

*Creating an ECO online Natural Fit Virtual Programs to Prepare Students for  
boosting 21<sup>st</sup> century Skills 4 the Future (UNITY)*

**2021-1-SE01-KA220-SCH-000032448**

*STE(A)M-focused PBL for transferring 2021<sup>st</sup> skills for fighting against  
climate change*

**LESSON PLAN 4:**

**Math and Variables**

*Presented by  
Malmö Sweden*

### Lesson procedure:

|   |   |
|---|---|
| <b>Date:</b>  | 2022 __/ __09 __/ __15 __   |
| <b>Teaching staff:</b>  | Mr/Miss/Ms  |
| <b>Term:</b>  | 2022-2023   |
| <b>Week:</b>  | 4   |
| <b>Year Level:</b>  | Primary   |
| <b>Time/length</b>  | 2 hours   |
| <b>Key Learning Area:</b>   | Understanding the effect of climate change using math and variables<br>Use of programming and logical thinking skills in the area of climate change with the help of interdisciplinary subjects, including science, math, art and social studies. |
| <b>Topic/focus:</b>   | Programming with Micro:bit using math and variables. Collection of data in order to understand the impact of climate change. Using different diagrams for explaining climate change'.   |
| <b>Lesson Name: Math and variables</b>  |   |
| <b>Foreseen Outcomes:</b>   |   |
| At the end of this lesson, students will be able to:  |   |
| <ul style="list-style-type: none"> <li>✓ understand the math, basic and input, “logic” and “loop”</li> <li>✓ Use of logic in programming to count</li> <li>✓ Get an introduction about variable</li> <li>✓ Get knowledge about CO2 emission and its impact on global warming</li> <li>✓ understand diagrams and data to explain climate change</li> </ul> |   |
| <b>Lesson Description:</b>  |   |
| Use of math variables in Micro:bits. Collecting and analyzing data, diagrams to understand Climate change.  |   |
| Prerequisites to this lesson plan: Students need to have access to digital technology and a computer in the classroom. 2-3 pupils can work together to know the key words in English about environmental problems and what they mean.   |   |

### Length (Lesson procedure):

This lesson will take 2 hours, which also includes interdisciplinary learning.

The teaching shall need digital devices to make students watch videos about carbon dioxide emission. The student needs to have access to google apps to use sheets, create diagrams. The students need to have access to the internet to do online programming with micro:bits.

### Step 1. Lead in:

The teacher starts the lesson by showing diagrams related to e.g. carbon dioxide emissions using gapminder. The teacher creates interest to learn math in a creative way. The teacher asks if students remember the basic blocks of Micro:bit. Then, students are divided according to their learning intelligence and or learning style. Here, teacher group students as:

- ✓ Group A: 2-3 students, having science learning interest/intelligence/capability/style
- ✓ Group B: 2-3 students, having technology learning interest/intelligence/capability/style.
- ✓ Group C: 2-3 students, having engineering (creativity) learning interest/intelligence/capability/style.
- ✓ Group D: 2-3 students, having art learning interest/intelligence/capability/style.
- ✓ Group E: 2-3 students, having math learning interest/intelligence/capability/style.

**Note:** As grouping the students, the number of students can change according to the class-size.

### Lesson standard:

The lesson is standardized around STEAM-focused PBL for transferring 2021st skills for understanding and taking against climate change. Here, we focus on programming and climate change, Goal 13. Through collaborative learning, the students will understand what are the main effects of climate change and what they can do as citizens to solve them. They will also be aware of the Goal 13 “Climate Action”.

### Common Core State Standards:

The teacher shall connect and correlate the lesson with the national syllabus and or school year program, which shall incorporate the lesson with the national program.

### Enduring Understandings:

The students will understand the device Micro:bit.

- ✓ Get basic knowledge of Block programming
- ✓ Get basic knowledge of data analysis
- ✓ Java script and Python which is combined in Micro:bit
- ✓ Learn mathematics
- ✓ Increase logical thinking in order to solve Climate problems

The lesson will also answer the following questions:

- ✓ In which way programming helps the pupil to understand the Global Goals of Climate Change
- ✓ How does logical thinking and coding help the pupils to get interested in Climate problems
- ✓ How to use programming in order to solve a problem in a collaborative environment
- ✓ How to combine different subjects in coding with Micro: bits
- ✓ How to analyze data to increase understanding and learning about climate change

### Essential Questions:

- ✓ What are the connections of the effects of climate change with STEAM skills?
- ✓ What are the connections of the effects of climate change with PBL?
- ✓ How can the study of the effects of climate change transfer soft skills?

