Globisens

xploris

CODING

My thermometer

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MY THERMOMETER

1. Introduction
2. Activity setup
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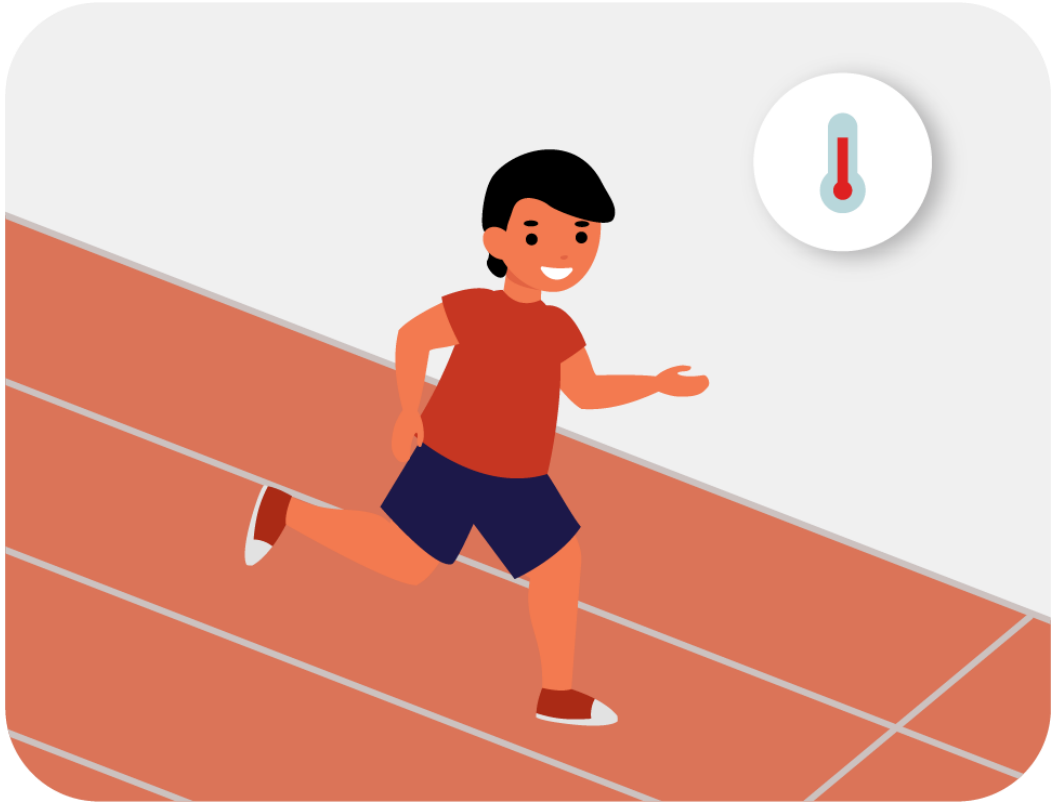
1 Introduction

I’m sure you've played a video game or used a smartphone at some point. **Have you ever noticed how they tend to heat up after a while?**

