photon

BUGS AND DEBUGGING

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BUGS AND DEBUGGING 2.1.1

Introduction

1. Introduce new terms to the class. Ask for volunteers to read the terms and to try to explain the meaning of each term in their own words.

2. Explain the proper definition of the terms to the class.

3. Instruct the students to write a sentence using one of the new terms.

NEW TERMS

bug - a defect within a computer program causing it to malfunction as a result of human error.

debug - finding and correcting bugs within the program

BUGS AND DEBUGGING 2.2.1

Offline task

author: Zuzanna Olechno

Activity 1. Searching for errors.

1. Pass out the scenario worksheet to each student.

2. Explain to the class that they are to find the three errors in the encoded word and then correct it.

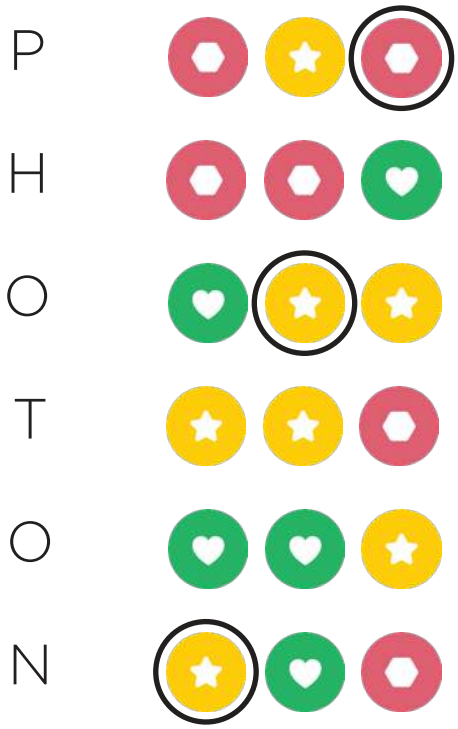
Activity 2. The encoded name.

1. Pass out a piece of paper and a pencil to each student. Ask them to code their names using the picture code.

2. Then, instruct the students to make one mistake in the spelling of their name.

3. After finishing the task, the studnet should exchange worksheets with a partner and try to locate the errors hidden in the code.

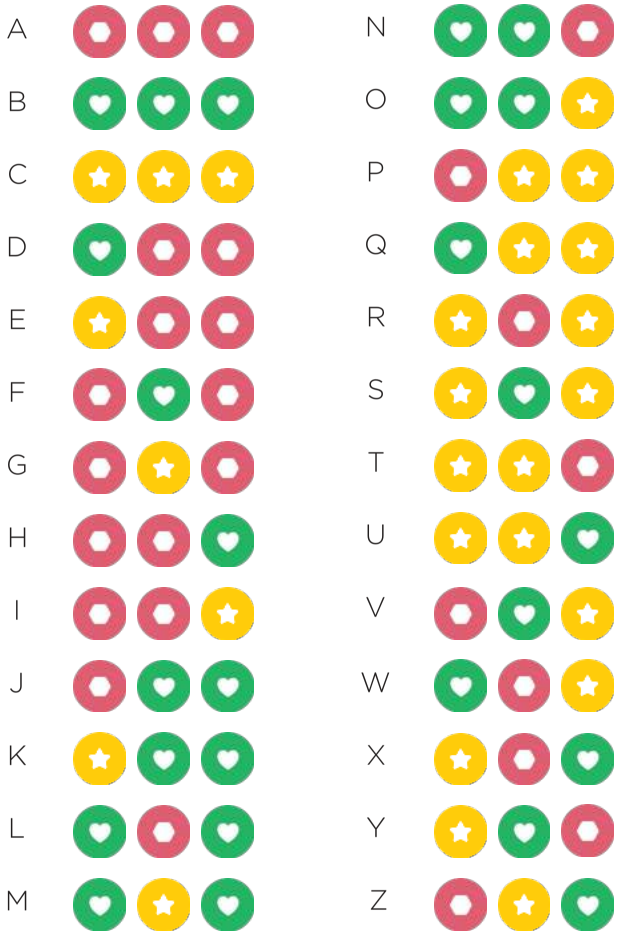
The solution of the task from the worksheet:



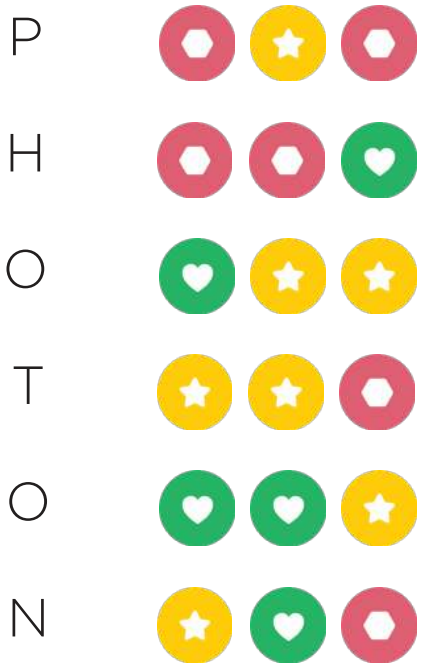
WORKSHEET

name: _____ class: _____

Activity 1. Below, each letters is represented by a colorful code. Compare the encoded word on the next page to the alphabet below, find the errors, and correct them.



Find the errors and correct them:



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BUGS AND DEBUGGING 2.2.2

Offline task

author: Zuzanna Olechno

Activity 1. Searching for a bug

1. Pass out the scenario worksheet to each student.

2. Explain to the class that they are to find the three errors in the encoded word and then correct them.

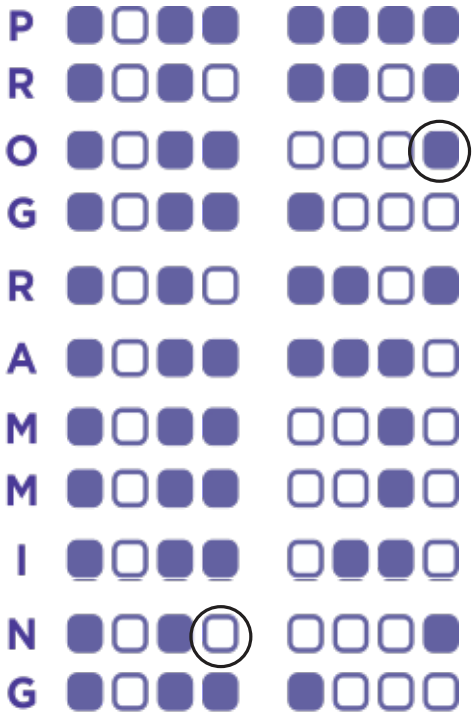
Activity 2. Encoding your name.

1. Pass out a piece of paper and a pencil to each student. Ask them to use the binary code to encode their names.

2. Then, ask them to make one mistake in the spelling of their name.

3. After finishing the task, the students should exchange worksheets with partner and try to locate the errors hidden in the code.

