

NEPO® Programming paper EU Code Week Special



Here we go: It's EU Code Week and Roberta would like to go on an adventure trip! However, she doesn't know where she would like to go and how to get there.

Glad you are here! Help Roberta reach her goal and discover the NEPO programming paper alongside the EU Code Week with her!

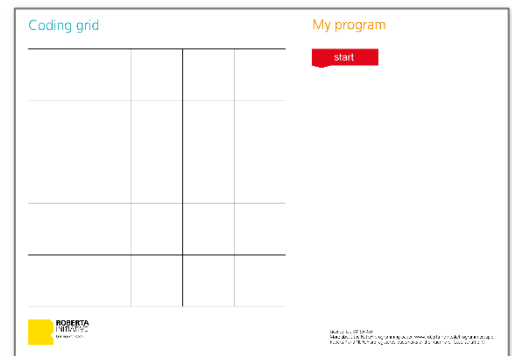


To show Roberta the way, you have to tell her which direction she should face, how far she should go and whether she has to turn or not.

Use the programming language NEPO so that Roberta can understand you.

“Programming language” sounds complicated, doesn't it? Luckily, it isn't – NEPO is easy as pie and you can understand it in no time. With NEPO you compile the programming code by putting colourful coding blocks together. Grab a friend and together you will easily manage!

Tip: First, look at the example and the rules for NEPO.



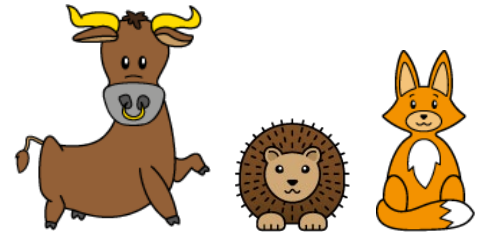
1. Warm up

Roberta starts with a little trip to warm up her bones. Join her to get ready!

1. Field preparation
 - a. Place the start-field in the upper left corner of the coding grid.
 - b. Place the finish-field in the middle of the coding grid.
 - c. Place Roberta on the start-field.
2. Thinking phase
 - a. What is the best way to get Roberta to her destination? What steps does she have to take? The individual steps form a program. You can easily place them under “My program” next to the coding grid. Still, please pay attention to the correct order!
3. Adventure time
 - a. Here we go: Execute your program together with Roberta. Will she reach her goal?
 - b. If you like, you can now have your girlfriend or boyfriend set a new route for you by moving the finish-field and sending Roberta off again.

2. Making new friends

The hustle and bustle on the coding grid gets going! Roberta meets her new friends “Zeus”, the bull, Henry Hedgehog and Fedora Fox. They prepare themselves for their journey across Europe – but have to avoid obstacles first.



You lead the way ;-)

1. Field preparation
 - a. Place the start-field in the upper left corner of the coding grid.
 - b. Place the finish-field in the bottom right corner of the coding grid.
 - c. Place Roberta on the start-field.
 - d. Grab Zeus, Henry Hedgehog, Fedora Fox, the tree and the stone and place an animal or obstacle in each row. The animals or obstacles must not be directly next to, above or below each other.
2. Thinking phase

On the way to her destination, Roberta wants to visit her friends Zeus, Henry and Fedora. Now you have to think again: What is the best way for Roberta to reach her goal? Fields with obstacles have to be bypassed; fields with friends can be used.
3. Adventure time

The journey begins! Execute your program together with Roberta! Will she reach her destination?

→ **Info:** Did you know that in Greek mythology, there was a woman called “Europa”, who rode on a bull (“Zeus”) across countries that nowadays are known as the continent Europe?

3. A trip across Europe

With all of her friends gathered around, Roberta is finally ready to take her adventurous trip across Europe. She relies on you to show her around. Look at the flags attached: Which countries should she travel to? Keep in mind, Roberta has a time limit: the complete code has to fit within the “my program” part next to the coding grid.

1. Field preparation
 - a. Place the start-field in the upper left corner of the coding grid.
 - b. Place the finish-field in the middle of the coding grid.
 - c. Place Roberta on the start-field.
 - d. Now place the flags of every country Roberta and her friends should visit on the coding grid.
2. Thinking phase

What a way ahead! With so many countries to visit, pause and think: What is the fastest way for Roberta to reach her goal in time? Keep in mind that Roberta has a time limit to reach as many countries as possible!

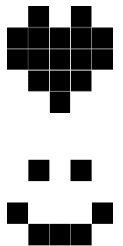
3. Adventure time
 - a. The journey begins! Execute your program together with Roberta! Will she reach all of her destinations in time?
 - b. If you like, you can now have your girlfriend or boyfriend set a new route for you and sending Roberta off again.

Pro-tip: Create short cuts by using repeat-blocks ;-)

4. Sidewalk chalk

Do you like to draw colourful pictures on the sidewalk? Roberta definitely does! On her trip across Europe, she would like to draw a picture on the coding grid – she needs your help, though!

