photon

CONDITIONAL STATEMENTS

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CONDITIONAL STATEMENTS 6.1.1

Introduction

author: Sebastian Pontus

1. Introduce the new vocabulary to your students.

2. Explain the terms and make sure that they understand the importance of the newly learned words.

NEW TERMS

conditional statements – instructions that function only under certain conditions, e.g. if there is light, go ahead.

condition - a factor that determines whether or not an activity is performed

3. Explain your students what the conditional statements for Photon are.

Conditional statements: are commands that, by means of the robot's sensors, determine how the robot should behave **if** something happens or what the robot has to do **until** some condition is met.

„IF" CONDITION

The condition „if" indicates what command (or sequence) the robot should carry out if the particular condition is met.

For example, go ahead for 50 cm and when you hear a loud sound - turn around on your own axis

The robot goes 50 cm and checks if there is a loud sound:
- **if YES**, it rotates around its own axis,
- **if NO**, the robot does nothing.

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„UNTIL" CONDITION

The condition „until" indicates which command (or sequence) the robot is to perform as long as it detects one of the factors.

Example: As long as there is noise - go ahead.

As long as the noise occurs - the robot goes ahead and when the noise stops, the robot stops.

Note: „Until" condition can be replaced with the „if" condition only with „repeat endlessly" command.

Example:
As long as it is light - make a sound.

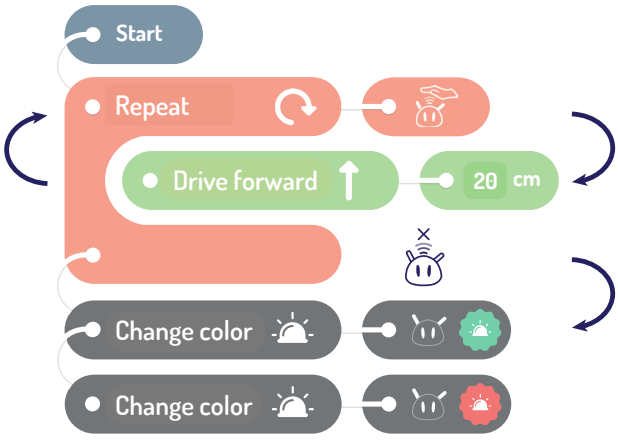
The robot makes a sound when it is light. When is dark, the robot will stop making a sound.

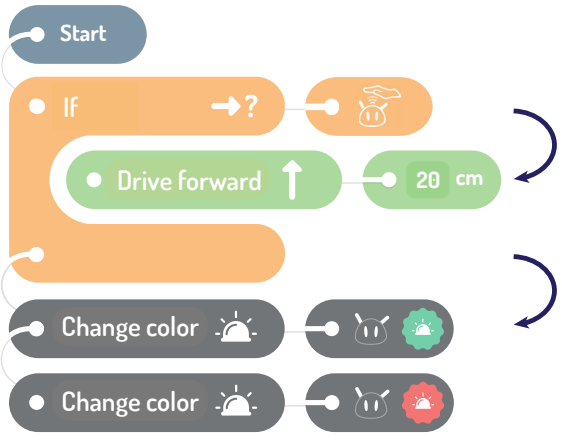
If you use the „if" condition, the program will look like this:

Repeat endlessly: if it is light - make a sound, if it is dark - stop

The robot makes a sound when it is light. When is dark, the robot will stop making a sound.

Conditional statements „if" and „until" are related to each other. The difference is that the „until" command is a loop, that is, everything that is in the block "until" it is repeated until the condition ceases to be fulfilled. On the other hand, „if" executes the command that is inside only once and goes on doing the rest of the program.





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CONDITIONAL STATEMENTS 6.2.1

Offline task

author: Sebastian Pontus

Activity 1. Cheerful monsters.

1. Pass out a blank page to each student and have them take out a pencil.

2. Explain the task:

Note! You will each draw a funny monster. Your monster should have arms, legs, a head, a torso, eyes, ears, and a nose. But, it can have as many parts of the body as you like! It can have 3 eyes, 4 legs and one arm. Make it as funny as you want.
Do not color your monster, this will be the second part of the lesson. Just use pencil for now. You have 5 minutes to create your monster... go!

3. Give your students five minutes to draw their monsters. Walk around and see how they are doing. After 5 minutes say:

Now, it is time to take out the crayons, you will be coloring according to my instructions, we will see how colorful your monsters will get.

EYES

1. If the monster has 1 eye, leave it white.
2. If the monster has two eyes, then color one yellow and leave the other white.
3. If the monster has three or more eyes, then color two of yellow and leave the rest white.

NOSE

1. If the monster has 1 nose, then color it red.
2. If the monster has two noses then color one brown and the other red
3. If the monster has three or more noses then color two of the red and the rest brown.

EARS – (you can choose the simple version according to the above rule and change the colors, or you can try to do it differently)

1. If your friends monster has no ears or has one, color all of your monster's ears black.
2. If your friends monster has two ears, color all of your monster's ears green.

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3. If your friends monster has 3 or more ears, color at least one of your monster's ears orange.

HEAD

1. If the monster has 1 head, then color it green.
2. If the monster has 2 heads, then color one blue and the other green.
3. If the monster has 3 or more heads, then color two blue and the rest green.

HANDS

1. If the monster has 1 hand, then color it red.
2. If the monster has 2 hands, then color one yellow and the other red.
3. If the monster has 3 or more hands, then color two pink and the rest purple.

LEGS – (you can choose the simple version according to the above rule for hand and change the colors, or you can try to do it differently)

1. If your frends monster has 1 leg, color all the legs of your monster brown.
2. If your friends monster has two legs, color all of your monster legs black.
3. If your friends monster has 3 or more legs, color all of your monster legs orange.

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CONDITIONAL STATEMENTS 6.2.2

Offline task

author: Sebastian Pontus

Activity 1. Game „what if".

1. Print the game boards - available on the next page.

2. Print movement cards for each group - available on the next page.

3. Cut out the movement cards, fold or curl them and place in a dark bag (for the chance to draw).

4. Divide your students into groups. Give each group a board.

5. Explain the rules of the game to them:

The game is about completing the game faster than the opponent. Just like in a ladder game, if a person stops in a space with a green arrow, she/he moves to the indicated place. If there is a red arrow – this person falls (go to the lower level).

We will use dice and condition cards to play the game.

First, we roll a dice - it indicates how many spaces we can move if the condition is met. Then we draw one condition card from the bag.

Example: We roll a "4" and the statement on the condition card says "If you do not blink for 10 seconds." If the student does not blink for 10 seconds, they move 4 spaces. If they blink before 10 seconds is up, they do not move.

You can also use two coins and a condition card. Then:
a) Heads and heads - move one space
b) Heads and tails - move three spaces
c) Tails and tails - move four spaces

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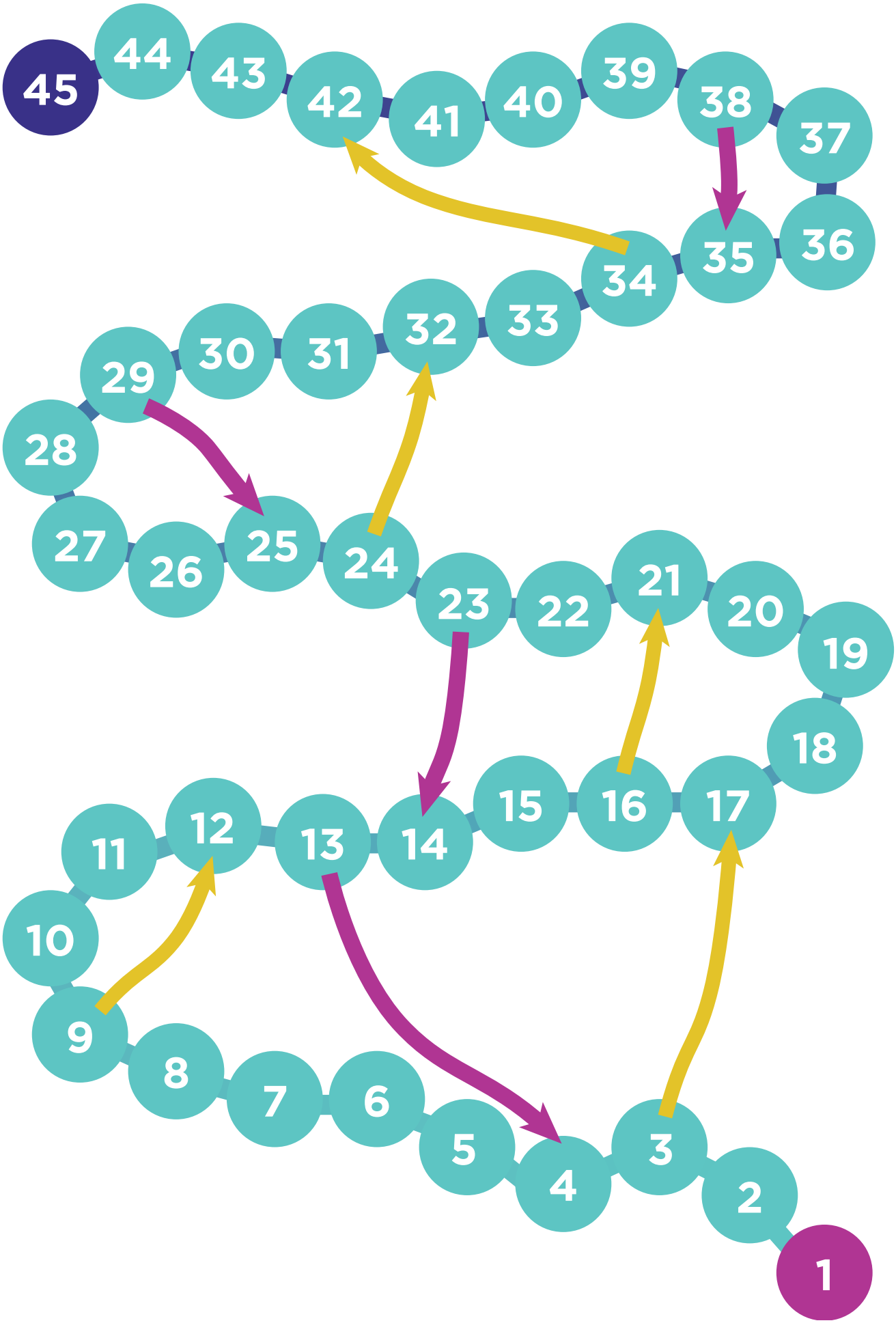