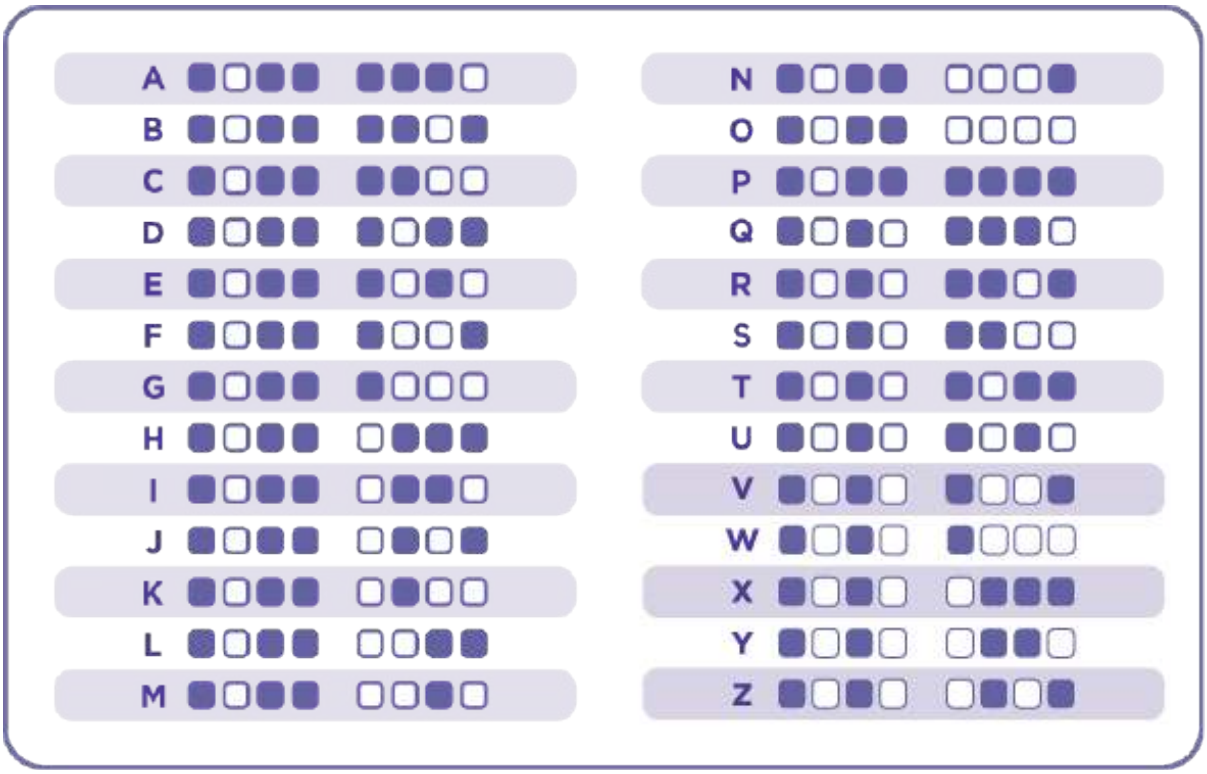
Solution to the activity 1:

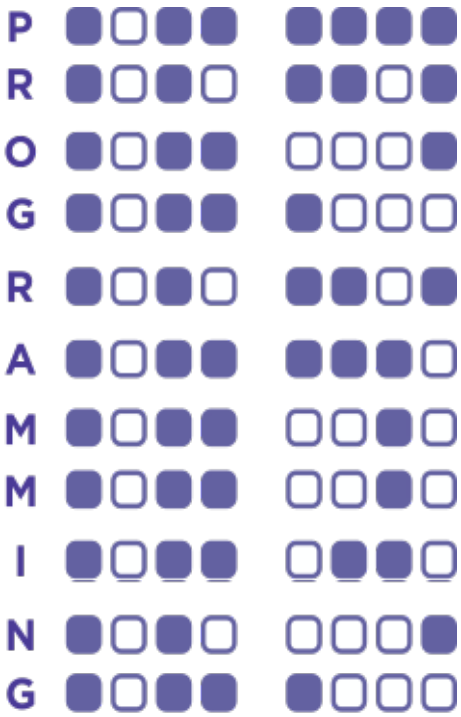


WORKSHEET

name: _____ class: _____

Activity 1. Using the table with the binary-coded letters, find errors in the word written below. Mark all of the errors and correct them.





BUGS AND DEBUGGING 2.2.3

Offline Task

author: Kamila Krupska

Activity 1. Where is the mistake?

1. Pass out a worksheet to each student.

2. Explain to the class that there are errors in the repeating colored codes. Their task is to find and correct the errors using the provided crayons.

3. After finishing the task, the students should check their work with a partner.

Task:

Solution:

WORKSHEET

name: _____ class: _____

Activity 1. Find 1 bug in each task, correct the code in the section labelled „The correct solution".

Task 1: ★

The correct solution:

Task 2: ★★

The correct solution:

Task 3: ★★★

The correct solution:

BUGS AND DEBUGGING 2.2.4

Offline task

author: Kamila Krupska

Acitity 1. The enchanted dice.

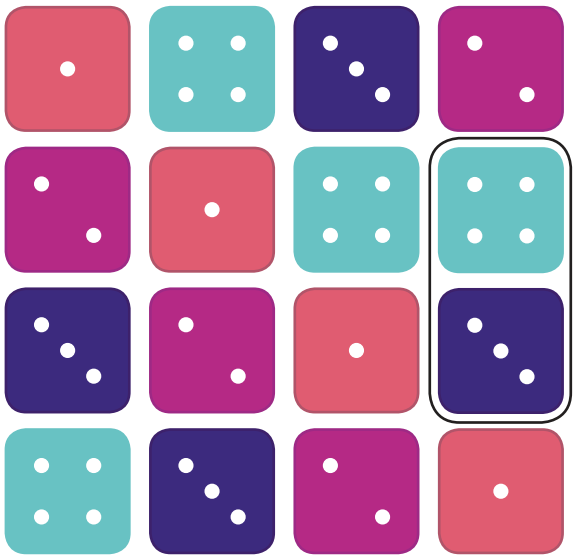
1. Pass out a worksheet to each student.

2. Thegoal of the activity is to find and correct the errors in the dice. The numbers on the dice range from 1 to 4. In each subsequent column, the dice slide one space down. If the cube „falls" off the board at the bottom, it must „go" to the top of the next column.

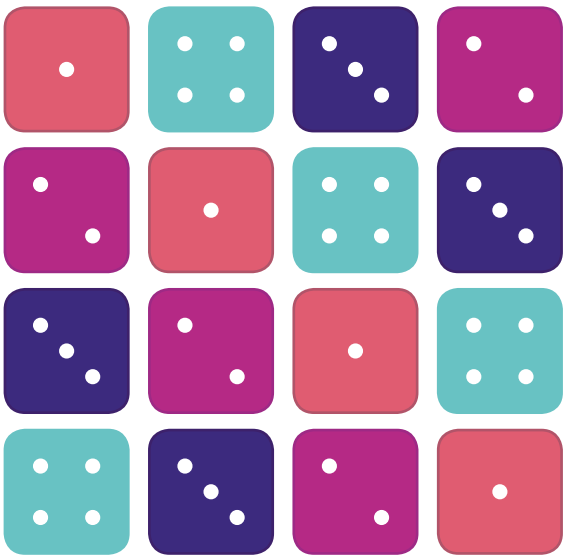
3. Pass out a piece of paper and a pencil to each student. Ask them to find an error in the dice, and then to correct it in the space provided.

4. After finishing the task. The students should check their worh with a partner.

Example task 1:



Correct solution:

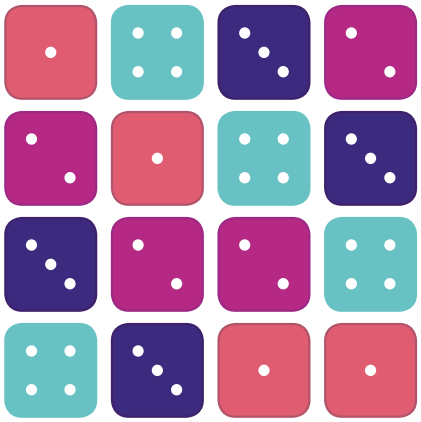


WORKSHEET

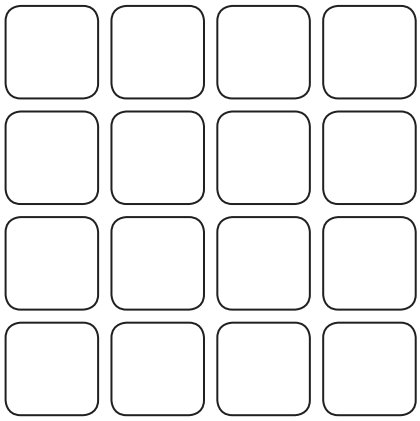
name: _____ class: _____

Activity 1. Find 1 error in each task, circle it and finally, correct it.

