



The Calliope mini as a random generator



Lio doesn't trust chance

Lio is playing a dice game with Jack.
Jack's dice always lands on  or on the .

He wins every time.
This is making Lio angry.
Lio now wants to make a dice himself.
Therefore Lio writes a dice program.



The dice - a random generator

If you roll a dice, you get a number between and .

No one can know in advance what number will appear.

It's called "chance". The number shown is called a "random number".

When you play a game with a dice, the dice shows random numbers.

The dice is therefore called a "random number generator".

The code

The Calliope mini can also be a random number generator:

When Button A* on the Calliope mini is pressed

a new random number shall be displayed.

The random number should be one of the dice numbers (1, 2, 3, 4, 5 or 6).



1. a) For your program you need the following blocks.

Put them together in the correct order in the NEPO® editor  (expert).



Solution: see page 20

Make sure that NEPO® is in expert mode.

b)  Try the code in the simulator.

Compare the sequence with the program description under "**the code**".

Remember to always start the simulator with 



c) ▶ Transfer the code to the Calliope mini and run the program.

2. a) Check if your Calliope mini works as a random number generator:

- Press button A to display a new random number.
- Draw a dash in the table behind the random number displayed in the "Frequency" column.
- Repeat this procedure 30 times.

random number	frequency	in total
1		
2		
3		
4		
5		
6		



b) Count how often a number was rolled.

Enter your results in the "in total" column.

This is the most frequent number: _____

That's the least frequent number: _____

Compare your results with each other. What did you notice?

Discuss it with your classmates.



3. Use your Calliope mini as a dice. Play the ludo game or any other dice game with the other kids in your group.



A child plays with a normal dice. Is the game still fair?

Explain your answer.

4. You want to win all the time?
Program your own "cheat dice".



a) What do you have to change? Mark the spot.
Program the "cheat dice".

```

+ start
repeat indefinitely
do
+ if button A pressed?
do
show text random integer from 1 to 6
  
```


b)  Open and  start the simulator. Try the program.



5. This code commands the Calliope mini:
If a 1 is rolled, display one dice point .

```

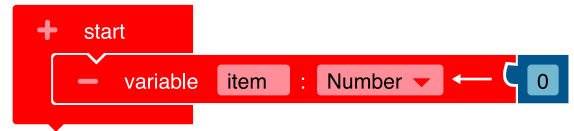
+ start
- variable dice : Number ← 0
repeat indefinitely
do
+ if button B pressed?
do
set dice to random integer from 1 to 6
clear display
wait ms 500
+ if dice = 1
do
show image
  
```

Program this code in the NEPO® editor  (expert).
Proceed step by step.



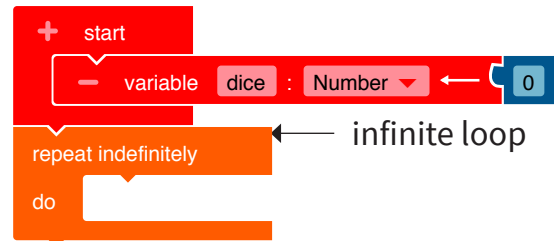
When naming variables, certain words must not be used. In case you happen to use one of the forbidden words, the editor adds a "2" to the name.

- In order to generate new numbers again and again, a variable* must be created. Click on the "+" next to "start". Click on the word "item" and type in the new variable name "dice".



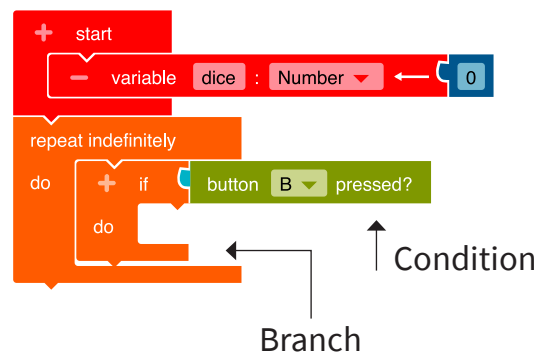
- In order for the random numbers to be generated infinitely, you need an infinite loop*.

Control ▶ Loops → "repeat indefinitely/do"



- If button B is pressed (if), a random number should be generated (do). You need a branch*.

Control ▶ Decisions → "if/do"
Insert the block into the infinite loop.



Sensors → "button B is pressed?"

Add the block as a condition (blue area) to the branch. Click on button "A" and select "B" instead.