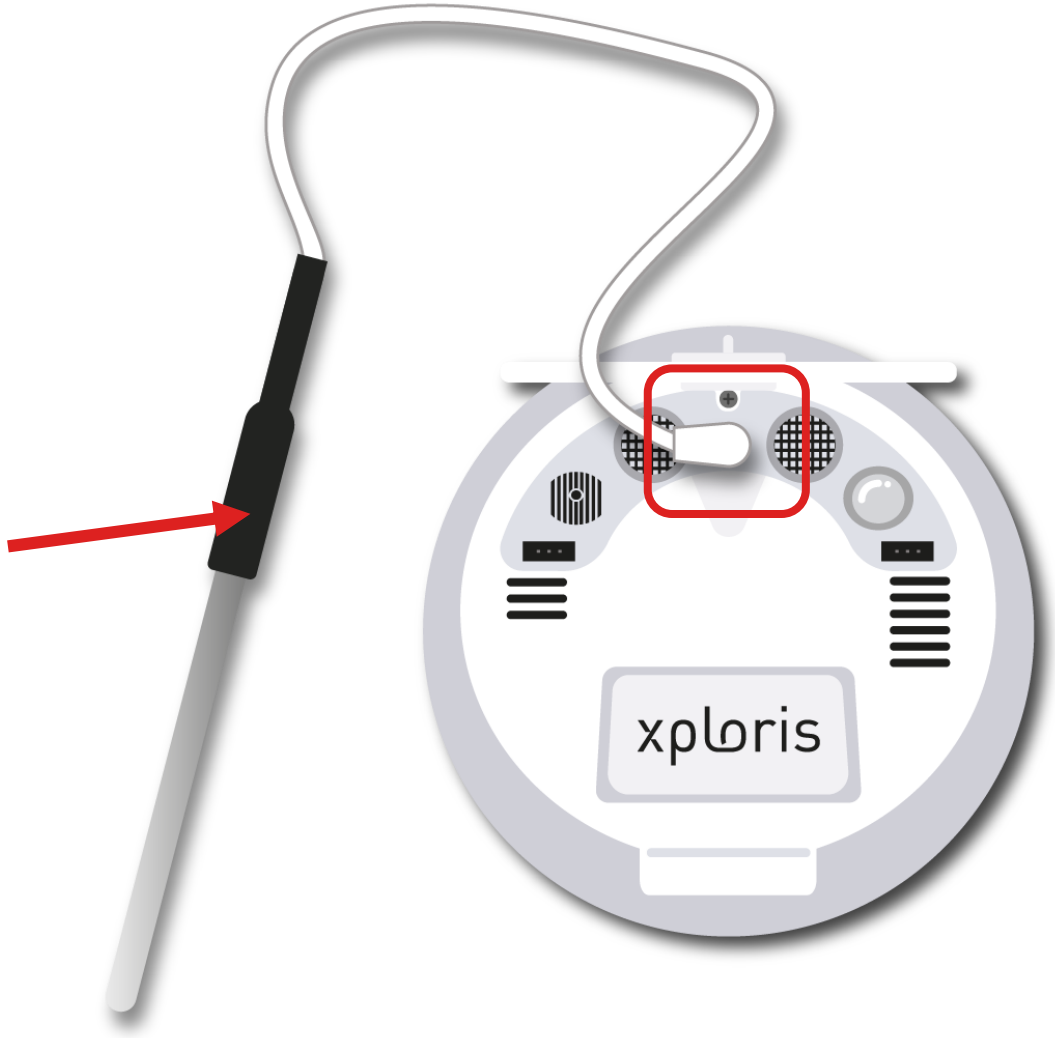
Both people and devices perform best when they're at the right temperature. If it gets too hot, we feel drained and struggle to focus. Devices work the same way—they can slow down, malfunction, or even get damaged if they overheat. **It's like a runner trying to race under the burning run!**

In this activity, you are going to become a scientist and a programmer. You will use block language and the Xploris device in conjunction with the external temperature probe to build your own thermometer that will let you know if the temperature is comfortable for people.



2 Activity setup

Make sure you connect the external temperature probe to the back of the Xploris as shown in the image.

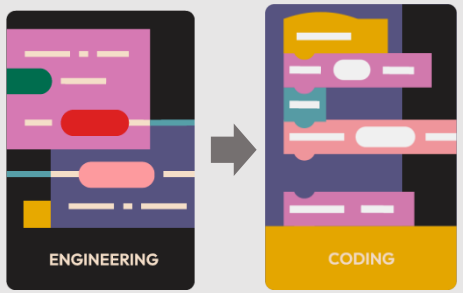


2 Activity setup

Turn on your Xploris and connect it to your computer or tablet.