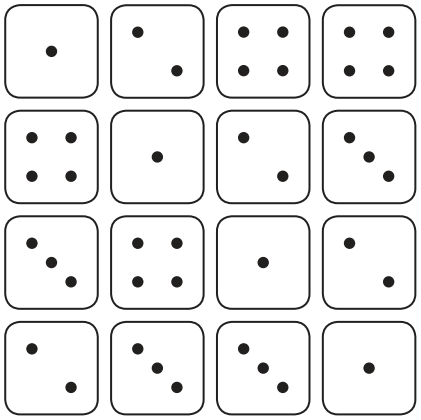
Task 1: ★



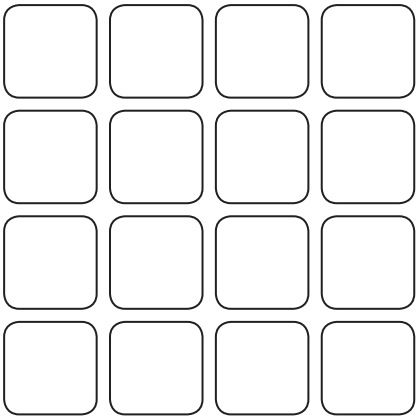
Correct solution:



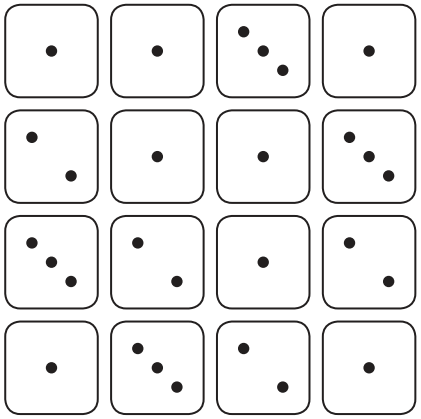
Task 2: ★★



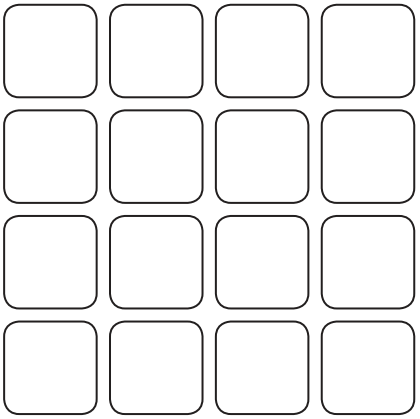
Correct solution:



Task 3: ★★★



Correct solution:



BUGS AND DEBUGGING 2.2.5

Offline task

author: Kamila Krupska

Activity 1. We search, we mark, we correct!

1. Pass out a worksheet to each student.

2. The goal of the activity is to find and to correct the errors. There is a repeating numeric code in the row.

3. Pass out pencils to the class. Explain to the class that they will need to find and correct errors.

4. After finishing the task, the students should check their work with a partner.

Task:

2	4	6	8	10	2	4	6	8	10	2	5	6	8	10

The correct solution:

2	4	6	8	10	2	4	6	8	10	2	4	6	8	10

WORKSHEET

name: _____ class: _____

Activity 1. Find 1 error in each task, circle it and correct each error in the space provided.

Task 1: 

1	2	3	4	1	2	3	4	1	2	3	4	2	3	4

The correct solution:

Task 2: 

2	4	6	4	2	4	6	4	2	4	6	2	4	4	6

The correct solution:

Task 3: 

1	2	1	3	1	2	1	3	1	3	1	3	1	2	1

The correct solution:

BUGS AND DEBUGGING 2.2.6

Offline task

author: Kamila Krupska

Activity 1. Let's make a mistake!

1. Partner students up and pass out worksheet A to one student and worksheet B to the other. It is important that the partners do not see what is on their partners worksheets.

2. The goal of the activity is for students to place 2 bugs into the code on the back of their worksheet. Then, the partners will swap papers and attempt to locate and correct the errors.

3. Pass out crayons and pencils to each student. Instruct them to rewrite the code on the back of the worksheet but to enter 2 error.

4. After the code has beed rewritten, ask the students to exchange worksheets with their partners.

5. Allow time for the students to find and correct the errors.

6. Finally, students will hand the worksheet back to its owner so that their partner can check if the code was fixed correctly.

Samples which children work on:

WORKSHEET A

WORKSHEET B

WORKSHEET A

name: _____ class: _____

Task 1: Turn the worksheet over and rewrite the pattern shown below but insert 2 errors into the code. You will then exchange the worksheet with your partner to see if you can find the errors.

WORKSHEET B

name: _____ class: _____

Task 1: Turn the worksheet over and rewrite the pattern shown below but insert 2 errors into the code. You will then exchange the worksheet with your partner to see if you can find the errors.

BUGS AND DEBUGGING 2.2.7

Offline task

author: Kamila Krupska

Activity 1. Photon loosing his patch, can you noticed a mistake?

1. Divide the class into Teams of 4. Give each team a mat printed on A4 sheet (or bigger).

2. One person from the team will say the commands, The goal is to make Photon to any place on the mat, inserting intentional mistakes into the directions. The following commands should be used: **go ahead, go back, turn right, turn left.** The rest of the team will visualize Photon's movements based on the directions. When the robot „leaves" the board or „hits" an obstacle, participants must quickly react and shout „ERROR". The student who notices the mistake and reacts first takes over the role of calling out directions.

3. Be sure the students are aware that the commands turn right and turn left are not the moves to the adjacent square, but only rotations. Student will need to include command „go ahead" to fully execute the move.

4. Difficulty option: The students use geographical terms such as turn east, turn north, etc. instead of the commends turn right, turn left, etc.

BUGS AND DEBUGGING 2.3.1BA

Introduction to programming **Photon Badge**

Access code:

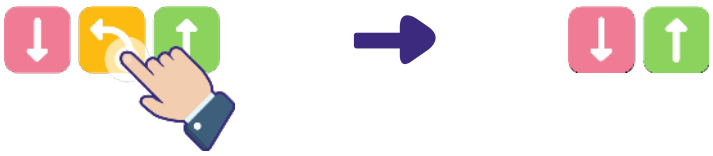
author: Zuzanna Olechno

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

2. Once the robot is connected to the tablet, run the Photon Badge interface using the **access code.**

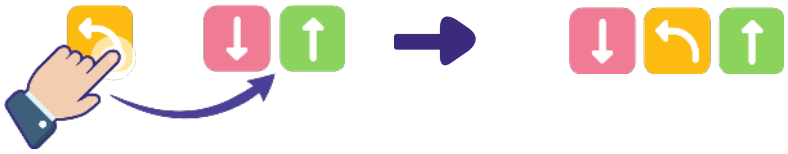
3. Model for the class the two ways to correct a program that has already been designed: deleting individual icons and adding commands to the program.

Removing individual icons:



To delete one icon from a program, simply press it.

Adding commands to the program:



To add a badge to a program that has already been designed, select the desired badge with your finger and drag it to the place where you want it to be.