Before the lesson implementation, the teaching staff shall brainstorm the above questions with the colleagues at the same school.

### Case section:

The teacher shall follow the following steps with the different groups of students

Step 1. The teacher will show a film about Carbon Dioxide emissions and a diagram about deduction of CO<sub>2</sub> emission during COVID-19 and 2021: Annual change in fossil CO<sub>2</sub> territorial emissions (interactive diagram). The teacher will give time to the students for discussions after film and after diagrams. The teacher will make different groups and ask them to discuss and the following questions

Questions for discussions to Group A: 2-3 students, having science

- ✓ Why is it important to collect and analyze data ?
- ✓ How is data used in a scientific arguments

Questions for discussions to Group B: 2-3 students, having technology

- ✓ How programming could be useful construction using logic
- ✓ How can data analysis be useful in technological development?

Questions for discussions to Group C: 2-3 students, having engineering (creativity)

- ✓ How is use data and diagrams in learning climate change to make a more increase safety
- ✓ How is use data and diagrams in learning climate change to make more secure and climate friendly contractions material ( constructions materail)

Group D: 2-3 students, having art learning

- ✓ How to use mathematical measurements in art?
- ✓ How to use the logic of scales to draw pictures and shapes?
- ✓ How to combine logical thinking in arts?
- ✓ Climate impact and use of paint and colors

✓ Group E: 2-3 students, having math learning

- ✓ How do you use programming and digital technology to analyze data?
- ✓ How do you use math and logic in micro:bit in analyzing data?

### Skill focus:

During the lesson, Cognitive Skills, such as decision making, problem solving, creative thinking and interpersonal skills will be the focus.

### Content:

Create a program using variables and math as “count” “Basic”, “Input “Loop” and “Logic”  
Building knowledge on the effects of climate change through STEAM-focused PBL approach.

**Assessments:**

The teacher will use formative assessments during every lesson by giving feedback. Pupils will document every program stepwise in the form of a document or presentation. The pupils will help each other to improve individual skills in programming.

**Evidence of Student Learning:**

Students' learning evidence will be the documentation of every program step by step

**Texts/Resources:**

Films : Carbon Dioxide emissions

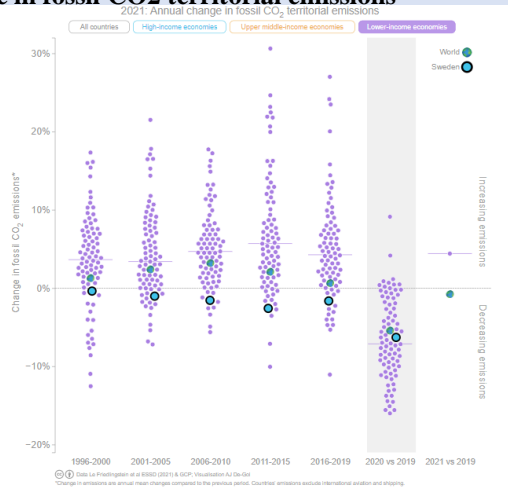
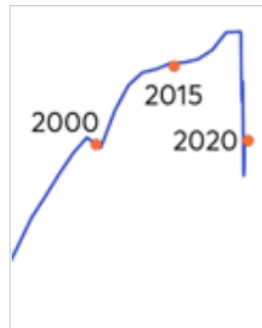
<https://www.gapminder.org/videos/gapcast-10-energy/>

**Diagrams for discussions**

<https://enactivescience.com/gcp2021/>

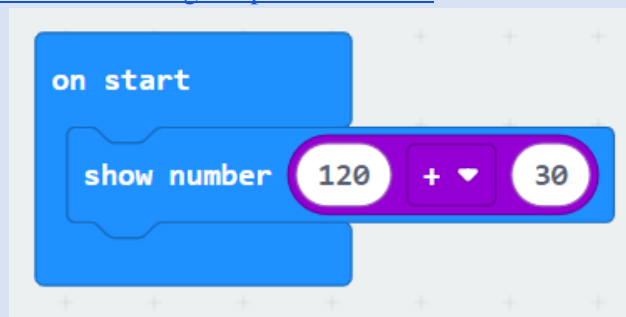
1. Reduction of CO2 emission during COVID-19
2. 2021: Annual change in fossil CO2 territorial emissions