Open the XploriLab software on your computer or tablet.

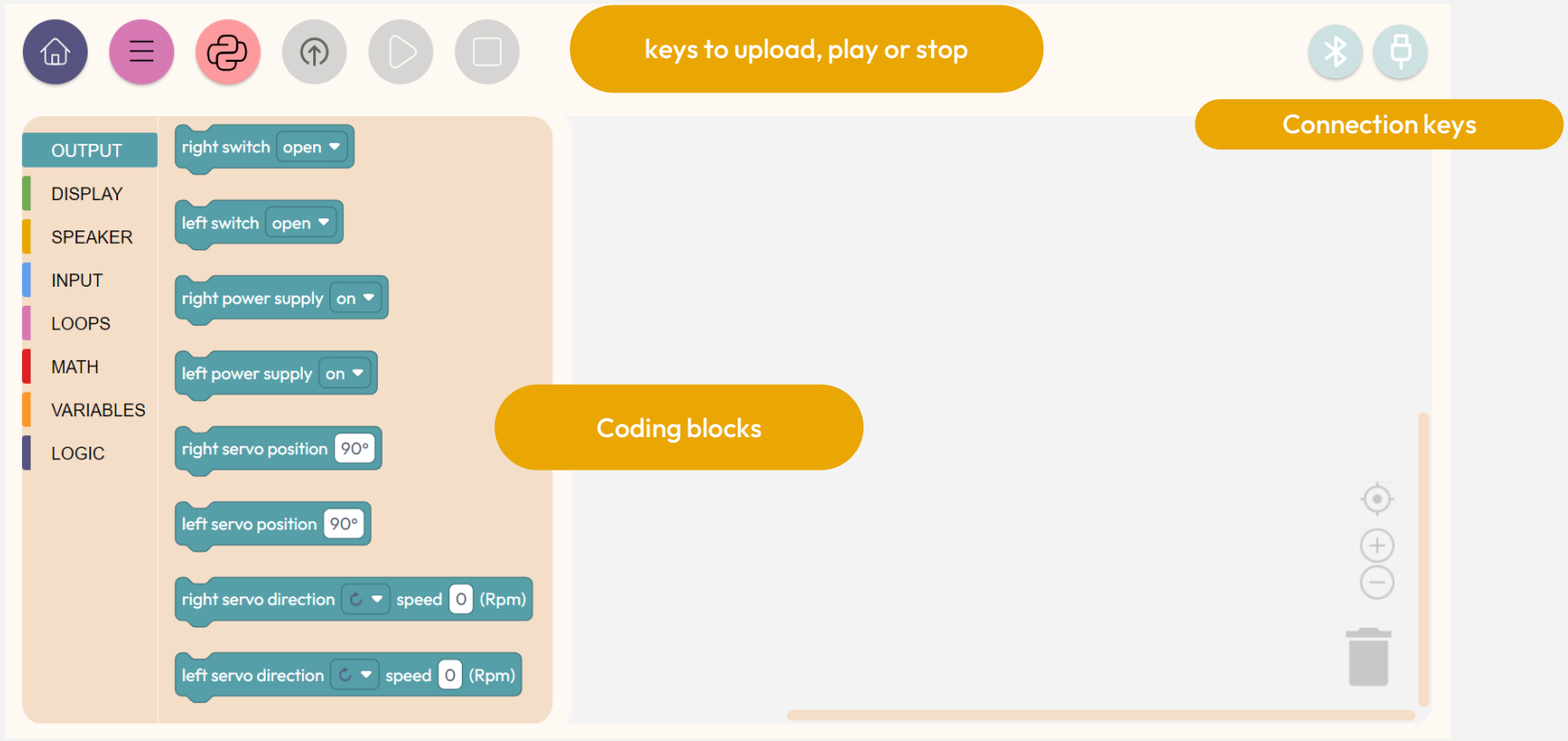
Once inside XploriLab, select the icon to connect the device via USB cable or bluetooth as applicable.