4. Using the applications, model for the class the processes of removing and adding badges.

5. Pass out a worksheet to each student and ask them to complete the tasks.

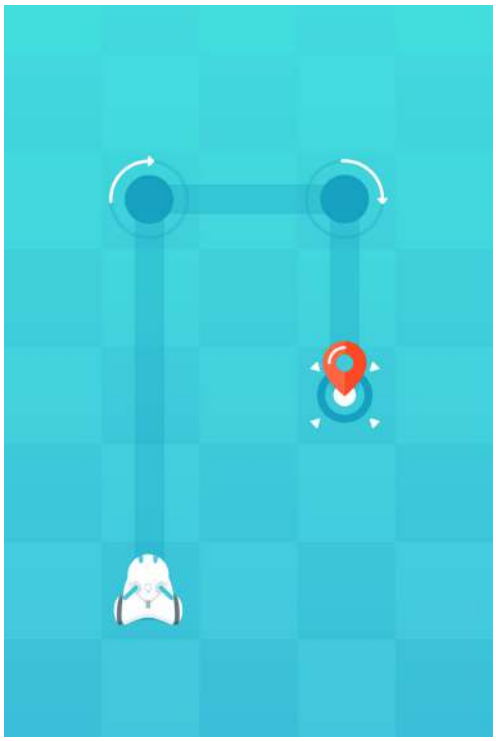
6. When students finish the task on the worksheet, ask them to add the commands into the program one by one. Then see how Photon responds! Correct the code if necessary.

WORKSHEET

name: _____ class: _____

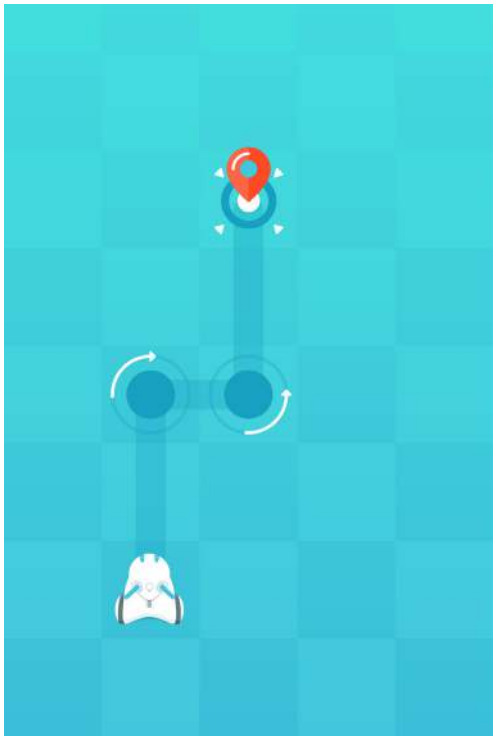
Activity 1. Find and circle the errors in the program. Then correct the program in the space below.

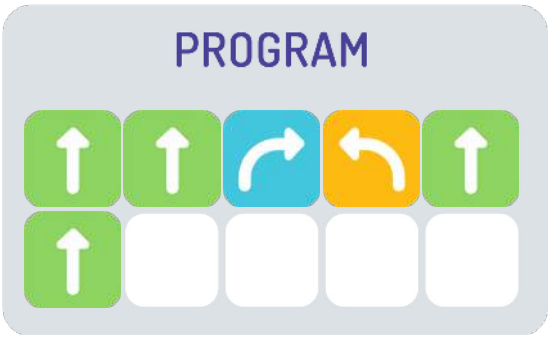
Task 1:



write the correct program below:

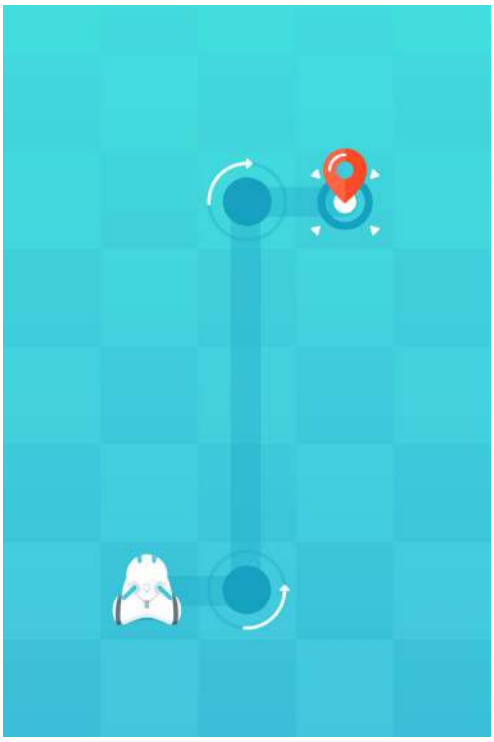
Task 2:





write the correct program below:

Task 3:



write the correct program below:

BUGS AND DEBUGGING 2.3.1BL

Introduction to programming **Photon Blocks**

Access Code:

author: Zuzanna Olechno

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

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

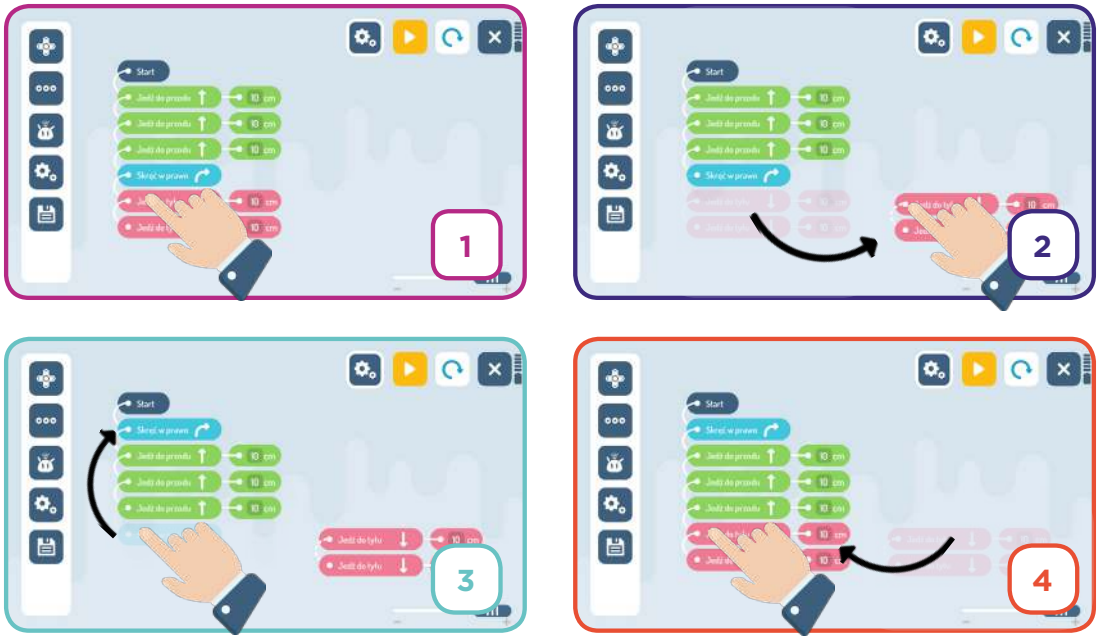
3. Model the three ways of correcting a program: (1) adding commands, (2) changing the order of the stacked blocks and (3) modifying the parameters of the individual blocks.

Adding commands to the program:

To add a block to a program that has already been designed, select a block with your finger and drag it to the desired locatio. For example, select and drag a block in between two other blocks.