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Materials to be cut:

If the number of students in the classroom is less than 20.	If you finish before 2 p.m.
If the number of students in the classroom is less than 20.	If you finish after 2 p.m.
If the number of boys in the classroom is less than 6.	If you have physical education class today.
If there are more than 20 girls in the classroom.	If there is no test today.
If 3 people are absent.	If you have fewer than 6 lessons today.
If more than 2 people are absent.	If fewer than 4 people less than 4 students are wearing yellow t-shirts.
If there are more than 15 people present.	If the board is on your left side.
If a classmate on your right side is wearing a yellow T-shirt.	If the board is behind you.
If a classmate on your left side is wearing blue pants.	If there are at least 20 chairs in the classroom.
If two of your classmates have red pens at their desks.	If there are no more than 18 chairs in the classroom.
If 3 people in the classroom have juice in their lunch today.	If there are fewer than 7 windows in the classroom.
If there is at least one potted plant in the classroom.	If there are fewer than 15 windows in the classroom.

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CONDITIONAL STATEMENTS 6.2.3

Offline task

author: Sebastian Pontus

Activity 1. Creating conditional statements „if" and „until".

1. Give each student a worksheet and scissors.

2. The task for your students will be to put the appropriate blocks into the marked places and compare their instructions with the instructions received by their class friends

3. Note that in this task, your students use the „until" block while in the Photon Edu application, this block is called Repeat until.

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WORKSHEET

Name:_____ Class:_____

Activity 1. Make sure to follow these steps:

1. Cut out the words „if" and „until", sensor statuses and robot activities.

2. Paste the sensor status into blue (light sensor) or green (sound sensor) fields.

3. Paste the robot activity into the orange fields.

4. Stick „if" and „until" into the purple fields.

5. Read the created conditional statements. Compare them with your friend's statements.

A.

B.

C.

D.

E.

F.

G.

H.

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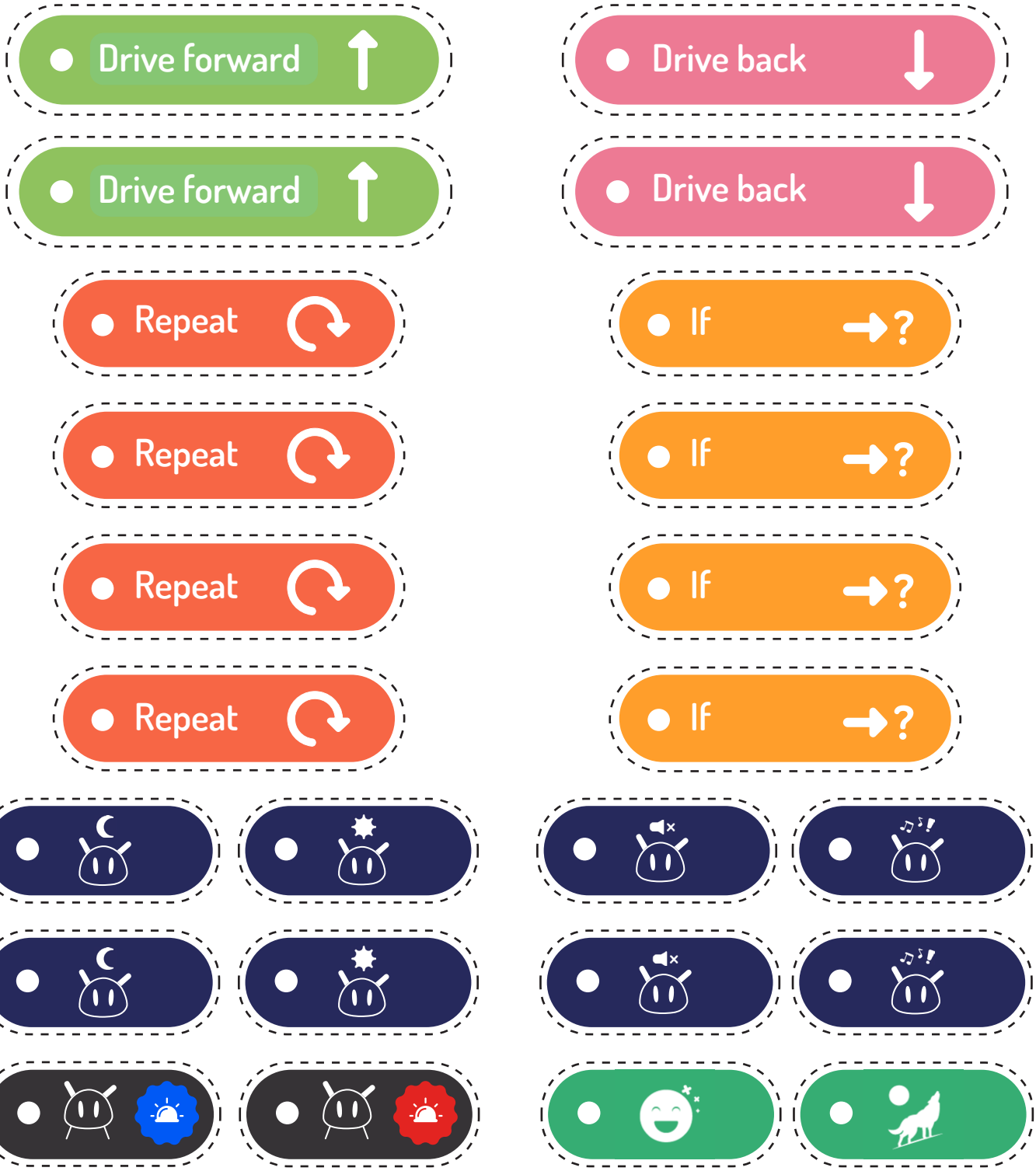
Materials to be cut out: cut on the dotted line



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CONDITIONAL STATEMENTS 6.2.4

Offline task

author: Sebastian Pontus

Activity 1. Creating conditional statements „if" and „until".

1. Give each student a worksheet and scissors.

2. The students task will be to analyze the robot's algorithm and to design the appropriate program.

3. After completing the task, ask for volunteers to read their programs.

4. In each example, ask if someone has managed to do this task in a different way.

Algorithms of the robots:

Robot A

As long as it is bright, the robot is at rest. When the light goes out, the robot makes a 360-degree turn.

Robot B

The robot goes ahead as long as it is loud. When the noise stops, the robot shines green.

Robot C

As long as there is silence, the robot shines red. If not, the robot shines blue.

Robot D

If it is bright, the robot laughs like a child. When it is dark he howls like a wolf.

Robot E

Until it is silent, the robot does nothing. When it gets loud, the robot makes a 360-degree turn.