Go to the ENGINEERING section and then to CODING.

3 Coding

In the Coding window, you will find the tools you need to create code using blocks.



3 Coding

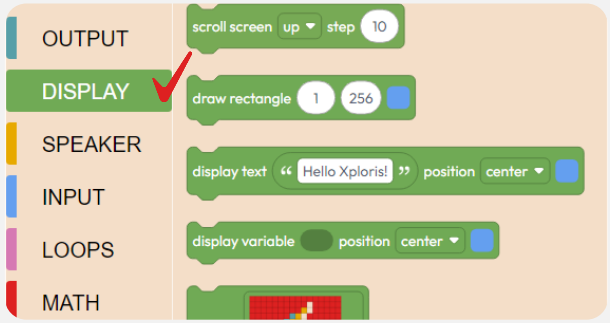
The available tools represent blocks that allow you to perform various actions.

Functions

OUTPUT	Output blocks to activate Xploris switches, power source and/or servos.
DISPLAY	Blocks to control the Xploris screen.
SPEAKER	Blocks to control the Xploris speaker: play sound tracks, notes and control the speaker volume.
INPUT	Blocks that enables you to use all Xploris keys and sensors, such as temperature, light, distance, sound and voltages.
LOOPS	Loop blocks to perform an action continuously or as long as their conditions are met.
MATH	Mathematical blocks, such as +,- and many other math functions.
VARIABLES	Blocks for creating variables, assign and replace their values.
LOGIC	Logic operators that will allow decisions to be made based on the state of the data.

3 Coding

1



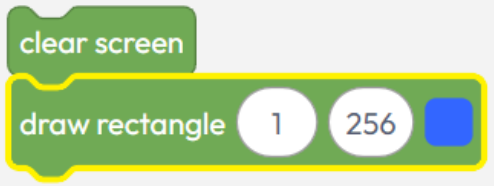
In this activity, you'll blend the art of drawing with the magic of programming, using the Xploris device and block programming. Your goal is to create a thermometer that displays a specific temperature range. To achieve this, you will begin by exploring the DISPLAY function.

2

You will use the clear screen block of the DISPLAY group clear the screen of the device, ensuring that you have a clean space to display the results of your programming. To use it, select it and move it to the workspace on the right.

3 Coding

3



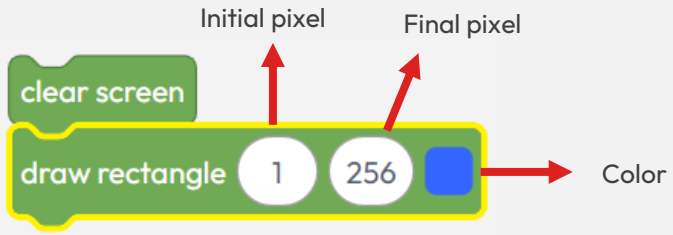
Search in DISPLAY and drag 

under the previous block, remember to join them!

Set the draws rectangles 3 parameters :

- **First and second parameters** are where oes the rectangle begin and end.
- **Thirdparameter** is color .

4



Let's paint the whole screen blue! You will use the block used to draw rectangles to cover the whole screen, from the top corner to the bottom corner!

Use for the start pixel and **256** for the end pixel. And don't forget the color: **blue**.

