**The theme: Number system conversion**

**Objective of the lesson:**

- to learn how computers store data;

- to convert numbers from one number system to another

**The type of the lesson:** combination of introduction and practice of new theme

**Terminology**

* Number systems - системы счисления
* binary – двоичная
* decimal- десятичная
* octal- восьмеричная
* hexadecimal - шестнадцатеричная
* the base of number system- основание системы счисления
* to convert – переводить
* to transform – преобразовывать
* to store- хранить

**The procedure of the lesson**

1. **Organizing moment.**
2. **Introduction of the theme and objectives of the lesson.**
3. **Entering new words.**
4. **Presentation of the theme.**
5. **Practical work with new theme**
6. **Summary and home task.**

**1. Organizing moment**

**2. Introduction of the theme and objectives of the lesson.**

**3.** **Entering new words.**

**4.** Presentation of the theme.

There are three types of conversion:

* **Decimal Number System to Other Base**  
  [for example: Decimal Number System to Binary Number System]
* **Other Base to Decimal Number System**  
  [for example: Binary Number System to Decimal Number System]
* **Other Base to Other Base**  
  [for example: Binary Number System to Hexadecimal Number System]

Decimal Number System to Other Base

To convert Number system from **Decimal Number System** to **Any Other Base**is quite easy; you have to follow just two steps:  
**A)** Divide the Number (Decimal Number) by the base of target base system (in which you want to convert the number: Binary (2), octal (8) and Hexadecimal (16)).  
**B)** Write the remainder from step 1 as a Least Signification Bit (LSB) to Step last as a Most Significant Bit (MSB).

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| **Decimal to Binary Conversion** | **Result** |
| Decimal Number is : **(12345)10**  decimal to binary conversion | Binary Number is **(11000000111001)2** |

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| --- | --- |
| Decimal to Octal Conversion | Result |
| Decimal Number is : **(12345)10**  decimal to octal conversion | Octal Number is **(30071)8** |

|  |  |
| --- | --- |
| Decimal to Hexadecimal Conversion | Result |
| **Example 1** Decimal Number is : **(12345)10**  decimal to octal hexadecimal | Hexadecimal Number is **(3039)16** |
| **Example 2 Decimal Number is : (725)10  decimal to octal hexadecimal** | Hexadecimal Number is (2D5)16  Convert 10, 11, 12, 13, 14, 15 to its equivalent... A, B, C, D, E, F |

Other Base System to Decimal Number Base

To convert Number System from **Any Other Base System** to **Decimal Number System**, you have to follow just three steps:  
**A)** Determine the base value of source Number System (that you want to convert), and also determine the position of digits from LSB (first digit’s position – 0, second digit’s position – 1 and so on).  
**B)** Multiply each digit with its corresponding multiplication of position value and Base of Source Number System’s Base.  
**C)** Add the resulted value in step-B.

*Explanation regarding examples:*  
Below given exams contains the following rows:  
**A)** Row 1 contains the **DIGITs** of number (that is going to be converted).   
**B)** Row 2 contains the **POSITION** of each digit in the number system.  
**C)** Row 3 contains the multiplication: **DIGIT\* BASE^POSITION**.  
**D)** Row 4 contains the calculated result of **step C**.  
**E)** And then add each value of **step D**, resulted value is the Decimal Number.

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| --- |
| Binary to Decimal Conversion |
| Binary Number is : **(11000000111001)2**  binary to decimal conversion |

|  |  |
| --- | --- |
| Octal to Decimal Conversion | Result |
| Octal Number is : **(30071)8**   octal to decimal conversion | **=12288+0+0+56+1** **=12345** Decimal Number is: **(12345)10** |

|  |  |
| --- | --- |
| Hexadecimal to Decimal Conversion | Result |
| Hexadecimal Number is : **(2D5)16**  hexadecimal to decimal conversion | **=512+208+5** **=725** Decimal Number is: **(725)10** |

**5. Practical work with new theme**

**Task 1.**

Convert numbers from decimal to binary and check your answers by converting binary back to decimal.

**1. 11 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2. 17 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3. 28 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**4. 255 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Task 2.**

1. Go to the [https://quizlet.com](https://quizlet.com/)
2. Insert in the search bar: 1.2 Number system
3. Click on 1.2 Number system

**6. Summary, home task.**

What kind of number system do you know?

What is the number system we use in our day-to-day life?

**Home task:** Learn the terminology and definitions and an exercise 1 on page 11