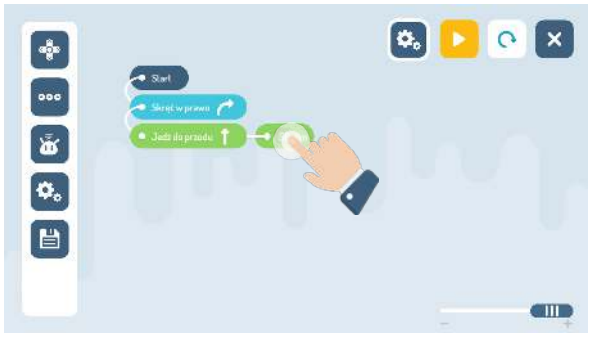
Changing the order of the stacked blocks:

If you want to replace the order of stacked blocks, you should:
[1] select a portion of the program that you must move to access the block,
[2] move it to any place in the work area,
[3] rearange the desired blocks,
[4] re-attach the portion of the program that you disconnected at the beginning.

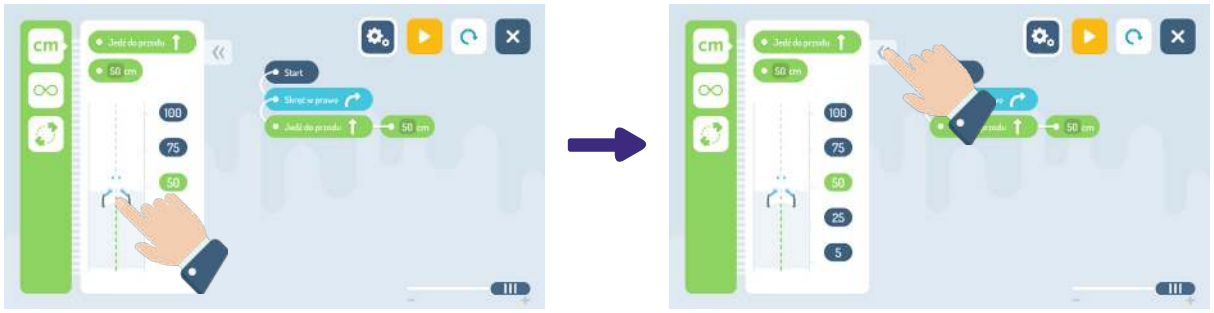


Changing the parameters of the already arranged blocks:

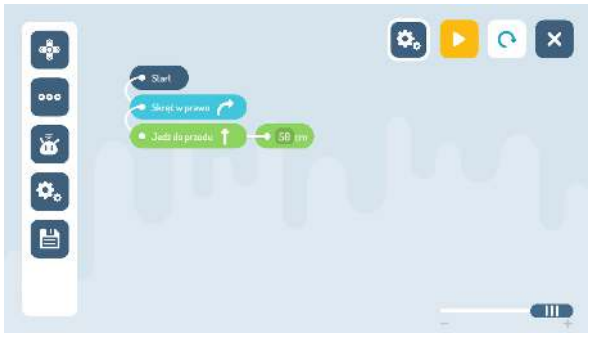
To change a parameter, press the icon attached to the block:



A side window will open up where you can change the parameter:



Close the side window and parameter is ready to go.



4. Using the application, model how to add blocks, change the order, and modify parameters

5. Pass out the worksheet to each student and ask them to complete the tasks.

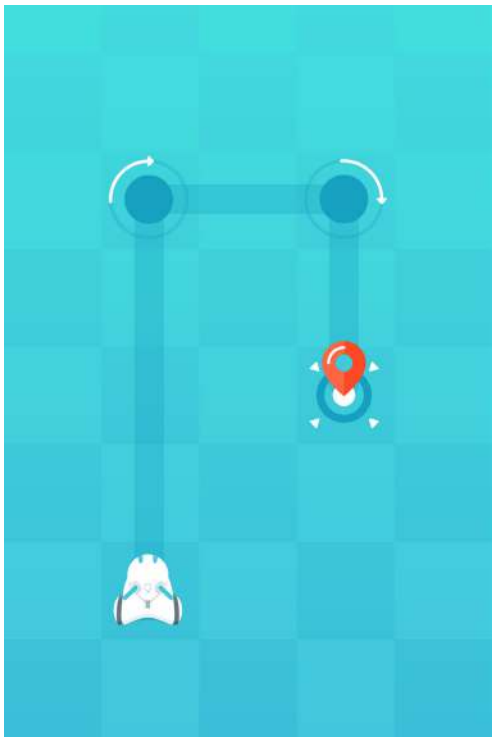
6. After the students have completed the task, ask them to enter the program into the application (one by one). Then see how Photon responds! Correct the code if necessary.

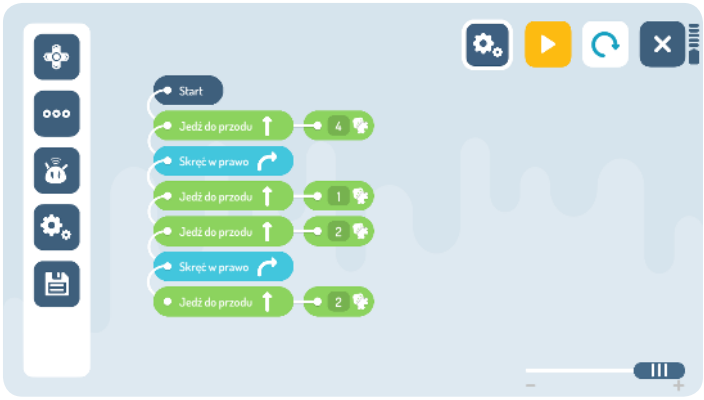
WORKSHEET

name: _____ class: _____

Activity 1. Find and circle the errors in the program. Then, write down how you would change in the program.

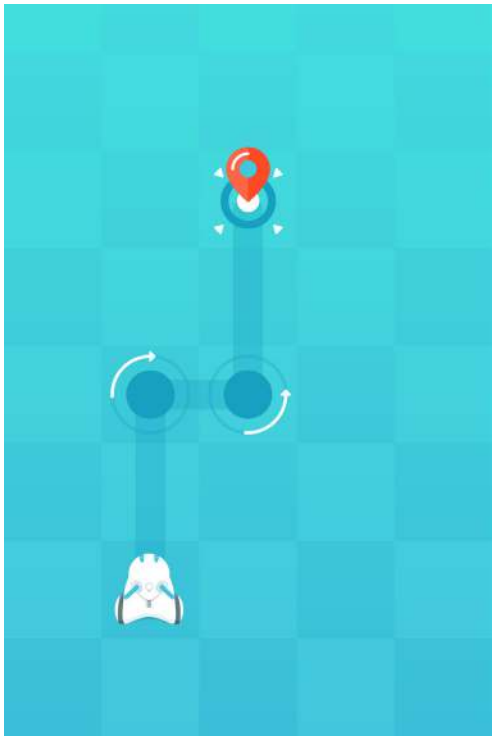
Task 1:

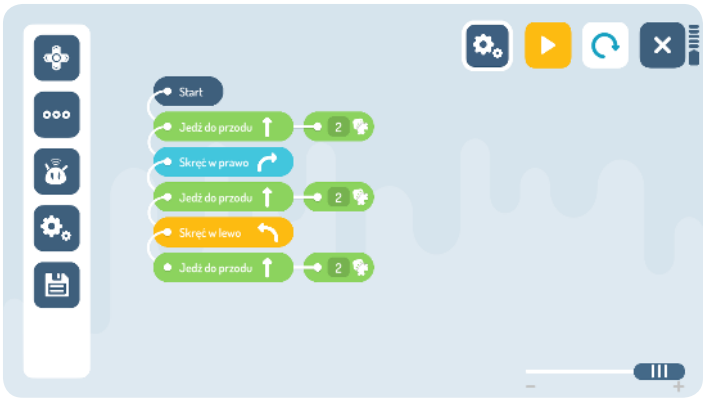




What should be improved?