3 Coding

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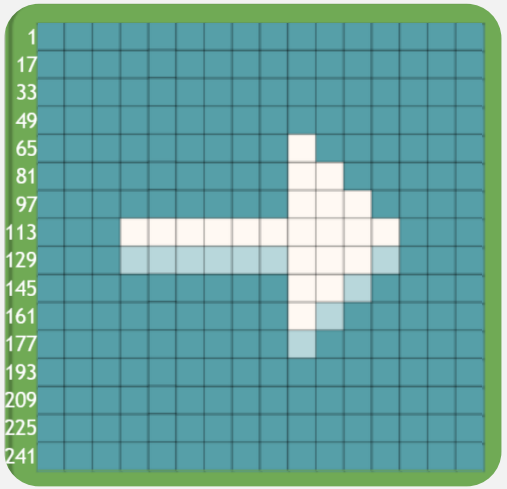
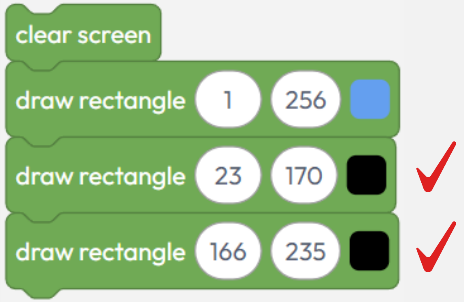


The Xploris screen is made up of **256 dots**, known as **pixels.** To count them, you start at the top left corner, move to the right and, when you reach the end of the row, move down to the next row and start again from the left.

6



Continue drawing the thermometer. To do this, you will use the colors black, red and white on the Xploris screen. First, drag the  option twice, one below the other. In he For first,rectangle set the **start pixel to “23” and the end pixel to “170”,** and choose the color black. In he For secondrectangle, set the **start pixel to “166” and the end pixel to “235”,** also with black color. Thus, you will have drawn two rectangles that will form the outline of our thermometer.

3 Coding

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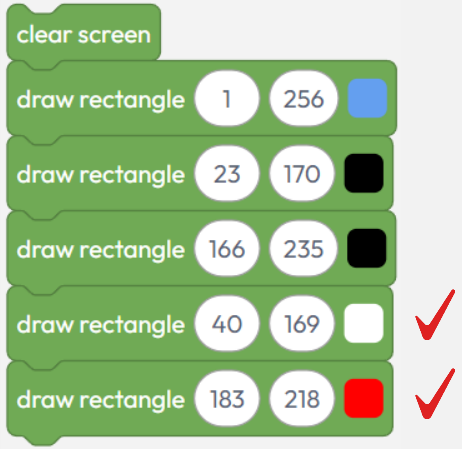

To draw the temperature indicator in red and white, drag two more  and join it to the ones previously added. In the first one, set the start point to “40” and the end point to “169”, and choose the color white. In the second one, set the start point to “183” and the end point to “218”, and choose the color red. This way you have drawn the base of your thermometer

8

In the LOOPS group section, use the 

block.

This will let you repeat the instructions inside it endlessly. **Simply place it next to the work you've already completed!**

Now, we are going to program the feature that lets us see how the temperature changes. We’ll be working within a range **of 20 to 30 degrees Celsius.**

3 Coding

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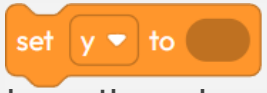
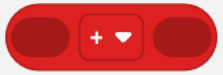
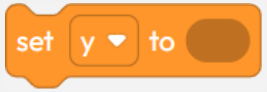
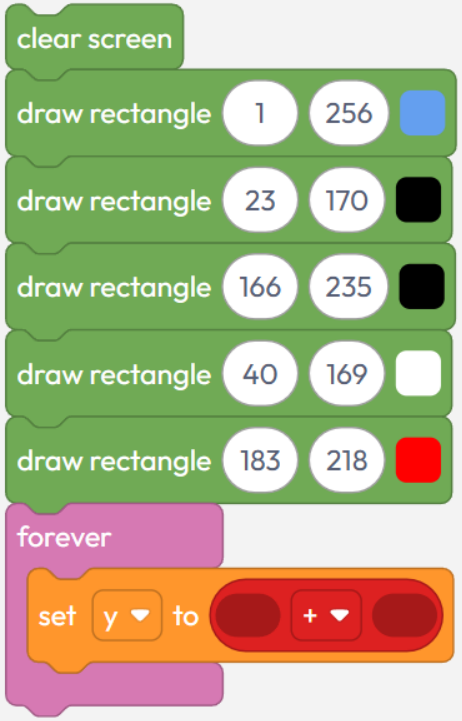
- From VARIABLES, you are going to use the 

block to create a “y” variable that will have the value of the temperature, which will be between a comfortable range for it to work well.
- Add it inside the 

block.
- Then, in order to operate the variable more comfortably, from group MATH drag 

inside “to”, to the interior of 

.



