Task 1

Measure the air quality with the senseBox.

a) Connect the OLED display and the sensors to the microcontroller.
b) Create a program so that the measured values of the temperature and CO2 sensor are shown on the display. (see step 1–3)

Step 1:
1. Open blockly.sensebox.de for programming
2. Our basic settings are created in the "Arduino run first".
3. The display must be recognized by the microcontroller. It must be initialized in the setup! Connect the "Initialize display" block with the purple "Arduino run first" block.

Step 2:
1. Something should be shown on the display. Connect the "Print on display" block with the infinite loop.
2. Now select the block to display measured values from sensors.

Step 3:
1. Now select the sensors whose values you want to display.
2. Also add 'Title' and 'Unit'.
3. Test your Code now!

Time for testing!
1. Enter the values of temperature and CO2 concentration in the table every minute.

<table>
<thead>
<tr>
<th>Time</th>
<th>Temperature</th>
<th>CO2 Concentration</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Place the sensor near a window and compare the measured values indoors and in the outdoor air.

2. Connect another sensor to the senseBox and record the measured values every minute.

<table>
<thead>
<tr>
<th>Time</th>
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Information: CO2 Sensor
The CO2 sensor has a measuring range between 400 ppm and 10,000 ppm.

The CO2 concentration in the air is given in parts per million (number of parts per million = ppm).
**Hint:**
There are two ways to solve the task:

**Option 1:**
- Compile the code.
- Press the Reset-Button twice.

**Option 2:**
- The display has a screen resolution of 128x64 pixels. This means 128 pixels in the horizontal direction (x-axis) and 64 pixels in the vertical direction (y-axis).

**Attention:** The x- and y-coordinates must be different for each measured value, otherwise the two measured values will overlap.

**Transfer the code**
1. Compile the code.
2. Press the Reset-Button twice.
3. Drag the code from the download folder to 'senseBox'.

**Construction of the senseBox**

**Debugging**
- Check if you have reset the microcontroller (press the reset-button twice).
- Are your cables and wires connected exactly as shown in the pictures?
- Are your instruction blocks actually connected like little "puzzle pieces"?
- Are the x- and y-coordinates different (see hint)?
- Did you delete all blocks that are not connected to your main block?

*Still problems? Ask a teacher!*

**For experts:**
**Task:** Program the LED to turn red when the CO₂ concentration is higher than 2000 ppm.

**Hint:** RGB-LED
Connect the RGB-LED to the microcontroller:
Therefore you need a JST-JST cable.
Connect one side to the "input" of the RGB LED and the other side to the digital port A of the microcontroller.

*Create and test this code:*