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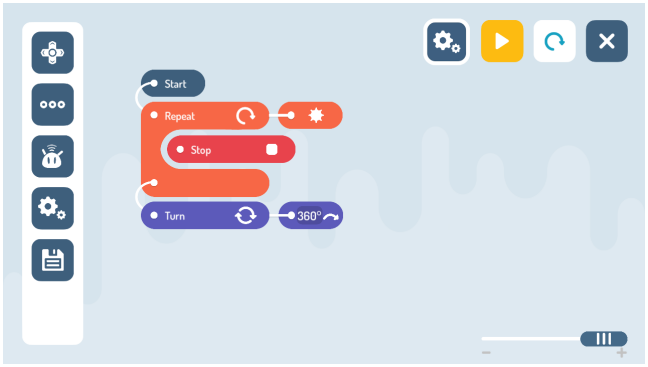
A properly designed program:

There can be many solutions. If the programs designed by your students do not comply with the options presented below, this does not mean that the task was done incorrectly. Run the program using Photon and the application and check whether the robot behaves in the manner indicated in the task.

Robot A

As long as it is bright, the robot is at rest. When the light goes out, the robot make a 360-degree turn.

Option 1:



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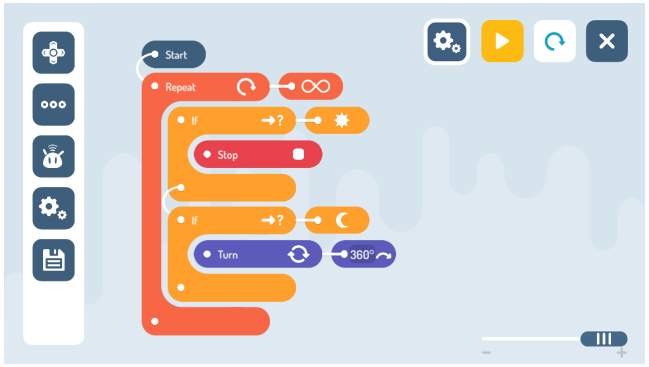
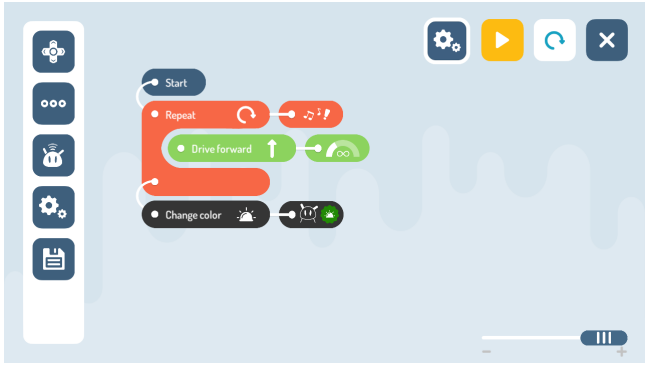


Robot B

The robot goes ahead as lond as it is loud. When the noise stops, the robot shines green.

Option 1:



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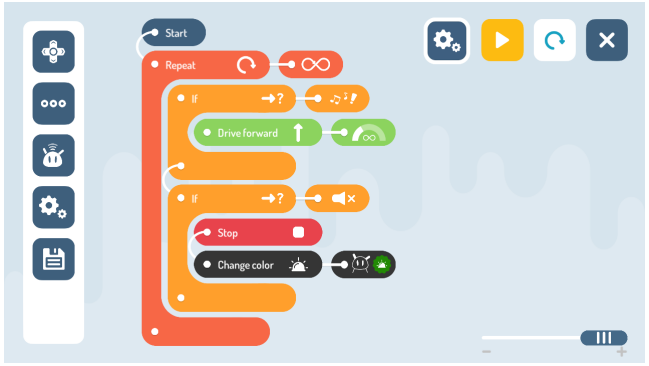

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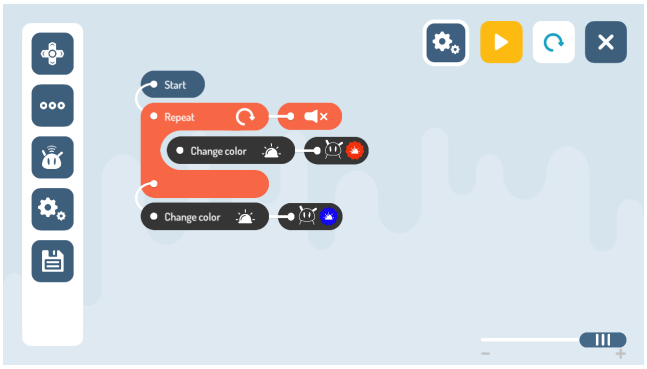
Robot C

As long as there is silence, the robot shines red. If not, the robot shines blue.

Option 1:



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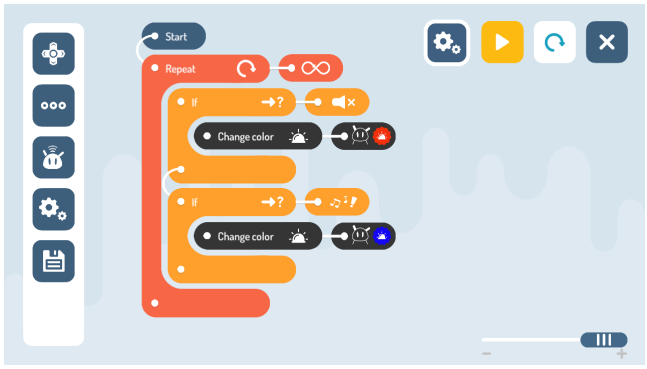
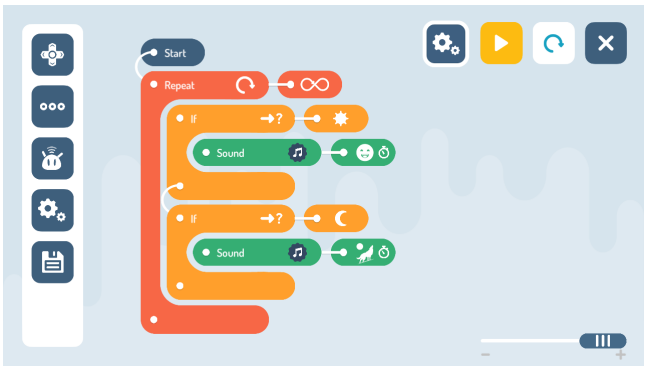


Robot D

If it is bright, the robot laughs like a child. When it is dark he howls like a wolf.

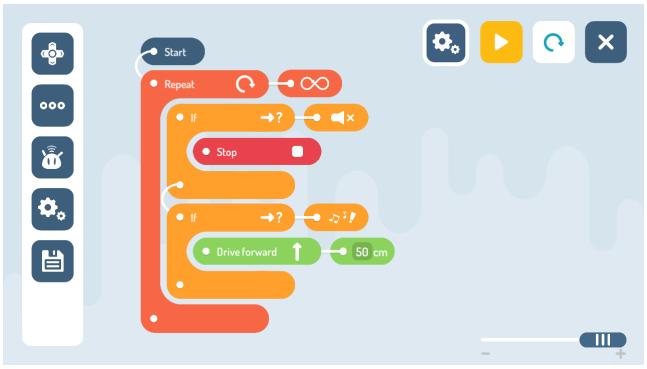
Option 1:



Robot E

Until it is silent, the robot does nothing. When it gets loud, the robot moves 50 cm forward.

Option 1:



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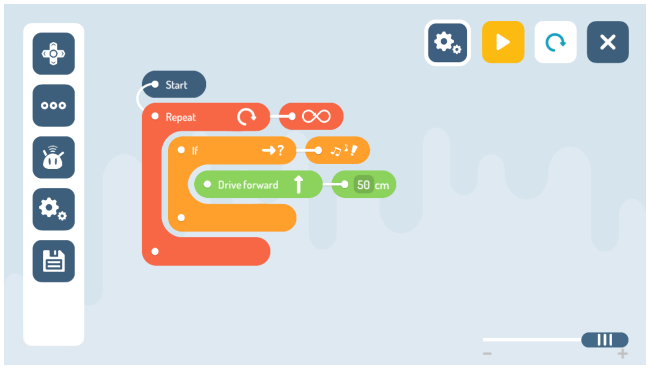

