**PROJECT REPORT OF TEAM 11**

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# 1 Introduction

This project work was done to improve our skills in areas like: JavaScript, CSS and HTML coding. It finally consolidated all the knowledge that we gained in last six months. We spent a lot of time doing it and learned a lot of new things. This project helps us to understand our level and shows us the things where we should work more. We worked with pleasure and hope that our efforts will be appreciated.

# 2.The work enviroment

## 2.1 The work environment in general

We have been working for two weeks at home and at school. At school we had to work from 8.00 to 15.00 and at home we usually tried to correct the code we had written in the afternoon. The correction usually took us approximately 2 hours. The environment around us was conducive for creating this project. Teachers helped us to solve different questions and explained to us things we didn’t understand.

## 2.2 Tools

For coding we used Visual Studio Code. It is a very convenient tool for Web-development. It has CSS, HTML and JavaScript libraries which have the feature of giving you options of all the possible coding commands after typing in a letter or two, making it easier to code. Also, it uses different colors to show main things in your code, thus making it more readable for other people. This tool can also make your code look good you have just to select the desired piece of code and press Ctrl+K, Ctrl+F. This tool also can be connected with your repository on GitHub which makes your commits easier.

For version control we used GitHub (GitHub, Inc., 2008). This tool helps you track changes in your project and can provide the work done in a team. We uploaded the changes at least once a day.

We also used the Internet to find the necessary information. The most useful site was <https://www.w3schools.com> (Data, 1999). This site contains a lot of information about HTML, CSS and JavaScript tools and can show you the features of them.

## 2.3 How the work is related to outside world

This site can help people to learn basic mathematics things. It helps calculate different values, for example values of number systems or nCr/nPr. From here you can get the basics of truth tables and random values. You also can make a list of prime numbers to understand the main logic of them. In general this project is a study source which improves your math skills.

# 3 Definition

Our project is divided into eight main parts: the main page, a converter, number systems, combinatorics, tables, random values, prime numbers and information about the project. You can go through the site using a menu which is constantly located at the top of each page.

## 3.1 Main page

Our main page is a small introduction of the whole project. It “greets” the user and explains the main idea of this site.

## 3.2 Converter

“Converter” is a number bases converter. The user can input a number, choose its number system and the number system the user wants his number to be converted to. Then press the button and get the answer.

This program is very flexible because the user can choose number systems, and it has the ability to detect errors and not give you the wrong answer if you have entered invalid numbers. It says where your error is. For example if you use binary system and input the number “5” it prints out “Wrong input”(because any binary number is made of “0” and “1”).

## 3.3 Number system

This page has only a description and a button named “show”. If you press this button, a table which has decimal, binary, octal and hexadecimal numbers that are arranged in ascending order from 1 to 50 will appear. You can also close this table using “clean” button.

## 3.4 Combinatorics

This page has a description, combinatorics calculator, formulas for combinatorics calculator and two types of sets output.

Using calculator you can choose the formula for either (nCr or nPr). To make it work you should press the button and the answer will appear.

Sets output works in a similar way. You choose type of set you need (with repetitions or without), number of elements and press the button to see the sets.

## 3.5 Tables

This page shows you truth tables of basic logical functions.

## 3.6 Random values

This page has a description and a user input for them to enter the range and amount of numbers. When the user presses “show” button this page generates random values based on options selected above and give detailed statistics about them and how many times each number appears.

## 3.7 Prime numbers

This page has a description and a functioning program. The user inputs the number and uses “Show” button to see all the prime numbers for the given value.

## 3.8 About project

This page contains the information about this project.

# 4 IMPLEMENTATION

## 4.1 Menu

Menu of this site is based on the example which was taken from <https://www.w3schools.com/howto/howto_js_full_page_tabs.asp> It was modified to be responsive using “flex” and “media” functions in CSS. In comparison with usual sites we made it in the way that it has only one page where the content is changing. Basically, users won’t see any differences from normal sites but for computer’s memory it is of a great importance. This menu uses JavaScript function to change the content on the pages depending on the button pressed in menu.

## 4.2 “Main page” and “About project”

Main page was done using only CSS and HTML. These pages have pictures and text. To make them look good we used classes in CSS files.

## 4.3 Converter

This part of the project was the biggest one. This program based on JavaScript.

Firstly, I made the program which converted numbers from decimal to any systems. I derived universal mathematics formula for this. Then I understood that the conversion from any system to any can be made in two steps: converting the number to decimal system and converting the number from decimal to the system I need (using the method I made). For my first step I used “parseInt” JavaScript method which directly solves this task. Then I connected this output to the input of my “Decimal” method and tried to use program. I saw a lot of bugs with user’s input, so I created “checking” methods that change the special variable “check” that change the output if something is wrong with the input. The user should type in the number that corresponds to the number systems chosen by him. There are two “error messages” : ”wrong input” and ”wrong number system”.

## 4.4 Number systems

This program creates the table which has decimal, binary, octal and hexadecimal numbers which are arranged in ascending order from 1 to 50. Firstly I created function “table” that gets a decimal number and converts it to the system we want. This function returns given number in a system we need. Then I created a loop which creates table rows with different number systems. When this table was done I created the button that changes the visibility of the table from “visible” to “hidden” and the button name from “Show” to “Clean” and vice versa using JavaScript function “turnOn”.

## 4.5 Combinatorics

Firstly, I created the calculator. I found in the Internet function for factorials and based on it built my calculator’s function. Depending on the user’s choice it uses different formulas. Then I wrote code to make the program output “wrong input” if variable “n” less than” r”. In this case this mathematical solution won’t be right. Then I wrote programs for sets. For ordered lists(without repetitions) I used “toString” and “filter” methods. For not ordered lists(with repetitions) I wrote simple function which enumerates all possible options of sets.

## 4.6 Random values

Firstly, I created the function that makes array of random values based on the function “getRandomInt”. Then I made “statistics” function which finds out what type of numbers the array has. Finally, I made a function that counts how many times certain number appears.

## 4.7 Prime numbers

For this task I used the same function I used in “Statistics” for prime numbers(“isPrime”). I made a function based on “for” loop that checks every number before the number given by user. It returns “true” or “false” and the program outputs “true” numbers.

## 4.8 Truth Tables

Truth table was made using HTML and CSS

# 5 Testing

The site was being tested for the whole period of its development. There were found and fixed a lot of “input” bugs on “converter” and “combinatorics” pages. Also, we made a small testing with our classmates.

This site was tested by 3 our classmates. We asked them to use all the functions of our site and give their opinions. We got the following results:

1. All the testers liked the design and functionality of the pages.
2. Second tester found a bug that you could type in negatives numbers to the converter.
3. First tester noticed differences between fonts.
4. First tester found a bug in size changing of the site.

Based on this small testing we fixed the bugs and fonts.

# 6 POSSIBILITIES OF FURTHER DEVELOPMENT

Expanding information on the site and adding different features, since It is to teach mathematics one option is to add page that explains symbols and what they do. Also having an option to change language so that It’s more approachable for larger populace.

# 7 conclusion

This project has taught us much about how different It is to work in a group than by yourself. First we made a plan what layout should look like and as the project site was coming together we also made improvements and changed some aspect on what kind of layout It should be.

In the end we decided to make It minimalistic so the main point of the site is clear and there wont be too much going on so It would be very easy to navigate.

Along the project working our communication and planning improved significantly. Despite the difficulties we faced on this project It was pleasant to notice how much one can learn when working on a project and how much information finding skills got better. Also realizing new things that might have not been so obvious before in terms of coding and developing.

All in all this first project was great base for future projects in which we can use our improved skills even more efficiently.

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