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Programme Your Future



## COMPUTATIONAL THINKING - LESSON SCRIPT

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<b>Lesson information:</b>	Subject:	Mathematics
	Duration:	45 min
	Grade/level:	1 <sup>st</sup> grade of middle school/3 <sup>rd</sup> educational stage
	Age:	13
	Topic:	Percents and fractions.

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<b>The curriculum specifications and requirements:</b>	The core curriculum of teaching Maths for the 3 <sup>rd</sup> educational stage. Point no. 5. Percents. Pupil: <ul style="list-style-type: none"><li>▲ Presents the part of a certain amount as a percent or per mille of this amount and conversely.</li></ul>
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<b>The aims of the lesson:</b>	Pupil: <ul style="list-style-type: none"><li>● can change any percent for a fraction,</li><li>● can change any fraction for a percent,</li><li>● can change any rational number for a percent,</li><li>● solves a problem with the use of the computer.</li></ul>
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<b>Previous knowledge:</b>	The section of the core curriculum of teaching Maths for the 2 <sup>nd</sup> educational stage(grades 4-6) concerning percents: Point no. 12. Practical calculations. Pupil: <ul style="list-style-type: none"><li>● interprets 100% of the given amount as a totality, 50% as a half, 25% as a quarter, 10% as one-tenth and 1% as one-hundredth of the given number;</li><li>● in practical situations calculates 50%, 10%, 20% of the given amount.</li></ul>
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<b>The forms of work:</b>	<ul style="list-style-type: none"><li>● working in pairs</li><li>● individual work</li><li>● teamwork</li></ul>
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<b>The methods of work:</b>	<ul style="list-style-type: none"><li>● brainstorm</li><li>● mind map</li><li>● exercise method</li><li>● informal discussion</li></ul>
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**Teaching aids:**

- the computer with the access to the Internet, projector, interactive board
- the image editor Microsoft Paint
- the spreadsheet Microsoft Excel
- the program for creating mind map XMind

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**The range of using ICT:**

- practicing and consolidating the skill of calculating
- presenting the knowledge
- presenting and processing information

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**The course of lesson:**

- Teacher activities
- Pupil activities
- The schedule

**1. Introduction - organisational activities.**

Greeting the pupils, checking the register, distributing worksheets, giving the topic of the lesson and introducing the aims of the lesson.

**5 min**

**2. Reminding information about percents with the usage of brainstorming and mind map creating program.**

The teacher opens the XMind program, inputs the concept of percent on the map and displays it on the interactive board. The teacher asks pupils about their associations with the concept of percent. All ideas and associations proposed by pupils are put on the mind map. The teacher moderates the formation of mind map by creating the hierarchy tree of ideas and associations. The teacher can ask additional questions so that the use of percents in everyday life and formulas allowing to convert percents for fractions and the other way round appear on the map. As a summary of that stage of the lesson there are  $p\% = p/100$  and  $a/b = a/b * 100\%$  formulas on the board.

**10 min**

**3. Developing the topic of the lesson**

Next, the teacher opens the file figures.png with the use of Paint program. He asks pupils to come to the multimedia board and fill with the given colour:

- a) The whole figure 1
- b)  $\frac{1}{2}$  of figure 2
- c)  $\frac{1}{4}$  of figure 3
- d)  $\frac{1}{5}$  of figure 4
- e)  $\frac{1}{8}$  of figure 5
- f)  $\frac{1}{10}$  of figure 6
- g)  $\frac{5}{6}$  of figure 7
- h)  $\frac{2}{3}$  of figure 8
- i) 0,375 of figure 9
- j) 0, (4) of figure 1

The teacher also requests the pupils to write given fractions as percents on the worksheet (worksheet – exercise 1).

**10 min**

**4. The teaching of computational thinking**

The teacher combines pupils into pairs and formulates the problem situation: What percent of the pupils in our class are girls and what percent are boys? Next the teacher asks pupils to discuss the problem according to instructions written on the worksheet (exercise 2) (duration of discussion –no more than 5 minutes)

Pupils discuss:

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- a) What kind of information do they need to solve the problem?
  - b) What should they obtain as a result of solving the problem?
  - c) Which formulas and dependencies do they need?
  - d) Which IT tools can be used to solve the problem?

The teacher sums up pupils' work. She opens the algorithm.doc file and asks one of the pupils to rank the blocks in the correct order. This way pupils create the algorithm which solves the problem. Then the teacher requests a few pupils to read their suggestions concerning the IT tools helpful in solving the problem. The rest of the pupils evaluate the usefulness of these tools. The teacher presents the example of how to solve the problem with the use of spreadsheet. She opens Microsoft Excel and inputs the value into cell A1, the number of boys into cell A2, the formula calculating the percent of girls into cell B1 and the formula calculating the percent of boys into cell B2. Pupils write the calculations on their worksheets (exercise 2)\*.

**15 min**

#### 5. Evaluation

The teacher asks pupils to formulate and write on the worksheet their own problem. Pupils design the table on the worksheet (exercises 3) and fill it with exemplary data and calculations.

The teacher should take the worksheets and familiarize herself with pupils' answers to evaluate to what extent the topic of the lesson is understood by them.

**5 min**

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#### Specific information:

- Programs
- Links
- Etc

- ▲ The image program Paint is available in operating system Windows
- ▲ Microsoft Excel – spreadsheet from package Microsoft Office
- ▲ Microsoft Office- word processor from package Microsoft Office
- ▲ The program for creating mind maps XMind-redisplayed on the basis of free licence at page

<http://www.dobreprogramy.pl/XMind,Program,Windows,68376.html>.

\*The teacher can show also the program creating in C++ language. He can show compiled file (program.exe) or source code of this program (program.cpp). Then the teacher need Dev-C++ program on his computer. It is redisplayed on the GNU General Public Licence.

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#### Attachments:

- Worksheets
- Programs
- files necessary
- Etc

- Worksheets (a file worksheet.pdf)
  - A file with geometrical figures figures.png
  - A file algorithm.doc
  - optionally: program.exe, program.cpp
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