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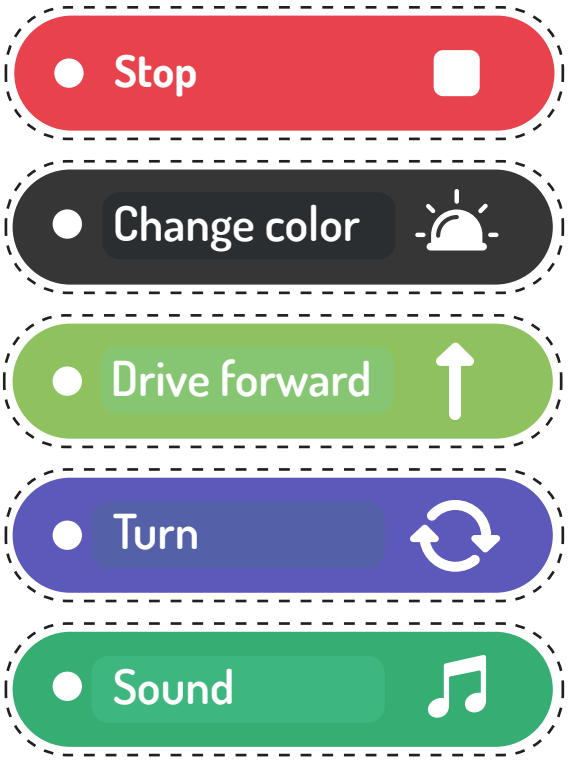

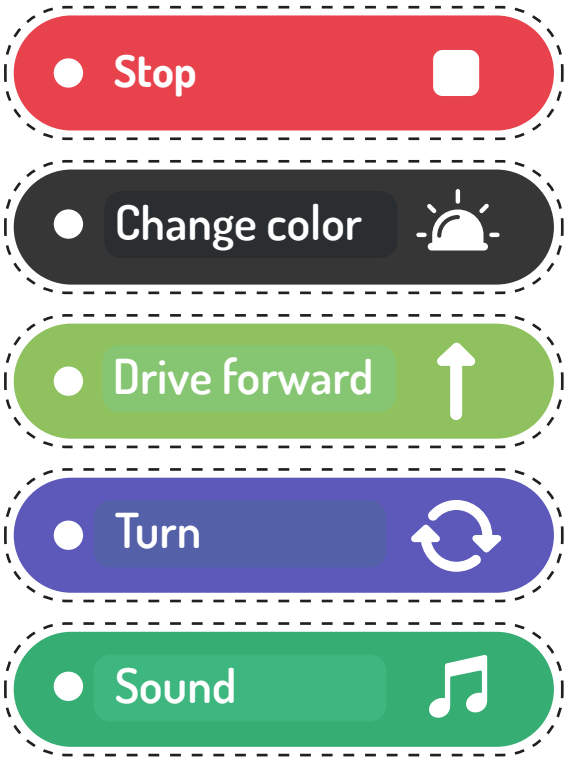

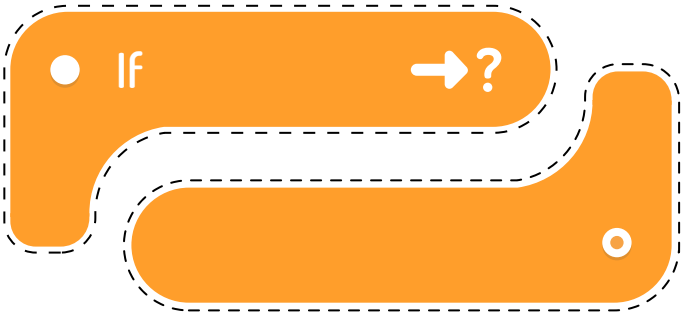

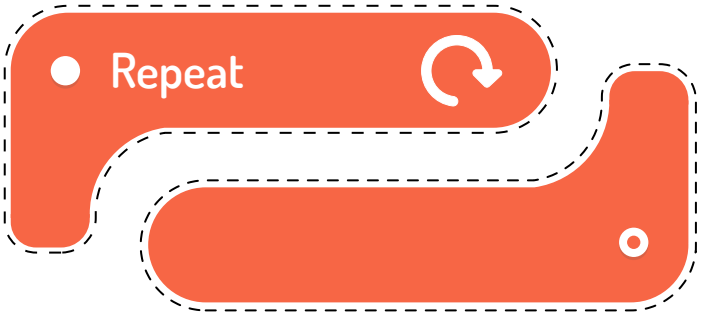

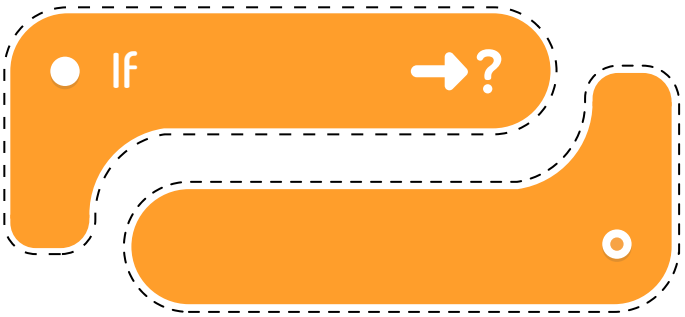

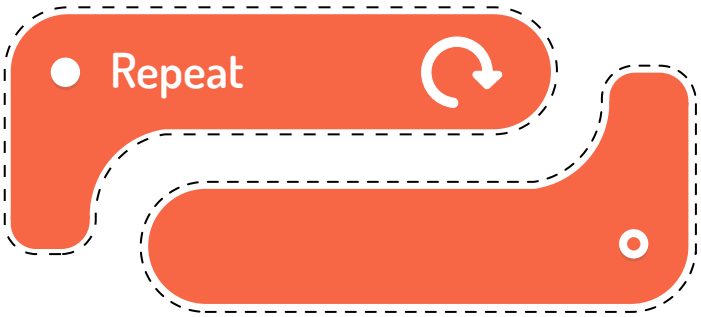

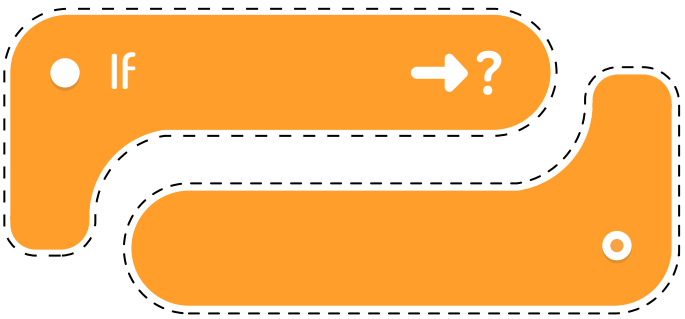

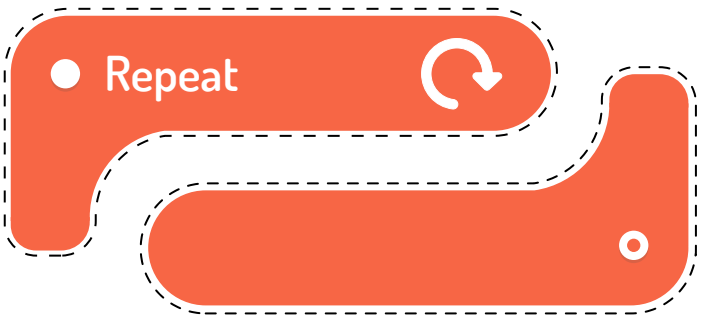

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WORKSHEET

Name:_____ Class:_____

Activity 1 Read the algorithms of robots A, B, C, D and E. Highlight (in each of them) the **sensor status using red** and the **command using green**. Then cut out the blocks and make up the conditional statements for each of the robots.

Robot A

As long as it is bright, the robot is at rest. When the light goes out, the robot makes a 360-degree turn.

Robot B

The robot goes ahead as long as it is loud. When the noise stops, the robot shines green.

Robot C

As long as there is silence, the robot shines red. If not, the robot shines blue.

Robot D

If it is bright, the robot laughs like a child. When it is dark he howls like a wolf.

Robot E

Until it is silent, the robot does nothing. When it gets loud, the robot makes a 360-degree turn.

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Robot A

As long as it is bright, the robot is at rest. When the light goes out, the robot makes a 360-degree turn.

Space for designing program:

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Robot B

The robot goes ahead until it's loud. When the buzz stops, the robot shines green.

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Robot C

As long as there is silence, the robot shines red. If not, the robot shines blue.

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Robot D

If it is bright, the robot laughs like a child. When it is dark he howls like a wolf.

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Robot E

Until it is silent, the robot does nothing. When it gets loud, the robot makes a 360-degree turn.

Space for designing program:

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CONDITIONAL STATEMENTS 6.3.1BL

Introduction to programming: **Photon Blocks**

Class code:

Author: Zuzanna Olechno

1. Turn on the robot and open the Photon Edu app. If you are able to, share the tablet screen on a projector so all students can see exactly what is happening on the tablet screen.