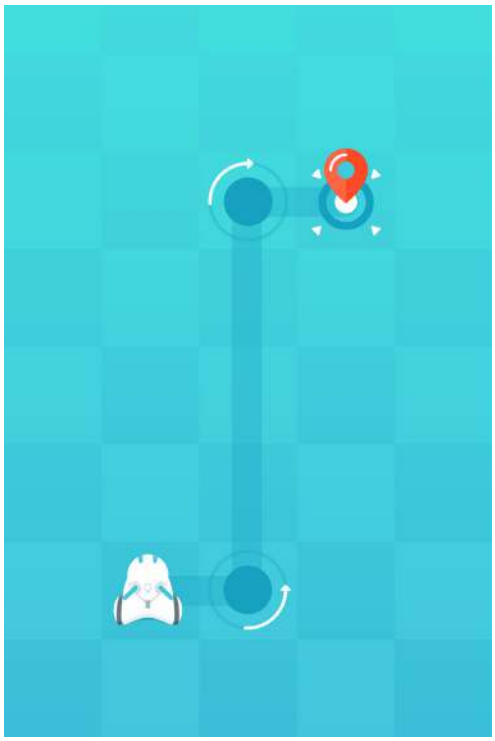
Task 2:

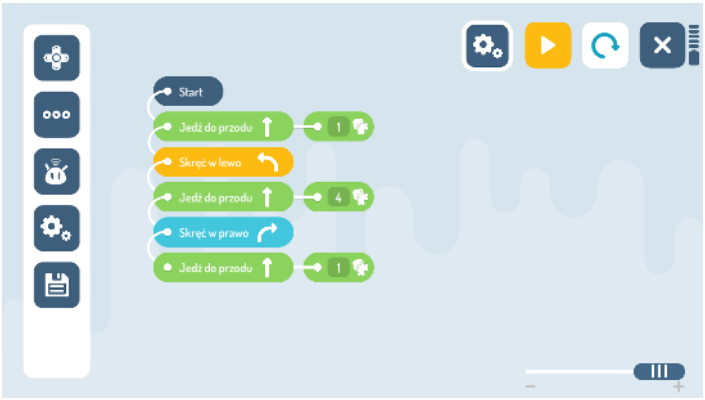




What should be improved?

Task 3:





What should be improved?

BUGS AND DEBUGGING 2.3.1CO

Introduction to programming **Photon Code**

Access code:

author: Zuzanna Olechno

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

2. When connected with the robot, run the Photon Code interface using the access code.

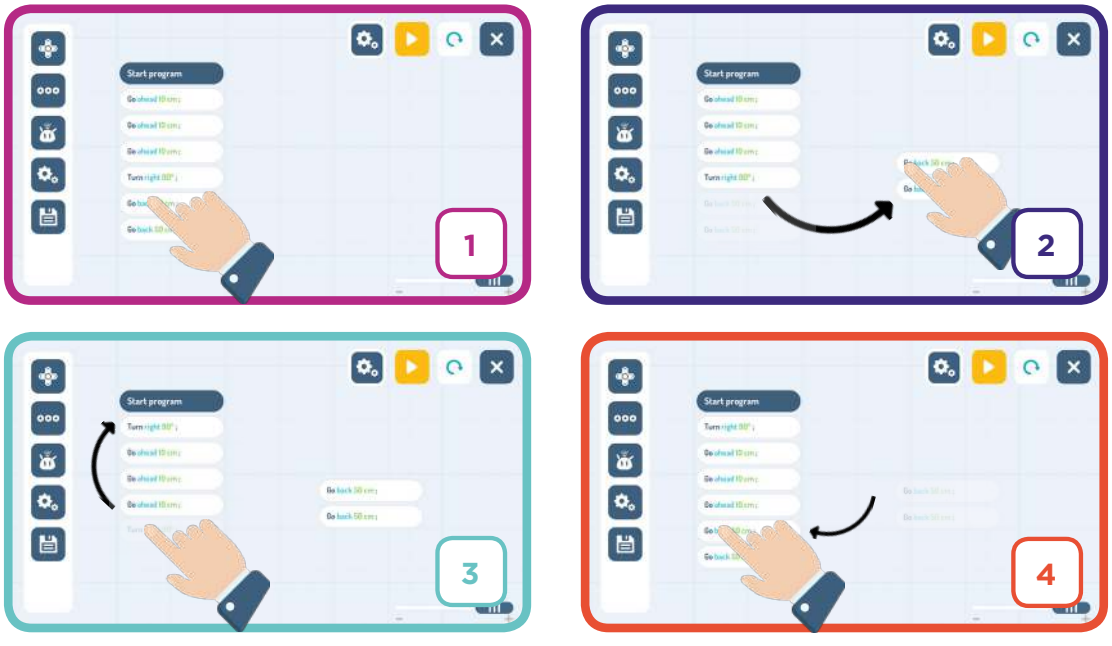
3. Model the three ways of improving a program by: (1) adding commands the program, (2) changing the order of stacked blocks, and (3) modifying the parameters of individual blocks.

Adding commands to the program:

To add a block to a program that has already been designed, select a block with your finger and drag it to the desired locatio. For example, select and drag a block in between two other blocks.

Changing the order of the stacked blocks:

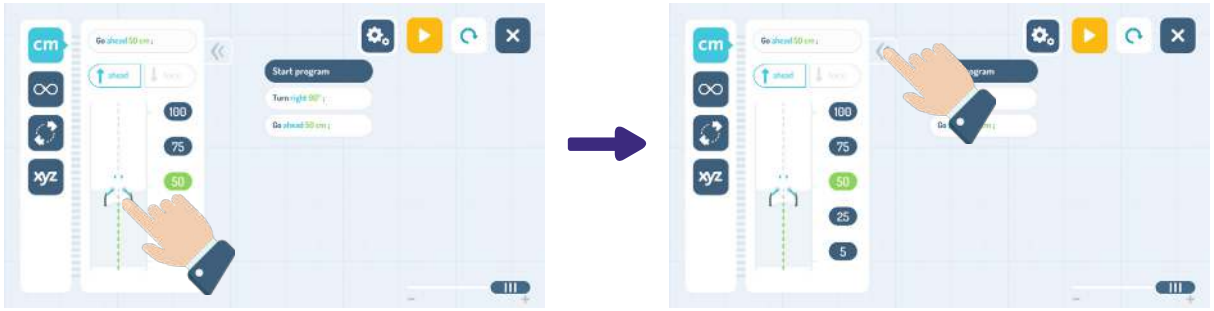
If you want to replace the order of stacked blocks, you should:
[1] select a portion of the program that you must move to access the block,
[2] move it to any place in the work area,
[3] rearange the desired blocks,
[4] re-attach the portion of the program that you disconnected at the beginning.



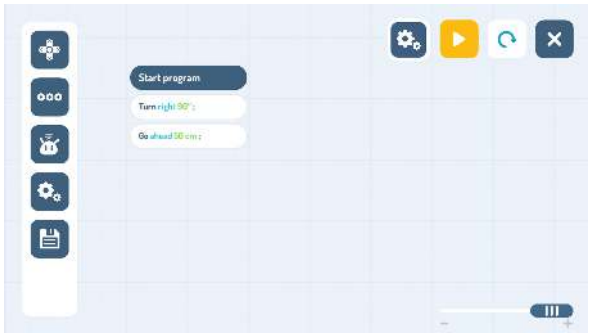
Changing the parameters of the coding blocks:

In order to change a parameter, press the coding block:

A side window will open where you can change the parameter:



Close the side window and it's ready to go!