3 Coding

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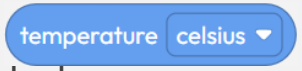
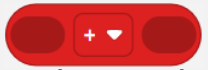
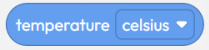
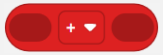
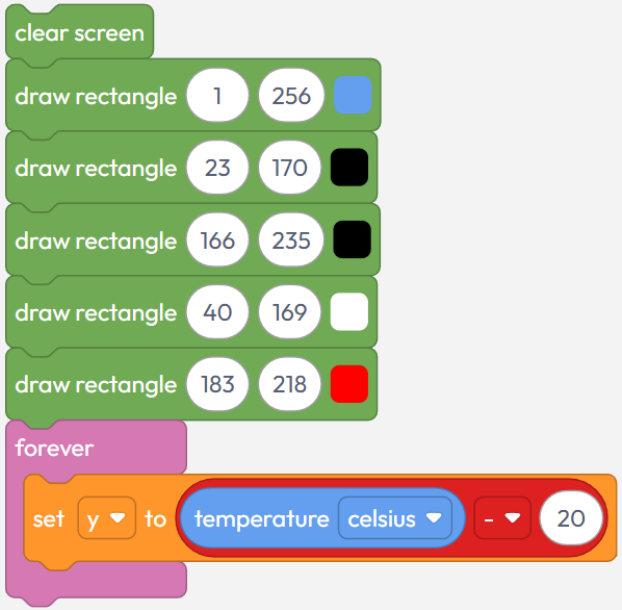
- Now you are going to fill in the information requested by the operator block  .
- Go to group INPUT and drag the block  and from MATH drag the 0 numeric block.
- Then fill the left side of the  operator block with  and make sure the scale you choose is **“Celsius”.**
- On the right side of the operator block, add the numeric block and change the value to “20”. The  operator should be configured to act as a **“–” (subtraction).**

Based on what you did before, you will be giving the variable “y” the value that the Xploris device reads from the **external temperature probe,** together with the instruction to subtract 20 from this value .



3 Coding

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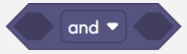
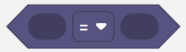
Continuing with the programming:

- Go to the group LOGIC and drag the function 

just below what you have already done.

- Then you will use 3 more functions from the same group: one 

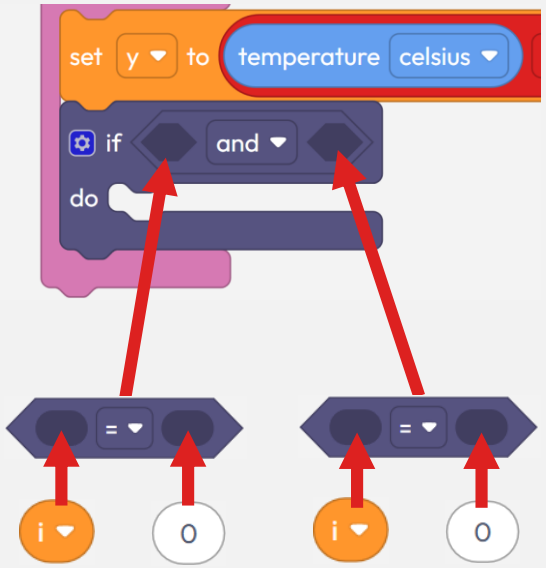
, and you add it inside the previous function, and two 

and you drag them to the workspace.