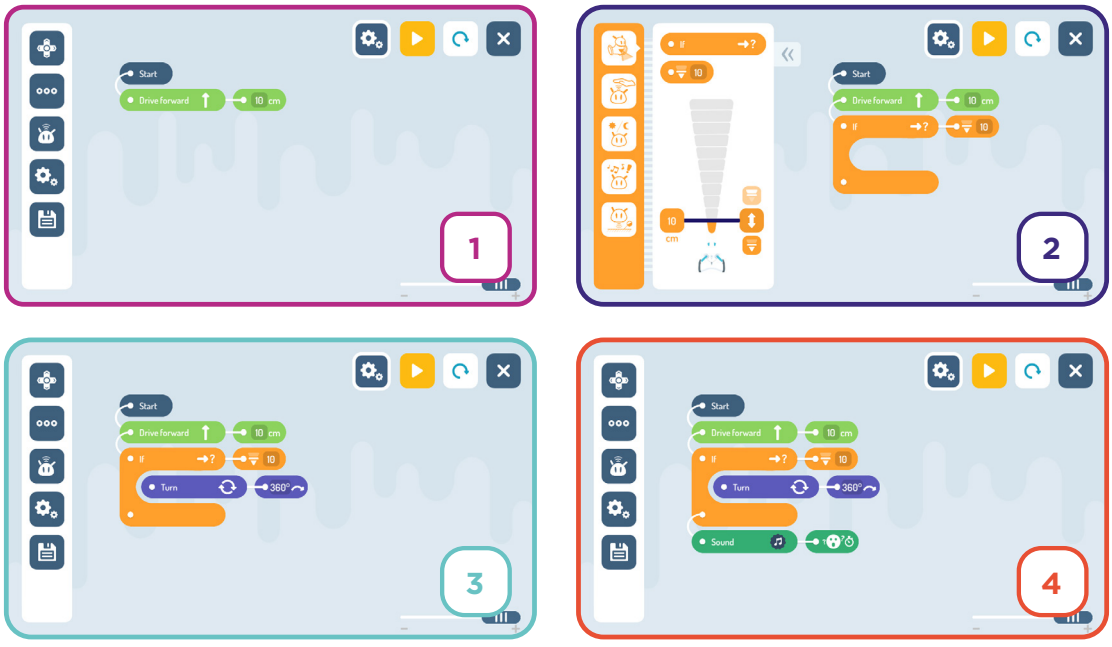
2. When connected to the robot, launch the Photon Blocks interface using the **class code.**

3. Show children what the blocks of conditional instructions are: if and repeat until.

If add the block to the program if you want the robot to react to some situation by means of its sensors. This statement is checked once. When the program gets to the block if, it checks if the chosen factor exists, for example whether it is loud. If it is loud, the robot will do what is inside the block if, otherwise, it will skip this command and go on.

Example: go ahead 10 cm, if the obstacle is at a distance of 10 cm make a 360-degree turn, then make a sound of surprise.

If you want Photon to do this once:
[1] add a block **go ahead for 10 cm**,
[2] add a block **if** and set the dependence: if the obstacle is closer,
[3] than 10 cm to the center of the block and add, **make a 360-degree turn**,
[4] finally add a block **sound** of suprise.



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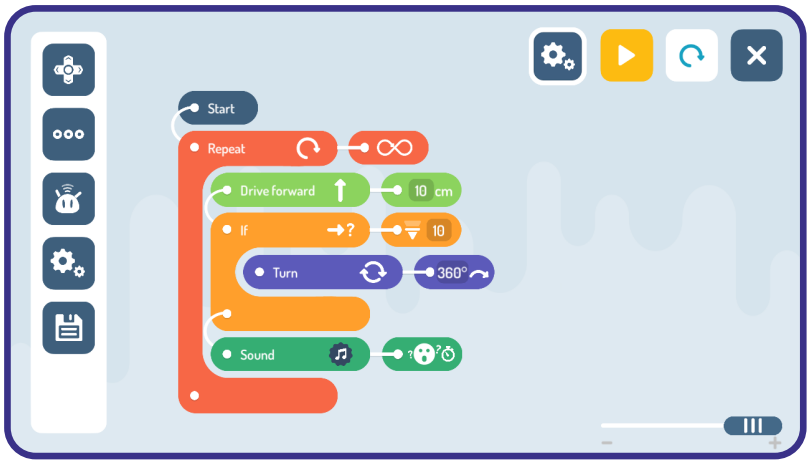
If you want Photon to perform this task on and on, put the whole previous program in the block and set the number of repetitions to infinity.



Repeat until - add this block to the program when you want the robot to repeat the activity or actions **until** some condition is fulfilled.

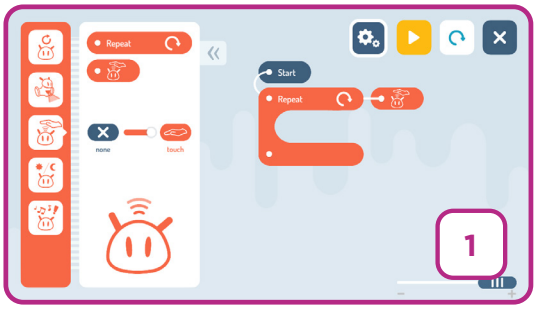
Example: as long as you keep your hand on the forehead of the robot, it makes sounds and if you let go, it will go ahead for 100 cm.

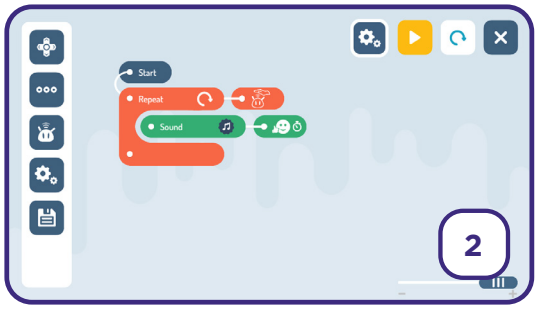
If you want Photon to do this once:

[1] add a block **repeat** to the program and set the parameter to touch option,

[2] add make a sound block to the repeat block,

[3] and to the end of the program add a block to go ahead for 100 cm.





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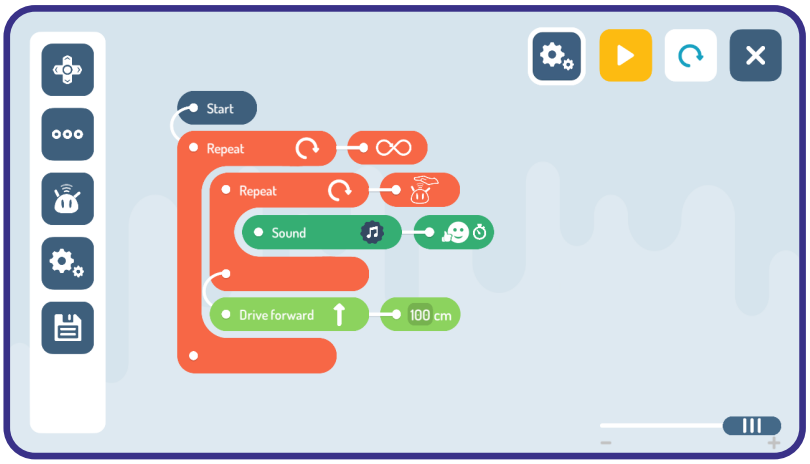
If you want Photon to perform this task on and on, put the whole previous program in the block and set the number of repetitions for infinity.



4. Using the application show how the use of blocks if and repeat look like in practice.

5. Give your students the worksheets and ask them to complete their tasks.

6. When your students perform the tasks on the worksheets, ask them to check the programs in the application and to check the behavior of Photon as well as the accurateness of their programs.

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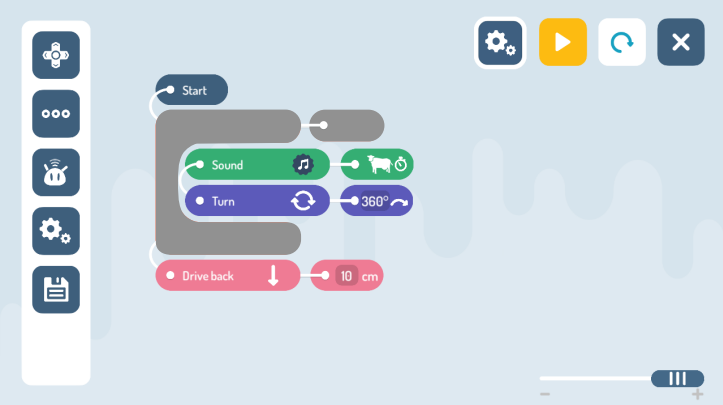
WORKSHEET

Name:_____ Class:_____

Activity 1. Read the information on the behavior of the robot, then decide what block was used in the program: if or repeat until and what parameter was set.