4. Using the application, model how to add blocks, change the order, and modify parameters

5. Pass out the worksheet to each student and ask them to complete the tasks.

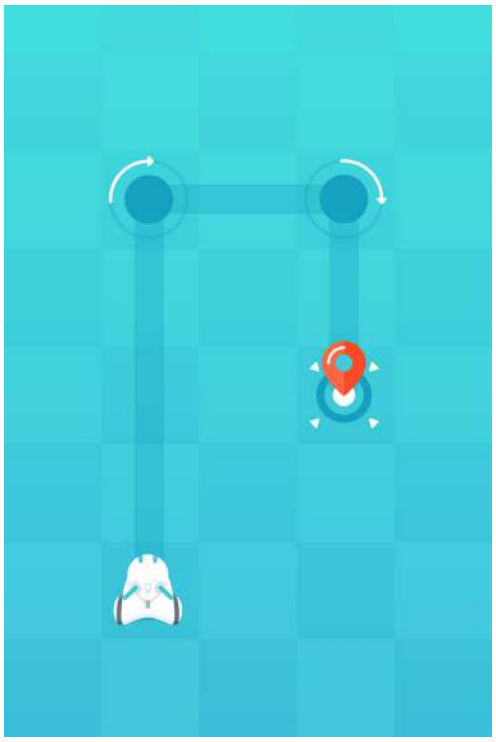
6. After the students have completed the task, ask them to enter the program into the application (one by one). Then see how Photon responds! Correct the code if necessary.

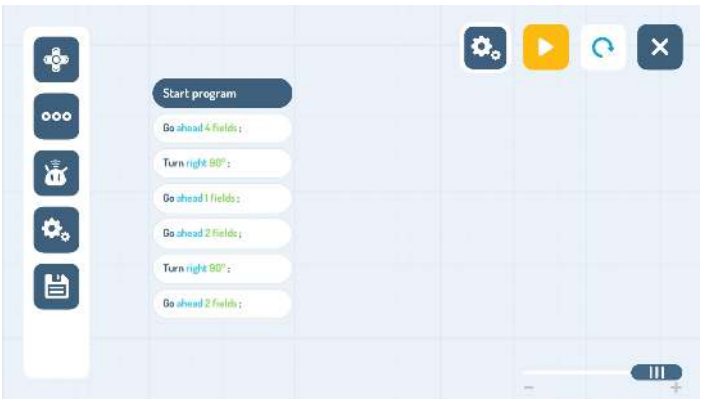
WORKSHEET

name: _____ class: _____

Activity 1 Find and circle the error in the program. Then, write a solution to correcting the program.

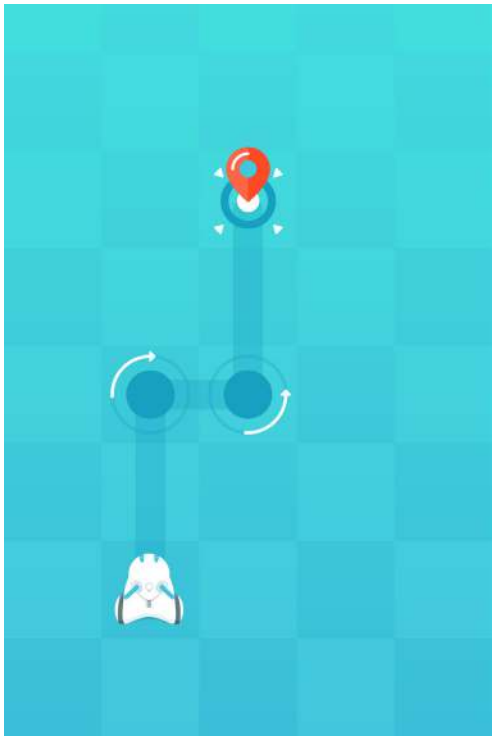
Task 1:

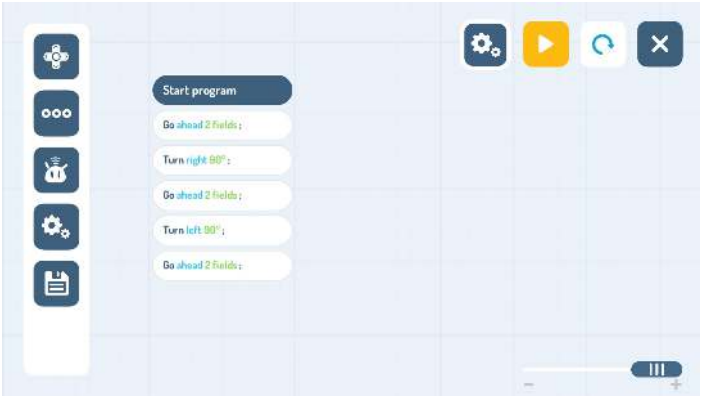




What should be improved?

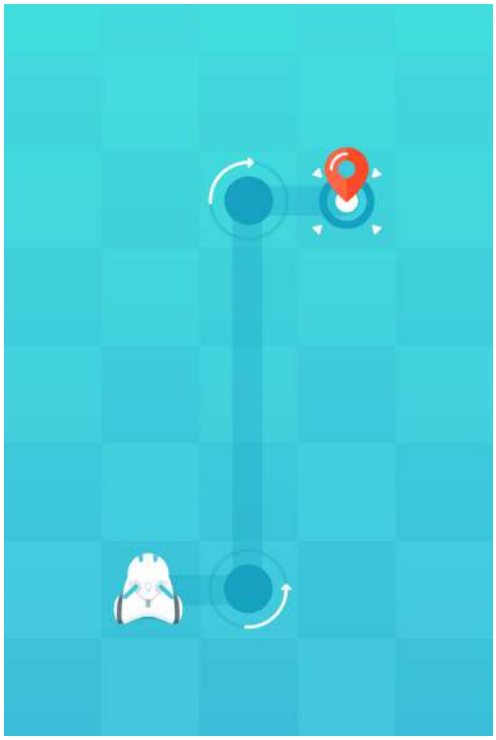
Task 2:

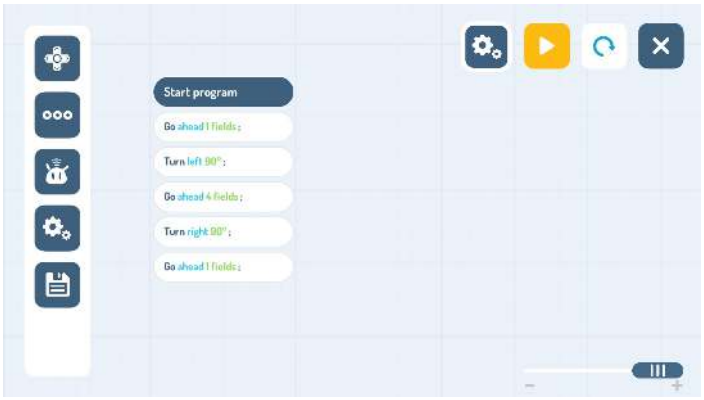




What should be improved?

Task 3:





What should be improved?

BUGS AND DEBUGGING 2.4.1BA

Activity **Photon Badge**

Access code:

author: Zuzanna Olechno

1. Split up the class into teams consisting of maximum of 10 studnets. Then, slelect the **Photon Edu** application, input the access code.