**Temporary Reduction  
in CO<sub>2</sub> Emissions  
During COVID-19**



There are many examples in Micro:bit websites and there are many you tube films for constructions using microbits

Website: <https://makecode.microbit.org/> . Open the website



### Learning Activities:

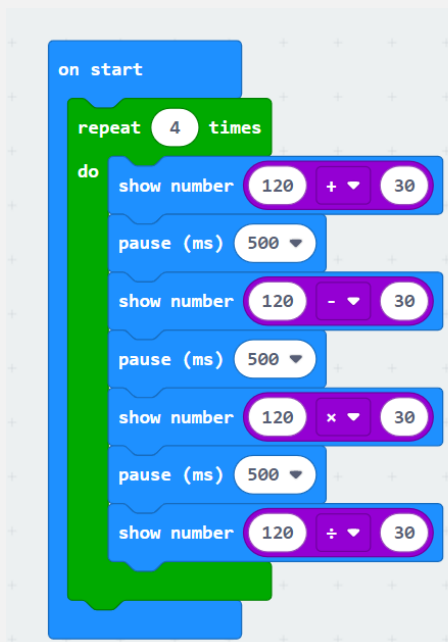
The teacher repeat the basic blocks and ask the students to create programs in the following area

- ✓ How does micro:bit to display an image using the LED screen, measuring temperature, measuring light level, measuring sound level
- ✓ How to use Micro:bit in logic
- ✓ How to use Micro:bit in true / false and if statements
- ✓ How to count
- ✓ How to use variables

The teacher will ask the students to create a program to show or explain or understand math using “Basic” “loop” and math.

Here you must add two numbers. Explore a few different values of the terms, and then test different methods of calculation.

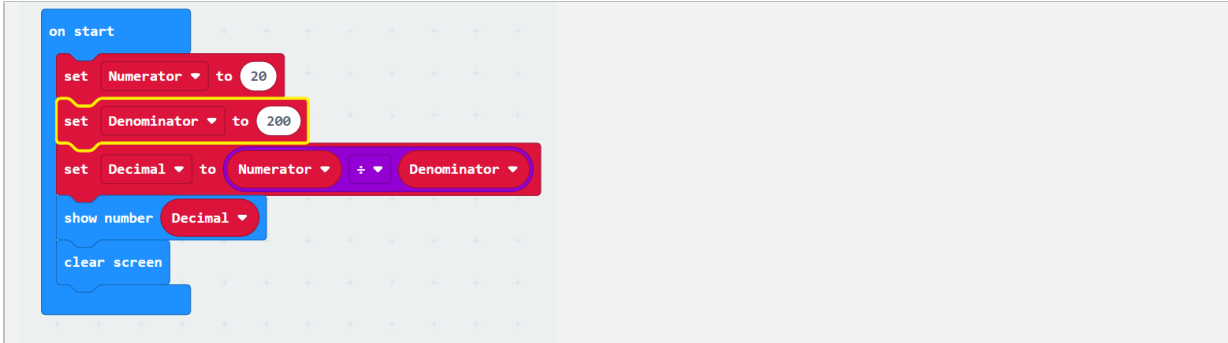
Create a few other programs using variables, or rather a variable. A variable can store a value. Here you should store a value and display it. Then you must change the value to another and display the new value.



**Practice:** Create a few other programs using variables, or rather a variable. A variable can store a value. Here you should store a value and display it. Then you must change the value to another and display the new value.

- a) Create a program using new variables such as steps, numbers and so on.
- b) Create a few other programs using variables.
- c) Discuss the term “variables”. Why is this term important in the climate context? Make a program about climate change using variables.





```
on start
  set Numerator to 20
  set Denominator to 200
  set Decimal to Numerator ÷ Denominator
  show number Decimal
  clear screen
```

Here is a division program . In the program, you can set a numerator and a denominator, and then the program calculates the ratio of these. Try different values on the numerator and denominator.

### Suggested Extensions:

- ✓ Create a program that calculates and displays the result of the calculation  $(1 + 2) * (3 + 4)$ .
- ✓ Create a program using new variables such as steps, numbers and so on.
- ✓ Discuss the term “variables”. Why is this term important in the climate context? Make a program about climate change using variables.
- ✓ Create a program that multiplies four values ( $a * b * c * d$ ). You should create a variable for each value, and the result should be printed (display number).
- ✓ Calculate for ex. Carbon dioxide emissions or other parameters.
- ✓ [Create different geometrical figures with the help of JavaScript](#)