- From the group VARIABLES you will take two 

and from the group MATH you will use two numeric blocks 

When you take the programming blocks to place them inside other blocks, make sure you leave them right up against the left edge of the block where you want to place them. If you don't do it like this, they may not fit inside the block correctly.



3 Coding

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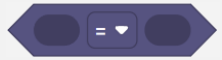
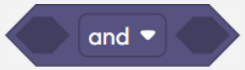
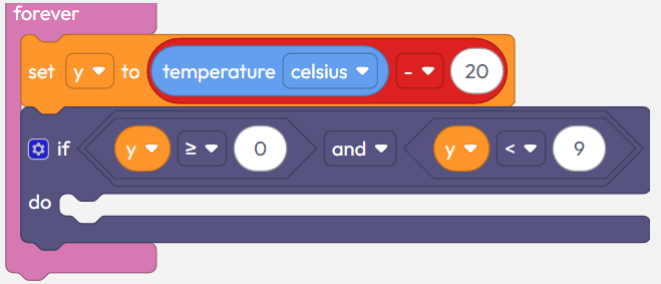
Now it's time to set the temperature at which your thermometer is going to make changes. To do this, you will have to indicate the values between which you want it to work.

- Make sure that both variables  have the letter **'y'** assigned to them and enter the value **'0'** in the numeric block  on the left and the value **'9'** in the one on the right.
- Then, in the left comparator  use he symbol "≥" and in the right comparator the symbol "<".
- Don't forget to set the block  to **"and"!**

That's it, you're almost done!



3 Coding

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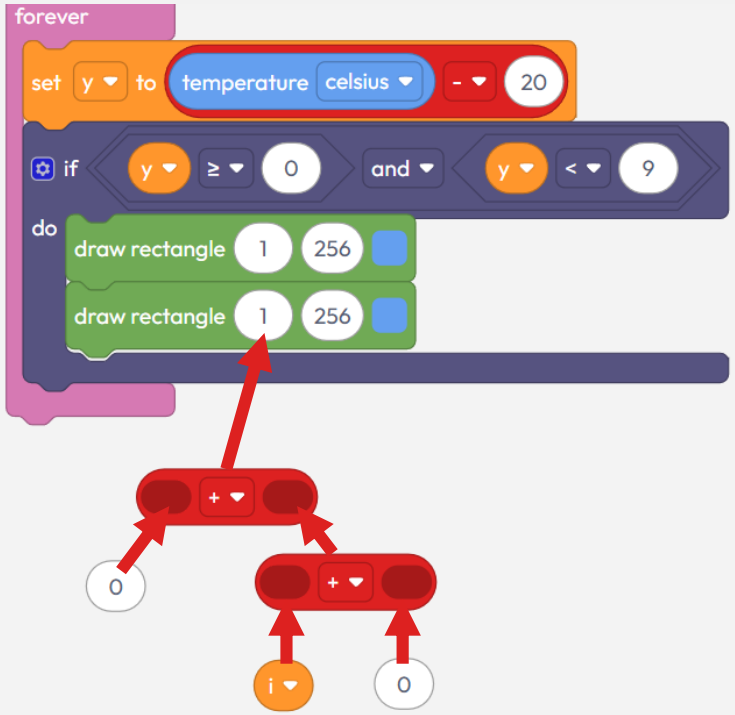
Now, you'll add color to your thermometer by following these steps, but only if the previously specified conditions are met.

- From the group DISPLAY, drag two draw rectangle 1 256 blocks and put them inside the if do block in the "do" part.
- Then, from MATH, drag two + blocks and two 0 numeric blocks.
- Finally, from VARIABLES, drag the i variable and use it in the workspace.



3 Coding

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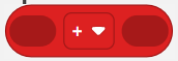
You're almost done! Now it's time to put the information inside the blocks.

- For the first 

block, the start position will be at pixel **“40”** and the end position at pixel **“169”,** both intend white.