1. Field preparation
 - a. Place the start-field in the upper left corner of the coding grid.
 - b. Place the finish-field in the bottom right corner of the coding grid.
 - c. Place Roberta on the start-field.
2. Thinking phase
 - a. Think of a pattern, that Roberta should paint on the field. This could be e.g. a heart, a smiley or a flag with stripes or crosses. It will look like pixel-art!
 - b. Now you have to think about Robertas path again. To paint a pattern, she has to go to the corresponding field and complete the order "Paint field". On the grid, you can paint the colour with a crayon; in the code, you can use the colour fields.



paint field

3. Adventure time

Roberta gets moving: Does she arrive at her destination? Which pattern appears?

5. Apple break

After that many trips, Roberta gets a little tired and finds a nice place for a break. She is hungry as well and sees an apple tree in the distance. She wants to quickly drive off and back again to grab an apple and eat it at her resting place. However, her battery is almost empty - can you help her finding a way by only using the following blocks?

turn left

turn right

go forwards

Special rule

The program starts with the block "Repeat ... times".



1. Field preparation
 - a. Place Roberta in the upper left corner.
 - b. First place the tree in the lower right corner and then move the tree up a field.
 - c. Place an apple to the left of the tree.
2. Thinking phase
What is the fastest way for Roberta to get to the apple and back?
3. Adventure time
Roberta drives off hungrily: Will she make it to the apple and back in time?



That were quite a lot of programming adventures for Roberta and her friends! If you like, you can now think up your own tasks with the NEPO programming paper or head on to the digital version and program Roberta online at lab.open-roberta.org.



NEPO® Programming paper – rules and examples

Every game has its own rules. We'd like to explain these to you in this document:

Rules

1. The programming paper consists of programming blocks, objects, markings and programming aids (start block and marking arrow).
2. The programming blocks tell Roberta what to do on the field.
3. Programming blocks can only be executed one after the other.
4. One or more programming blocks build a program.
5. Each program starts below the start block.
6. Fields with objects (except Robertas friends) can't be used by Roberta.
7. The objects can't be moved while the program is running.
8. A program is processed step by step.
9. With each step Roberta can be moved or an action can take place.
10. "One step forwards" corresponds to a movement from one square to the other square.
11. Numbers/rotations/colours: These blocks only work together with programming blocks.
12. Roberta can't fly.
13. The colour sensor checks the field where Roberta is currently located.
14. You can determine yourself which sensors Roberta has additionally. Please determine beforehand how exactly this sensor works.
 - a. Example: The ultrasonic sensor can detect an object standing on a field in front of Roberta. The ultrasonic sensor can only "look" in the direction in which Roberta is looking.

The NEPO® programming language

The programming language for Roberta is called NEPO. NEPO consists of different blocks that can be divided into the following categories:

Action

This executes an action (go, rotate, paint). With these programming blocks you can “tell” Roberta what to do.

Control








With these programming blocks the program is controlled: For example, you can execute other programming blocks again or only if something “special” occurs.
















Sensors

This allows Roberta to use its sensors. For example, Roberta can check whether it is on a coloured field. With the sensor block, which has no specification, you can determine yourself which sensors your Roberta has and what she should check with them.

Numbers / Rotations / Colours

These indicate how often Roberta goes forward or backward, how far she should rotate to the left or right and whether she should colour in a field or check whether a field has the same colour.

Action		Roberta moves forward as often as specified in the attached number block.
		Roberta goes back as often as specified in the attached number block.
		Roberta rotates to the left as indicated in the attached number block.
		Roberta rotates to the right as indicated in the attached number block.
		Roberta paints the field on which she is located.
Control		Roberta checks the condition. If the condition is met, Roberta does what is specified in “do”. If the condition does not occur at the moment it is to be executed, it is skipped. Roberta then directly executes the following programming blocks.
		If the condition is not met, you can specify under the “else”-block what Roberta should do.

		<p>Roberta repeats all blocks in the loop as often as specified in the field.</p> <p>The programming blocks are also executed from top to bottom within the loop.</p>
		<p>Final block part of the "control"-blocks</p>
Sensors		<p>Roberta can use this block to check whether a field has a certain colour.</p>
		<p>Roberta can use this block to check what you have written into it.</p>
Numbers		<p>Numeric blocks for the programming blocks "go forward" and "go back".</p>
		<p>Roberta goes a field ahead or back.</p>
		<p>Roberta goes two fields ahead or back.</p>
		<p>You can set a number yourself.</p>
Rotations		<p>Rotary blocks for the "turn"-block. Roberta always turns on the spot with all rotary blocks.</p>
		<p>Roberta turns 90 degrees.</p>
		<p>Roberta turns 180 degrees.</p>
		<p>You can enter a degree yourself.</p>
Colours		<p>Colour blocks, which determine with which colour Roberta paints a field.</p>
Other		<p>The start block indicates where the program starts. Only programming blocks below the start block can be executed by Roberta.</p>
		<p>The arrow indicates where you are currently in the program.</p>

Example

So that you can see our programming paper in action, we will show you an example.

The task is to get Roberta to the finish. On the way there she has to collect the apple and visit her friend Zeus.

Coding grid

ROBERTA INITIATIVE
Learning with robots

My program

start

go forwards 3

repeat 2 times

do

turn right 90°

go forwards 2

turn left 90°

go forwards 2

turn left 90°

go forwards 1

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