2. Ask the teams to sit in a circle (each team creates a separate circle, further instructions apply to each team separately). The goal of the game is to indicate 2 students who will intentially make mistake within a program (only you and the chosen studnets will know who makes the mistakes). Then, the studnets will have to find the errors in the program based on the code displayed on the board and on Photons movements.

3. Pass out one direction card to each student, (which is available on the next page) It is important that students do not show each other what card they received.

4. Instruct the students to turn their backs to the center of the circle and to close their eyes. Now, choose 2 students whose task will be to enter the error into the program. While walking behind children, tap the arms of 2 students to indicate that they should not enter the command on the card, but rather anothr one.

5. Instruct the students to turn around and open their eyes.

6. Provide the tablet with the Photon Edu application running to a student to begin programming. When completed, she/he passes the tablet to the next person on the left (the tablet goes clockwise).

7. The studnets, one by one, enter commands including the 2 students who will enter wrong commands.

8. When the whole class has entered a piece of the program, the students approach the board and one by one place the badges in the order. If you have magnet, place them directly on the board, if not, write them in the form of badges or words. For example, ahead, left, yellow, etc.

9. Instruct the class to analyze the program on the board and the movements of the robot trying to find the mistakes. Then, the students try to guess who is responsible for making the errors.

Materials to cut out:

cut on the dotted line

BUGS AND DEBUGGING 2.4.2BA

Activity **Photon Badge**

Access code:

author: Zuzanna Olechno

1. Split the classinto the teams consisting of a maximum of 6 students. Then select the **Photon Edu** application and enter the access code.

2. Instruct the students in each team to make circle. (each team creates a separate circle, further instructions apply to each team separately). This game is similar to playing a whisper down the lane. The students will whisper a set of commands to each other. Then, students will input the program to check for errors.

3. Give each team a Photon and a tablet running the Photon Edu app and Photon Badge interface.

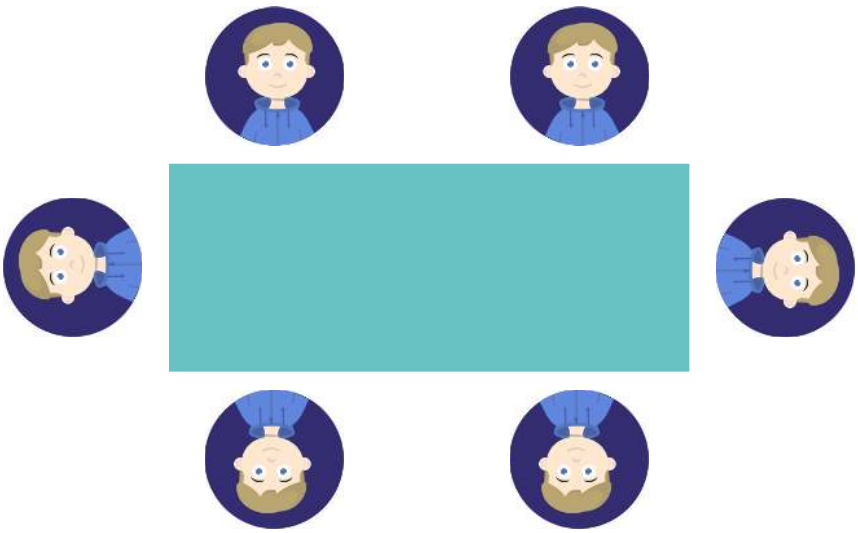
4. Ask the first student to come up with a program consisting of a maximum of 5 commands.

5. When ready, the entire program is whispered into the ear of the person sitting on his/her left.

6. The program is "passed on" to each team member.

7. When the program reaches the last team member, s/he should take the tablet and input the program into the application. Then, run the program.

8. The team member who designed the program will check if Photon respond accurately. If yes - the team member will exchange their roles and continue the game. If not - the team should analyze each step, looking for the error. Once it is located, fix the error! Then, exchange roles and continue to play.



BUGS AND DEBUGGING 2.4.1BL

Activity **Photon Blocks**

Access code: 

author: Zuzanna Olechno

1. Split up the class into teams consisting of maximum of 10 studnets. Then, slelect the **Photon Edu** application, input the access code.

2. Ask the teams to sit in a circle (each team creates a separate circle, further instructions apply to each team separately). The goal of the game is to indicate 2 students who will intentially make mistake within a program (only you and the chosen studnets will know who makes the mistakes). Then, the studnets will have to find the errors in the program based on the code displayed on the board and on Photons movements.

3. Pass out one direction card to each student, (which is available on the next page) It is important that students do not show each other what card they received.

4. Instruct the students to turn their backs to the center of the circle and to close their eyes. Now, choose 2 students whose task will be to enter the error into the program. While walking behind children, tap the arms of 2 students to indicate that they should not enter the command on the card, but rather anothr one.

5. Instruct the students to turn around and open their eyes.

6. Provide the tablet with the Photon Edu application running to a student to begin programming. When completed, she/he passes the tablet to the next person on the left (the tablet goes clockwise).

7. The studnets, one by one, enter commands including the 2 students who will enter wrong commands.

8. When the whole class has entered a piece of the program, the students approach the board and one by one place the badges in the order. If you have magnet, place them directly on the board, if not, write them in the form of words. For example, go ahead, turn left, color yellow, etc.

9. Instruct the class to analyze the program on the board and the movements of the robot trying to find the mistakes. Then, the students try to guess who is responsible for making the errors.

Materials to be cut out:  cut on the dotted line

go ahead	go ahead
go ahead	go ahead
go ahead	go ahead
turn left	turn right
turn left	turn right
turn left	turn right
color red	go back
color green	go back
color blue	go back
color yellow	go back

BUGS AND DEBUGGING 2.4.1CO

Activity **Photon Code**

Acces code: 

author: Zuzanna Olechno

1. Split up the class into teams consisting of maximum of 10 studnets. Then, slelect the **Photon Edu** application, input the access code.

2. Ask the teams to sit in a circle (each team creates a separate circle, further instructions apply to each team separately). The goal of the game is to indicate 2 students who will intentially make mistake within a program (only you and the chosen studnets will know who makes the mistakes). Then, the studnets will have to find the errors in the program based on the code displayed on the board and on Photons movements.

3. Pass out one direction card to each student, (which is available on the next page) It is important that students do not show each other what card they received.

4. Instruct the students to turn their backs to the center of the circle and to close their eyes. Now, choose 2 students whose task will be to enter the error into the program. While walking behind children, tap the arms of 2 students to indicate that they should not enter the command on the card, but rather anothr one.

5. Instruct the students to turn around and open their eyes.

6. Provide the tablet with the Photon Edu application running to a student to begin programming. When completed, she/he passes the tablet to the next person on the left (the tablet goes clockwise).

7. The studnets, one by one, enter commands including the 2 students who will enter wrong commands.

8. When the whole class has entered a piece of the program, the students approach the board and one by one place the badges in the order. If you have magnet, place them directly on the board, if not, write them in the form of words. For example, go ahead, turn left, color yellow, etc.

9. Instruct the class to analyze the program on the board and the movements of the robot trying to find the mistakes. Then, the students try to guess who is responsible for making the errors.

Materials to be cut out:  cut on the dotted line

go ahead	go ahead
go ahead	go ahead
go ahead	go ahead
turn left	turn right
turn left	turn right
turn left	turn right
color red	go back
color green	go back
color blue	go back
color yellow	go back

BUGS AND DEBUGGING 2.5.1

Conclusion

Summary of the classes:

1. Repeat the new terms and sidcuss as a class.

2. Divide the children into groups of 3 and ask the groups to write a short story using all of the new terms. As a class, check that the terms were used accuratcly.