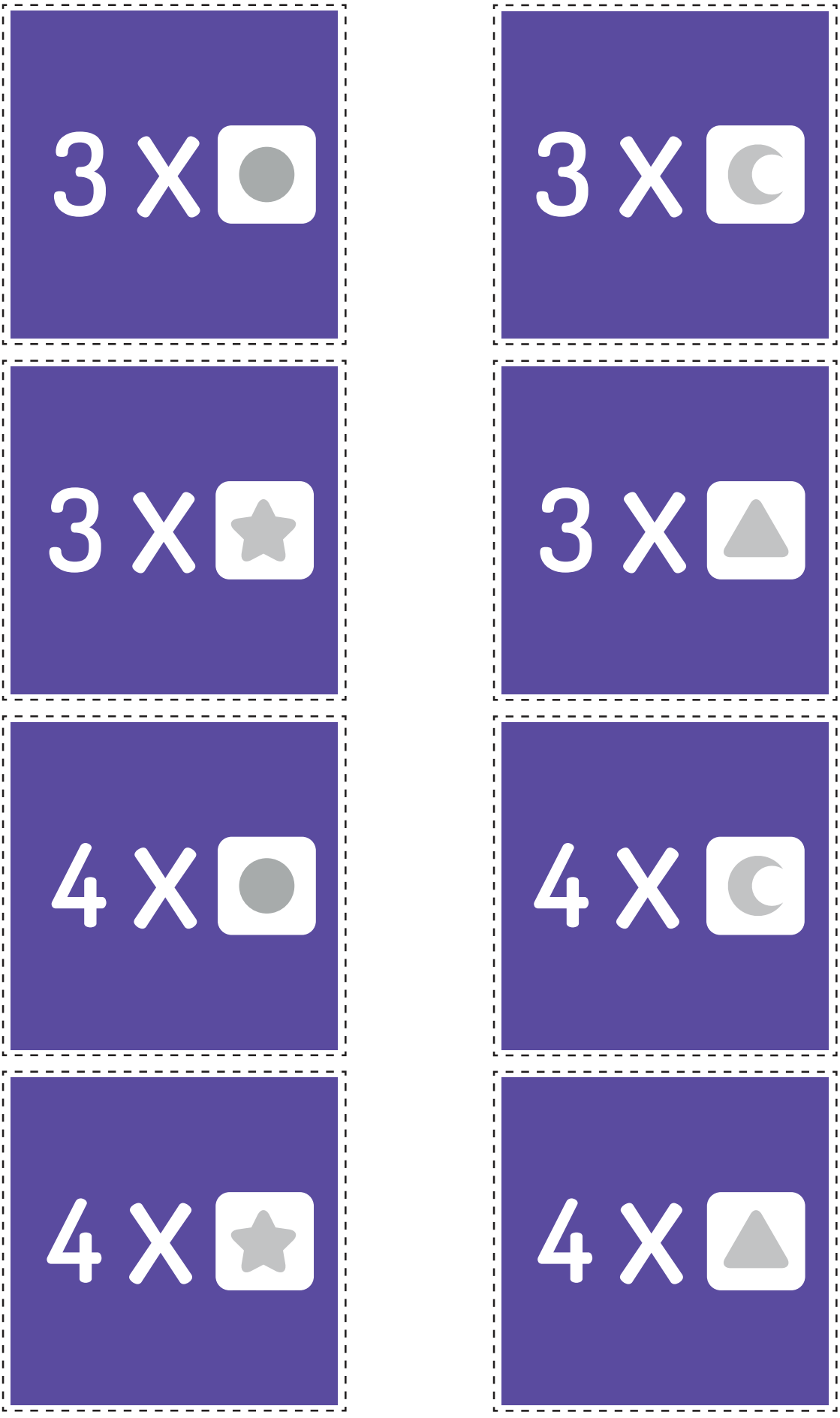
Materials to cut out:

cut on the dotted line



Materials to cut out:

cut on the dotted line



ALGORITHMS AND SEQUENCES 1.5.1

Summary of the classes

Summary of the classes:

1. Repeat the terms discussed in the classroom. Pass out a definition to each student and ask them what term the definition is describing Repeat all terms.

eg.
definition: a set of steps that you can take to solve the problem
answer: algorithm