- In the second 

block, already assembled, fill in the information from left to right: put a numerical block 

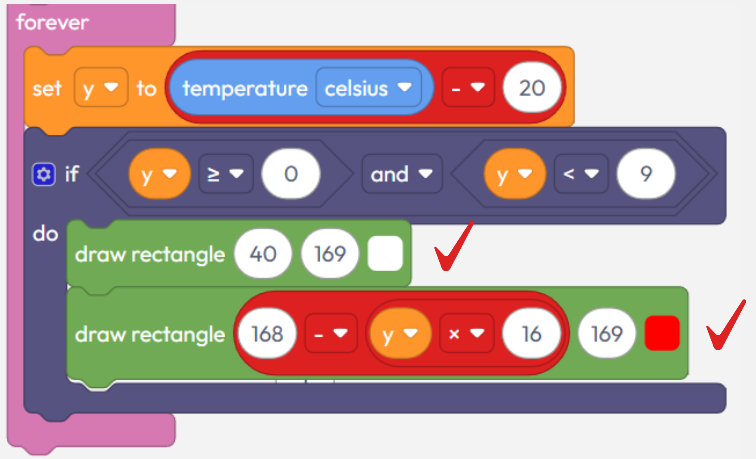
with the value **“168”,** then the 

block with the subtraction option, and in the block on the right, put the variable “selected in “**y**” doing 

, he operation **“x” (multiplication)** assigning it the value **“16”.**

- Then fill the 

block with the final pixel **‘169’** and make it **red .**



3 Coding

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- Finally, from the LOOPS group use the delay 100 (ms) block, which will help you to see the temperature variation on the screen of the Xploris device more clearly.

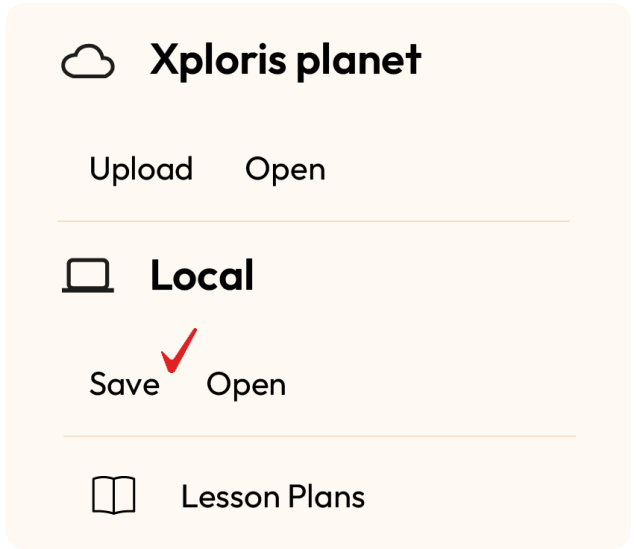
3 Coding

To make sure that the program works correctly, we will follow these final steps:

Press the three-bar icon at the top and select the “Save” option. Then, assign a name and save our program.

Press the “Upload” button in the Xplorilab interface. This will transfer the program to the Xploris device.

Once the program is loaded, press the “Play” button on Xplorilab software. Take a moment to admire your work: an amazing thermometer brought to life through block programming.



4 Questions

1. **Sciences**
   How could we use this code to represent other scientific data, such as distance or the amount of light?

2. **Art**
   What patterns or shapes could we create if we changed the values of the rectangles?

3. **Let's keep experimenting!**
   Could we get the program to emit sounds as the temperature varies?

5 Activity summary

- We used the Xploris screen to display a thermometer that tracks temperature variations
- We used the values from a temperature probe and saved them in a variable. We used a “Logic” programming block so that the program only draws the elements when the temperature is within a certain range.
- We used the XploriLab program to draw a thermometer on the screen that adjusts based on the temperature measured by one of the Xploris device probes.

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