# Lesson 7 – Sensing Your World Activity Sheet

Setting the Scene

In this project we will explore the micro:bit’s temperature sensor and use some other blocks in MakeCode to create a temperature sensor.

Open <https://makecode.microbit.org/>

From the basic blocks add a ***forever*** block with a ***show number*** block that contains the ***temperature*** input

A screenshot of a cell phone

Description automatically generated

**Save** this as **TemperatureSensor.hex** and upload it to your micro:bit. You will now see the temperature in degrees centigrade continuously scroll across the LEDs. Try moving the micro:bit to warmer and cooler areas to see the changes on the screen (if you have a battery, long enough USB cable or are using a laptop).

We will now use some simple logic to display a message based on the current temperature.

## Success Criteria

We are going to make a program that senses the temperature and ***if***

* the temperature is less than 18°C it will show the message ‘Too cold!!’
* the temperature is between 18°C and 24°C it will show the message ‘Just right!’
* the temperature is more than 24°C it will show the message ‘Too hot!’

To start we need to add a forever block to hold the selection statement so the program will run continously. We need to add an ***if else*** block from the **Logic** blocks

A picture containing text, sign, screenshot

Description automatically generated

This will test if something happens and then will do something that we choose. We want to sense ***if*** the ***temperature*** (in °C) is ***less than 18*** so we now need a compare block (also in the **Logic** block)

A picture containing object

Description automatically generated

Pro-tip

Make sure you know what the logic operators do:

|  |  |
| --- | --- |
| = | EQUAL to |
| ≠ | NOT equal to |
| < | LESS than |
| ≤ | LESS than or EQUAL to |
| > | MORE than |
| ≥ | MORE than or EQUAL to |

We need to add this to the ***if*** block

A screenshot of a video game

Description automatically generated

We now need to add in the ***temperature*** input, the desired temperature (18°C) and a message ***if*** the temperature is ***less than 18***°C. The ***if*** block is a logical test and will return a True or False, it will only run the blocks in the ***then*** section ***if*** the test is True. Then click on the + at the bottom left of the else to add a further branch.

A screenshot of a computer

Description automatically generated

The message ‘Too cold!’ will only show if the temperature is ***less than*** 18°C.

That should now have met the first success criteria. The second success criteria will be slightly more complex as it will need two tests to see if the temperature is equal to or above 18°C and equal to or less than 24°C. To do this we need to use another Logic block with an ***and*** in it to carry out two tests at the same time. If this condition is true the message “Just right!” should be displayed.

A screenshot of a computer

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Pro-tip

You can **right click** on any block and **duplicate** them to save time!

The final part of the ***if*** block is an else statement which will be used if neither of the other conditions are true. If the other conditions are false it means that the temperature is 24 or above. A screenshot of a computer

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## Stretch Tasks

Here are some challenges that use the micro:bit’s inputs:

* Adjust the temperatures to what you think is too cold, just right and too hot
* Make Button A sense the temperature and Button B sense the light intensity
* Swap the ***show string*** for a custom icon
* Use the ***on pin P0 pressed*** input to generate a random number between 0 and 99
* Use the ***on button pressed*** blocks to test for ***magnetic force*** (you will need a magnet to trigger this sensor)and use the result to give an output
* Write down some real world examples of technology that uses ***if*** blocks, logic and sensors to perform a task

## Final Thoughts

You have just learned how to:

* Use the inputs on the micro:bit in a program
* Use computational logic
* Use selection to test an input and return an output

Think about how this program could be extended. If it were too hot, what could we get the program to do instead of just saying it’s too hot? What machine could the program turn on?

Research what a **solenoid** is and how it could be used to turn on or off a machine using a program.