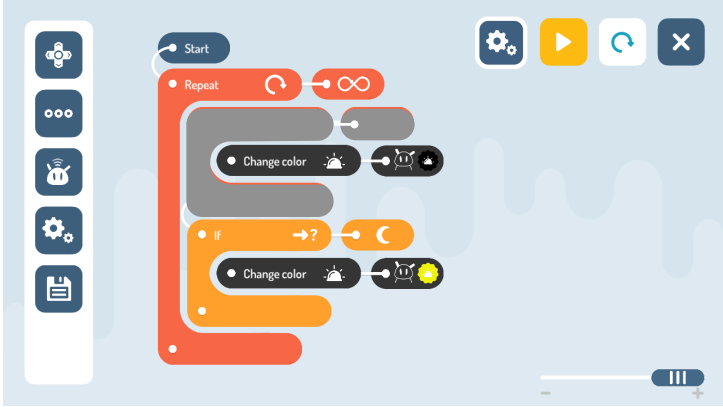
Task 1:



Description: Photon makes the sound of a cow and makes a 360 degree turn until we take a hand off its head. When we do so, it will go back 10cm.

Answer:

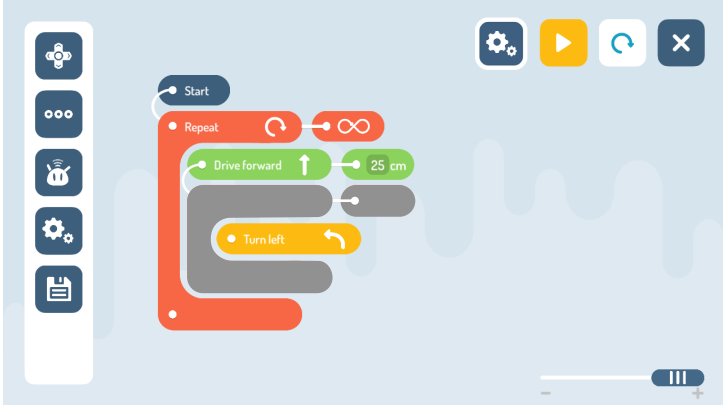
Task 2:



Description: When it is bright, Photon's tentacle and eyes turn off and when it is dark, they are yellow.

Answer:

Task 3:



Description: Photon goes 25 cm ahead,Than if the distance between it and the obstacle is 35 cm, the robot turns left and goes ahead for 25 cm again.

Answer:

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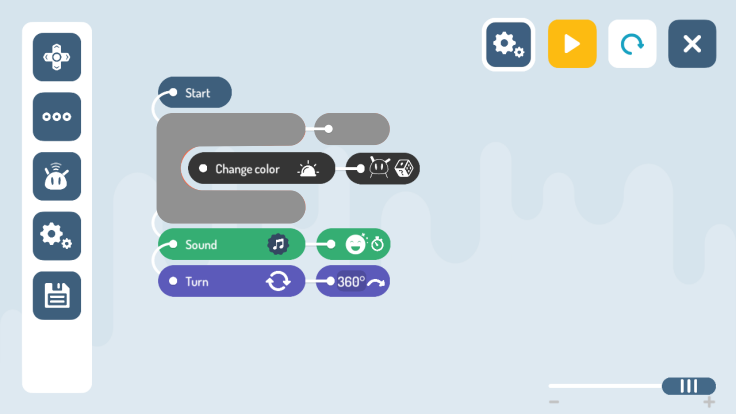

Description: When it is light, Photon changes the color of its antenna and eyes. If the light turns out, it makes a sound and makes a 360-degree turn.

Answer:

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CONDITIONAL STATEMENTS 6.3.1CO

Introduction to programming **Photon Code**

Class code:

author: Zuzanna Olechno

1. Turn on the robot and open the Photon Edu app. If you are able to, share the tablet screen on a projector so all students can see exactly what is happening on the tablet screen.

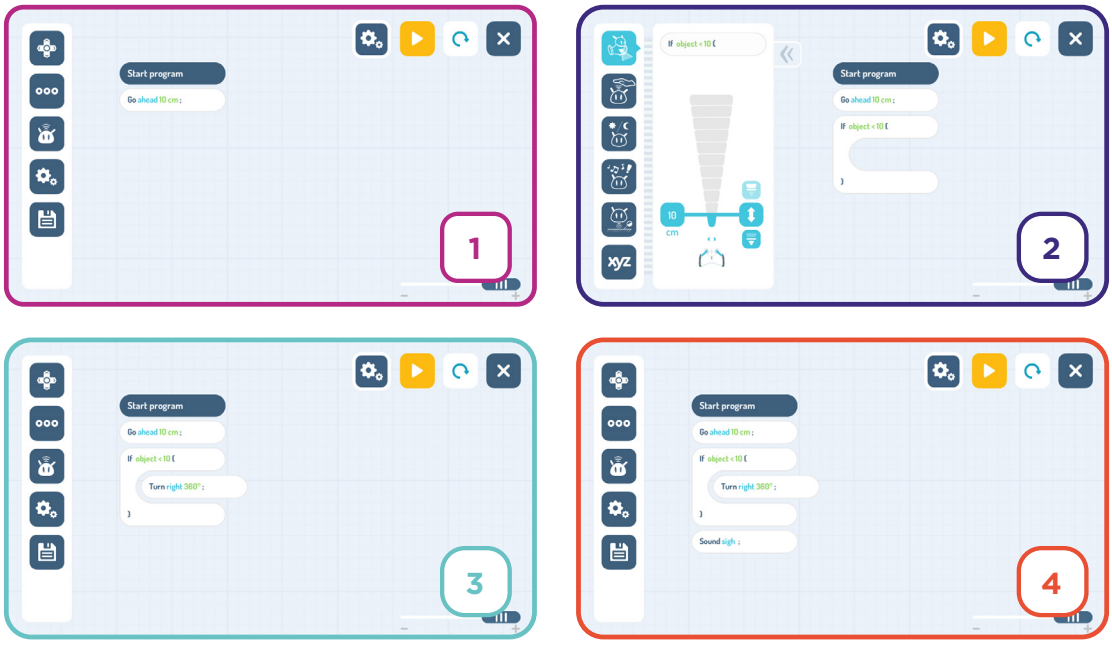
2. When connected to the robot, launch the Photon Code interface using the **class code.**

3. Show children what the blocks of conditional instructions are: if and repeat until.

If add the block to the program if you want the robot to react to some situation by means of its sensors. This statement is checked once. When the program gets to the block if, it checks if the chosen factor exists, for example whether it is loud. If it is loud, the robot will do what is inside the block if, otherwise, it will skip this command and go on.

Example: go ahead 10 cm, if the obstacle is at a distance of 10 cm make a 360-degree turn, then make a sound of surprise.

If you want Photon to do this once:
[1] add a block **go ahead for 10 cm**,
[2] add a block **if** and set the dependence: if the obstacle is closer,
[3] than 10 cm to the center of the block and add, **make a 360-degree turn**,
[4] finally add a block **sound** of suprise



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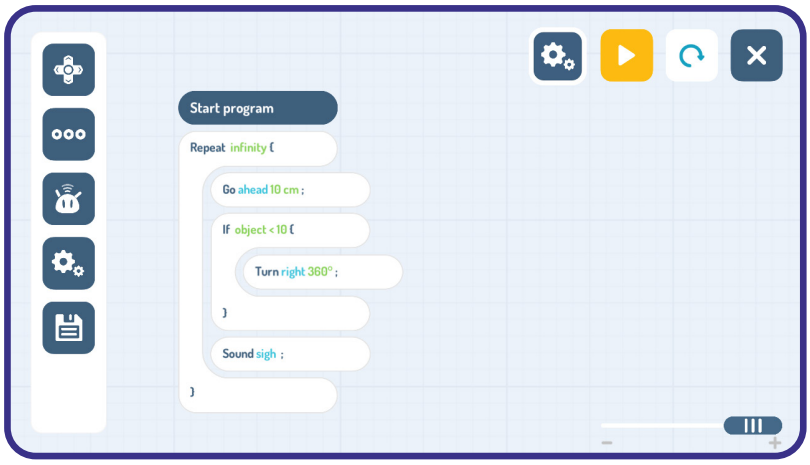
If you want Photon to perform this task on and on, put the whole previous program in the block and set the number of repetitions to infinity.



Repeat until - add this block to the program when you want the robot to repeat the activity or actions **until** some condition is fulfilled.

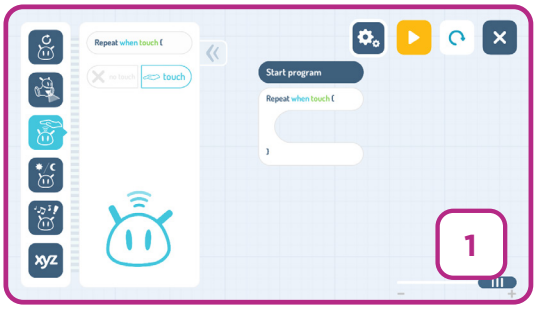
Example: as long as you keep your hand on the forehead of the robot, it makes sounds and if you let go, it will go ahead for 100 cm.