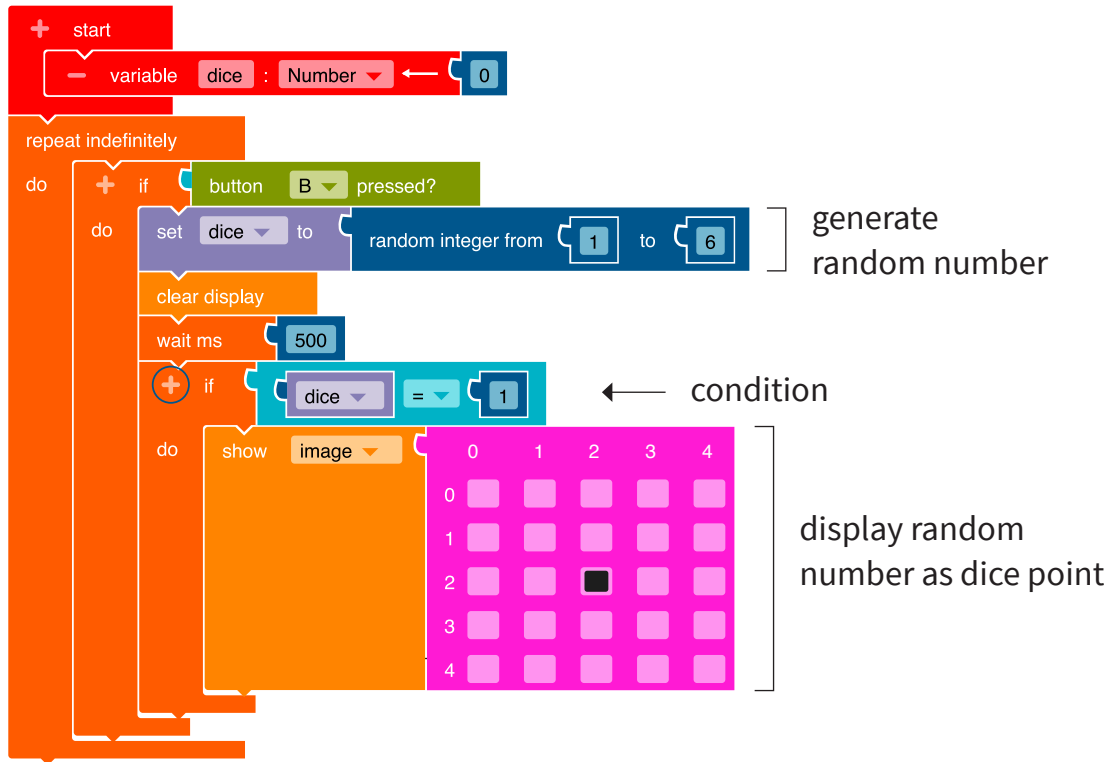
- The Calliope mini should display the random number as dice points. First the random number has to be determined.

Variable → "set dice to"
Insert the block into the branch.

Math → "random integer from 1 to 100"
Add this block and change the value 100 to the number 6.

Action ▶ Display → "clear display"

Control ▶ Wait → "wait ms"



- You are now instructed* to display the random number (if) as a pip on the LED screen*.
You need to the following:

Control ▶ Decisions → "if/do"

Insert the block into the branch.

Logic →

Variable → "dice"

Math → Change the number to a 1.

Add these three blocks as a condition to the branch.

Action ▶ Display → "show image"

In the pink block, click on a square that should flash as the dice point 1.

- If you want to display the numbers 2 to 6 as pips on the LED screen, complete your program: Click on the "+" next to the circled "if" above and repeat the previous steps.



6. ▶ Transfer the code to the Calliope mini and run the program.

The small coding encyclopedia

instruction When you receive an instruction, you can execute it. For example:

(= command) "Hang the wet socks on the clothes horse to dry."

The same is true for the computer. It executes instructions that clearly describe what it should do. A code/program is built from instructions.

loop with a condition A loop allows a sequence of instructions to be executed over and over again. For example:

"Hang up socks as long as there's laundry in the basket."

The **loop** is: "Hang up socks as long as (repeat) ..."

The **condition** of the loop is: "Is there still laundry in the basket?"

Answer: "Yes!"

In the loop, **four instructions** are executed one after the other:

1. Take a wet piece of laundry
2. Hang the piece of laundry on the clothes horse
3. Use two clothespins
4. Fasten the piece of laundry with the clamps

If the answer to the condition "Is there still laundry in the basket?"

is "No!", the program continues behind the loop:

"Bring the basket to the bathroom."

infintite loop An infinite loop **has no condition** und and will run until the Calliope mini is switched off.

variable A variable is a container for a specific value (number, word, etc.), image or something else that is set at the beginning of the program. Each variable needs a unique name and you have to decide if the variable should store a number, a word (→ string), an image or something else.

branch with a condition Every branch in a program needs a condition. The condition defines the next instructions in the program.

There are two ways of doing this, for example:

Condition: "Is the laundry on the clothes horse still wet?"

