The Calliope mini as an automatic scooter light

Lios scooter light

Lio is fascinated: There are cars whose lights turn on automatically in the dark.
Can Lios new scooter also get an automatic light?
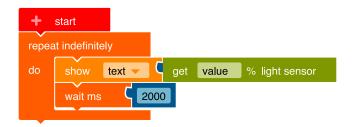That would be simply brilliant.

An automatic scooter light

The lighting of many cars today is programmed to switch on as soon as the surrounding light becomes weaker.
If the surrounding light becomes stronger again, the lighting switches off.
Similar to the lighting system in a car, the Calliope mini can also be programmed, for example as a front light for Lios scooters.

The code to measure brightness

First program a code with which the Calliope mini measures the surrounding light and displays the value on the LED screen*.

1. Program this code in the NEPO® editor ☐
Proceed step by step.

- In order for the Calliope mini to continuously measure the light intensity of its surroundings, you need an infinite loop.*****.
  Control → "Repeat indefinitely / do"

```
+    start
repeat indefinitely          ← infinite loop
do
```

- The Calliope mini shall display the strength of the surrounding light as a numerical value.
  Action → "show text"
  Insert the block into the infinite loop.
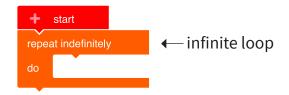 Remove the "Hello" block and throw it in the trash.
  Insert at this position:
  Sensors → "get value light sensor"

```
+    start                              "  Hello  "
repeat indefinitely
do      show    text ▾      get  value  %  light sensor
```

- The measured value should be displayed for 2000 milliseconds (ms) – which is 2 seconds.
  Control → "wait ms"
  Attach the block.
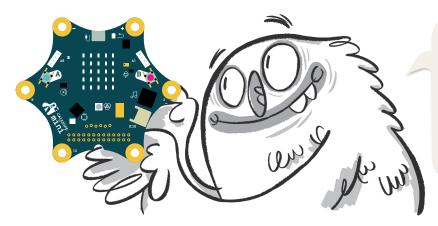 Now click into the blue block and enter the number 2000.

```
+    start
repeat indefinitely
do      show    text ▾      get  value  %  light sensor
        wait ms      2000
```

1000 ms = 1 second

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

> If you touch one of the gold-coloured contacts on the Calliope mini, measurement errors may occur. That's not a problem. Then simply touch the Calliope mini in another place.

3. Try out the Calliope mini at the window, under a lamp, under a jacket, under a table …

Write down the values the Calliope mini measures.

Location	measured value
at the window	
under a lamp	
under a jacket	
under a table	

The code of the automatic scooter light

The light (the RGB LED*) of the Calliope mini should:
– switch on as soon as the surrounding light becomes weaker,
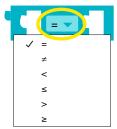– switch off as soon as the surrounding light becomes stronger again.

4. The Calliope mini can decide, whether its surroundings are "bright" or "dark". To do so, you have to define a threshold value with the next block:

Turn on the light now

bright
dark
threshold value

get value % light sensor < 30

The surrounding light is measured and translated into a number.

Threshold value. At first enter the threshold value 30 here.

It is possible to compare something with this block from the **Logic** category.

=

✓ =
≠
<
≤
>
≥

Tip: Click on the charater =. A box opens with further characters. Click on **<**.

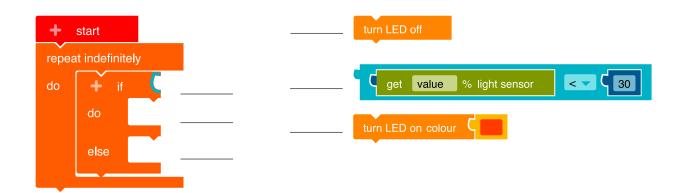Think and complete the sentence.
This sign **<** means that the light is always turned on

bigger, smaller

when the measured value of surrounding light is _____ than

the set threshold value.

5. a) The code of the automatic scooter light requires the following blocks. Connect the blocks on the right to the correct place in the left block.

+ start
repeat indefinitely
do   + if
      do
      else

_____ turn LED off

_____ get value % light sensor < 30

_____ turn LED on colour

_____
_____
_____

b) Program this code in the NEPO® editor ☐ .

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

7. a) Test your program by taking the Calliope mini to places of varying brightness. You've set the threshold to 30. What happens now? Check the boxes.
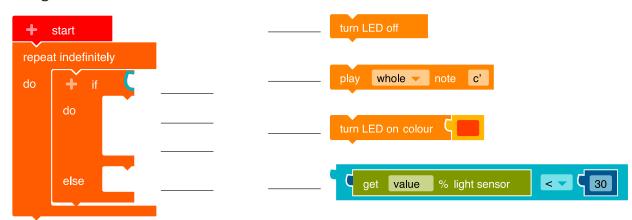
b) Change the threshold value and try the Calliope mini again.

The calliope mini …	Threshold value: 30		Threshold value:	
The calliope mini …	light on	light off	light on	light off
shade with the hand				
under the table				
under a jacket				
at the window				
under a lamp				

8. Program the Calliope mini as an alarm system. It alerts you when your Calliope mini comes out of the dark schoolbag.

a) For your program you need the following blocks.
Assign the blocks to the started code. Connect.

```
+ start
repeat indefinitely
do    + if          _____    turn LED off
      do            _____
                    _____    play  whole ▼  note  c'
      else          _____    turn LED on colour ▮

                    _____    get value % light sensor  < ▼  30
```

b) Program this code in the NEPO® editor ☐ .
c) ▶ Transfer the code to the Calliope mini and
run the program.

The small coding encyclopedia

instruction (= command)	When you receive an instruction, you can execute it. For example: "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."

infinite 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?"

branch

If yes -
then: "Wait an hour"

If no -
then: "Take off the laundry"