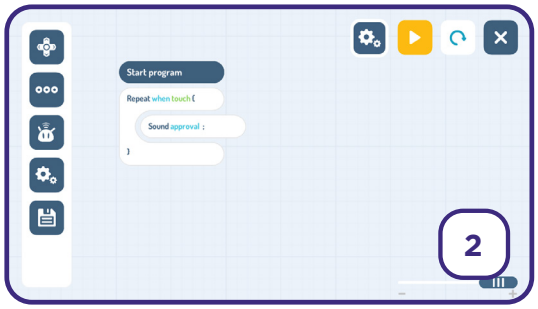
If you want Photon to do this once:

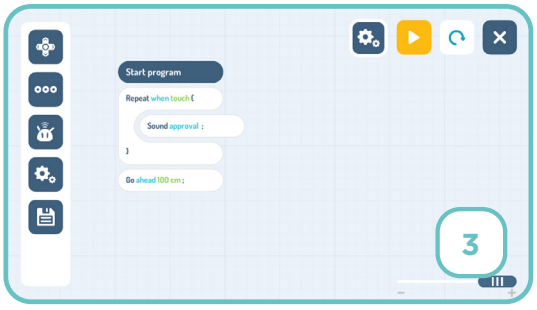
[1] add a block **repeat** to the program and set the parameter to touch option,

[2] add make a sound block to the repeat block,

[3] and to the end of the program add a block to go ahead for 100 cm.







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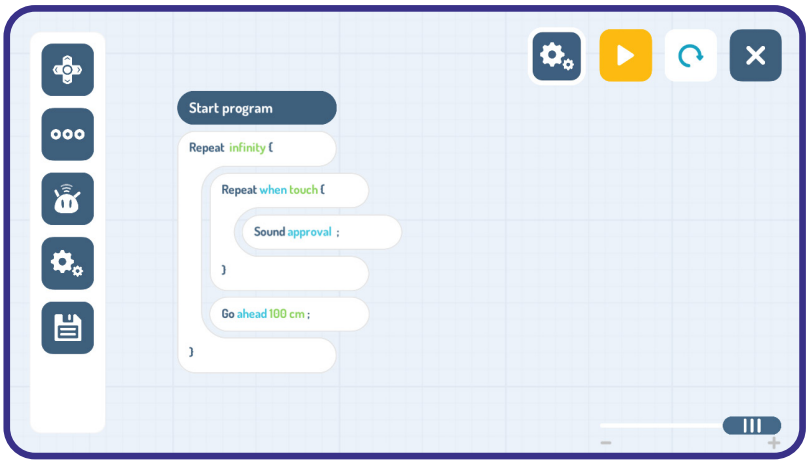
If you want Photon to perform this task on and on, put the whole previous program in the block and set the number of repetitions for infinity.



4. Using the application show how the use of blocks if and repeat look like in practice.

5. Give your students the worksheets and ask them to complete their tasks.

6. When your students perform the tasks on the worksheets, ask them to check the programs in the application and to check the behavior of Photon as well as the accurateness of their programs.

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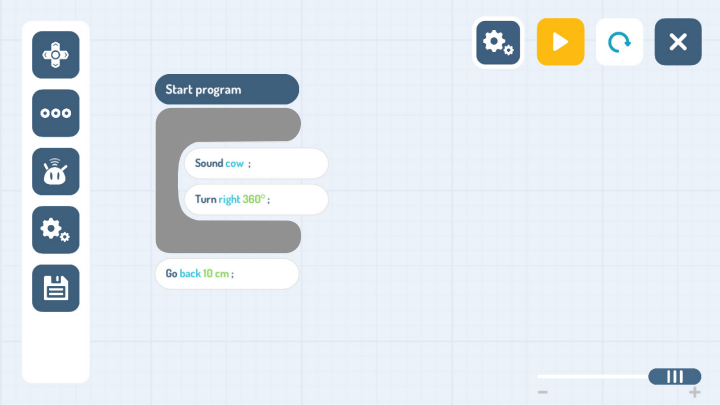
WORKSHEET

Name: _____ Class: _____

Activity 1. Read the information on the behavior of the robot, then decide what block was used in the program: if or repeat until and what parameter was set.

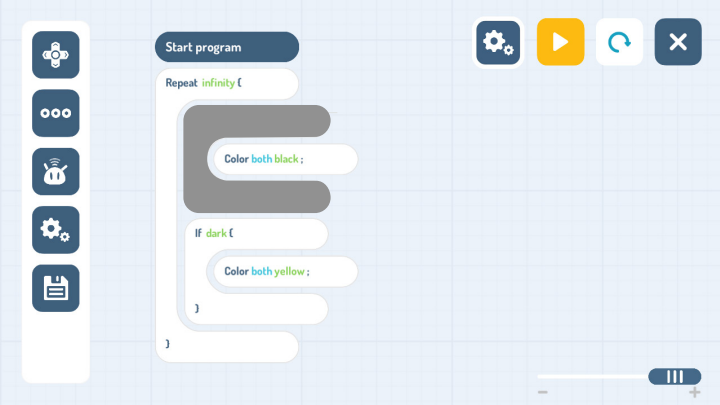
Task 1:



Description: Photon makes the sound of a cow and makes a 360 degree turn until we take a hand off its head. When we do so, it will go back 10cm.

Answer:

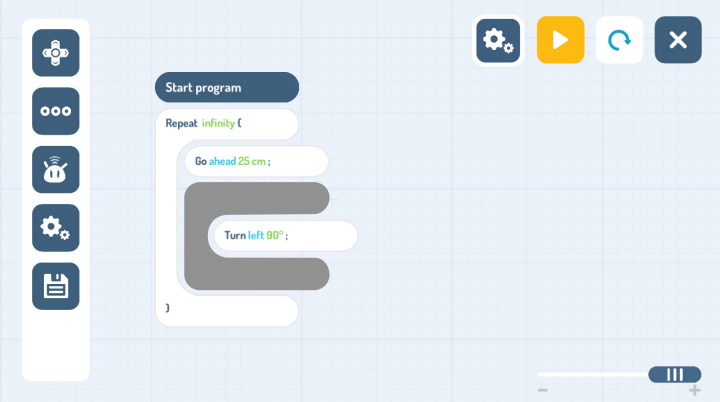
Task 2:



Description: When it is bright, Photon's tentacle and eyes turn off and when it is dark, they are yellow.

Answer:

Task 3:



Description: Photon goes 25 cm ahead,Than if the distance between it and the obstacle is 35 cm, the robot turns left and goes ahead for 25 cm again.

Answer:

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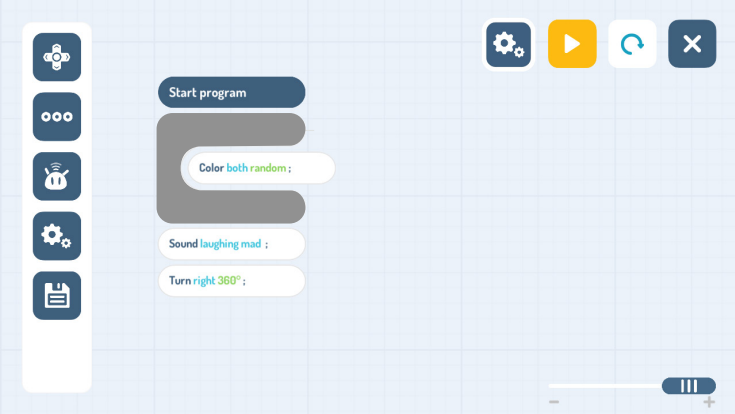

Description: When it is light, Photon changes the color of its antenna and eyes. If the light turns out, it makes a sound and makes a 360-degree turn.

Answer:

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CONDITIONAL STATEMENTS 6.4.1BL

Activity **Photon Blocks**

Class code:

author: Sebastian Pontus

1. Divide children into the teams consisting of maximum of 3 students and run the **Photon Edu** application, then use the class code.

2. Ask your students to sit in a circle.

3. Give each group a Photon and a tablet running the application and interface.

4. Give students cards with tasks. Their task will be to program Photon in such a way that it behaves as shown on the sheet.

5. Students try to program the robot in teams by means of trial and error. When they do the task, they raise their hands.

6. Your task is to check the correctness of the task performed. Below you will find examples of solutions.

NOTE: There can be many solutions. If the programs designed by students do not comply with the options presented below, this does not mean that the task was done wrong. Run the program using Photon and the application and check whether the robot behaves in the manner that specified in the task.

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WORKSHEET

Name:_____ Class:_____

Activity 1 Read the instructions that the Photon should perform. Determine together what commands to use to correctly complete the task. Use the application to program the robot. Check the accurateness of the created program.

Program 1

Our Photon loves to play with us! Each time we place our obstacle in front of it (a plush cube), it goes back and waits until we put it back.

Program 2

Our Photon loves to be patted and does not like when it's loud. When we pat it, it gives it joy: the Photon shines green, comes forward and gives joyous cheers. When we make a noise it gives out nervous sounds, its anrenna becomes red and it escapes backwards.

Program 1

Program 2

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CONDITIONAL STATEMENTS 6.4.1CO

Activity **Photon Code**

Class code:

author: Sebastian Pontus

1. Divide children into the teams consisting of maximum of 3 students and run the **Photon Edu** application, then use the class code.

2. Ask your students to sit in a circle.

3. Give each group a Photon and a tablet running the application and interface.

4. Give students cards with tasks. Their task will be to program Photon in such a way that it behaves as shown on the sheet.

5. Students try to program the robot in teams by means of trial and error. When they do the task, they raise their hands.

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NOTE: There can be many solutions. If the programs designed by students do not comply with the options presented below, this does not mean that the task was done wrong. Run the program using Photon and the application and check whether the robot behaves in the manner that specified in the task.

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WORKSHEET

Name: _____ Class: _____

Activity 1 Read the instructions that Photon should perform. Together, determine what commands to use to correctly complete the task. Use the application to program the robot. Check the accurateness of the created program.

Program 1

Whenever Photon sees an obstacle, it is at first delighted with it, which is expressed with the sound and color of the tentacles. It drives back a little to get a better look at this, which is expressed again with the sound of „wow". Then it tries to move it and after a while it drives away from the obstacle.

Program 2

Our tourist Photon travels around the classroom. It knows that a collision with the wall hurts. Therefore, it stops about 15 cm ahead of any obstacle, gives an alarm signal, departs slightly, turns and then continues moving around the classroom

Program 1

Program 2

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CONDITIONAL STATEMENTS 6.5.1

Conclusion

Summary of the lesson:

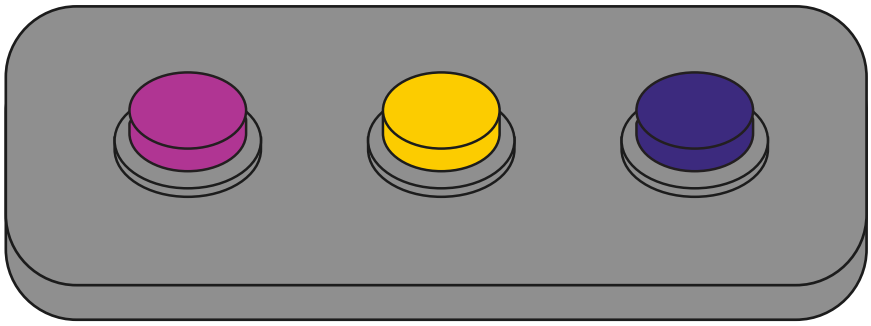
1. Repeat the vocabulary discussed in the classroom.

2. Ask for volunteers to iprovide examples of everyday situations where the statements „if „ and „until" are encountered.

3. Divide your students into pairs.

4. Print and give each pair a remote control. Ask each pair to assign specific situations to the buttons, e.g. if I press the red button - jump, etc.

5. The students task is to control each other by means of a remote control.



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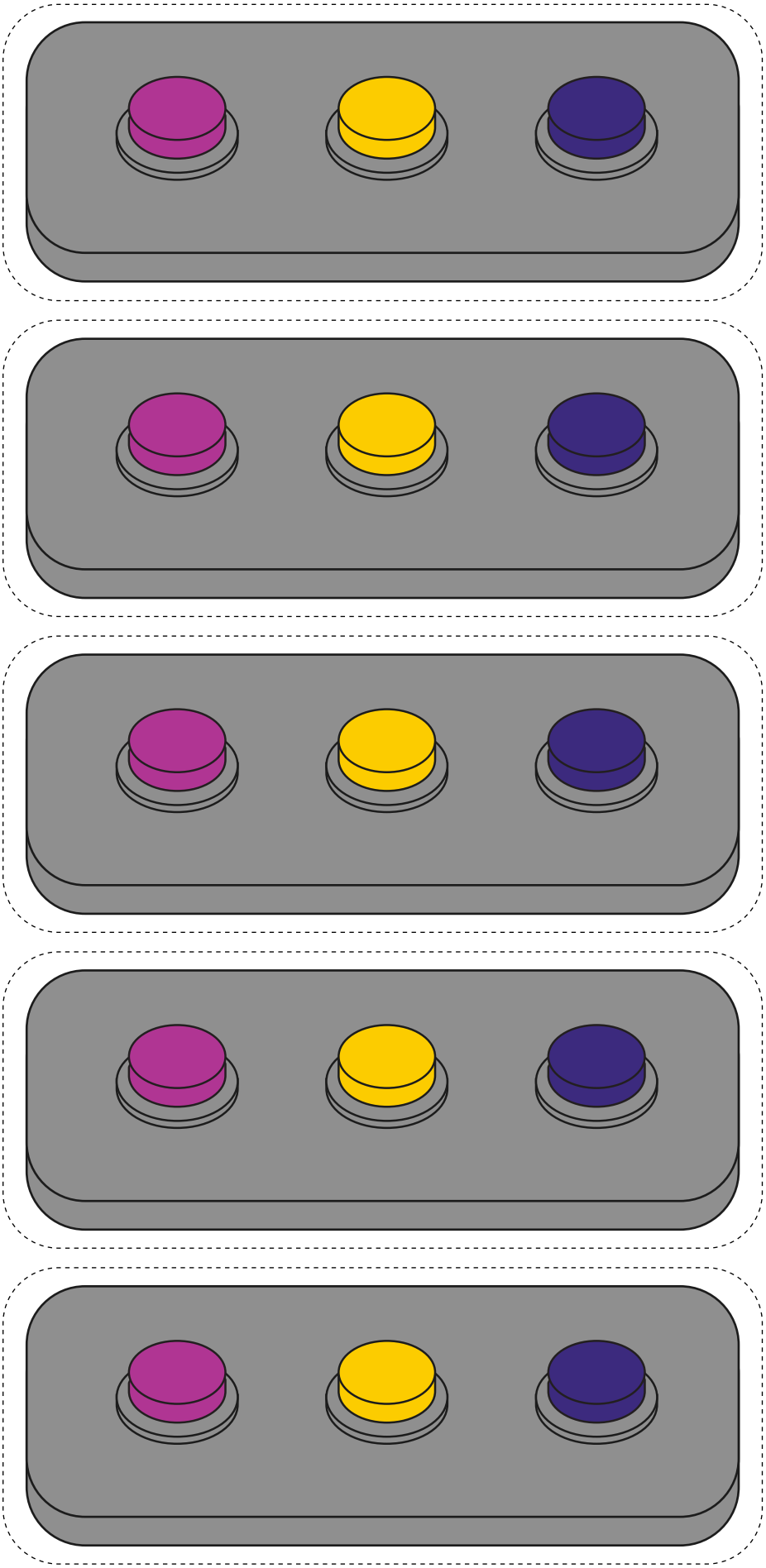
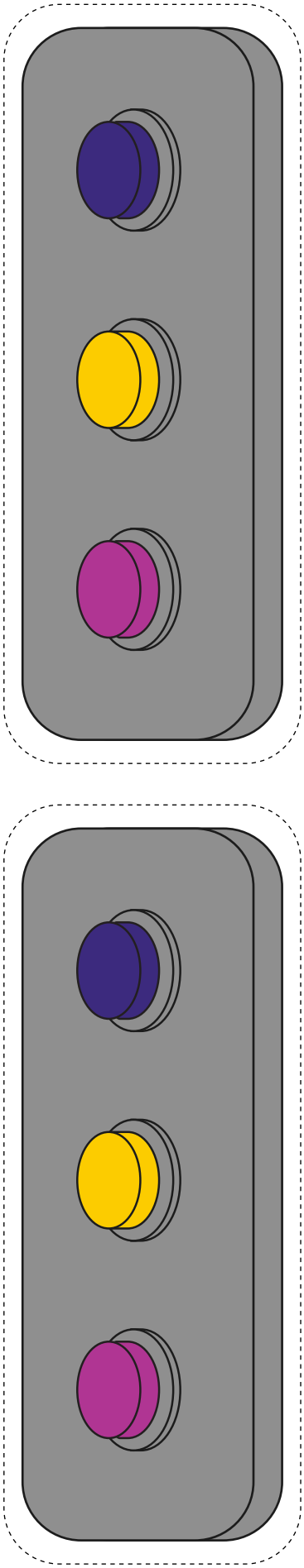
Materials to be cut out: cut on the dotted line





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