# Worksheet 1 Primitive data types, binary and hexadecimal

# Task 1: Converting binary and decimal values

# A currency icon not represented by keys on the regular QWERTY keyboard can be displayed on a computer monitor using an 8x8 grid. Working right to left, columns in the grid are given binary place values of 1, 2, 4, 8, 16, 32, 64 and 128.

# The values from each row are stored in a table, using the place values to calculate the total. Row one in the figure below gives the value of 32.

1. Complete the values for rows 2-8 to store the ₺ character for Turkish Lira**.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Row** | **Value** |
|  |  |  |  |  |  |  |  |  | **1** | **32** |
|  |  |  |  |  |  |  |  |  | **2** | 36 |
|  |  |  |  |  |  |  |  |  | **3** | 56 |
|  |  |  |  |  |  |  |  |  | **4** | 228 |
|  |  |  |  |  |  |  |  |  | **5** | 57 |
|  |  |  |  |  |  |  |  |  | **6** | 226 |
|  |  |  |  |  |  |  |  |  | **7** | 44 |
|  |  |  |  |  |  |  |  |  | **8** | 48 |

1. Draw the Euro character € formed from the data values in the table below:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Row** | **Value** |
|  |  |  | a | a | a |  |  |  | **1** | 28 |
|  |  | a | a |  |  | a |  |  | **2** | 50 |
| a | a | a | a | a |  |  |  |  | **3** | 248 |
|  | a | a |  |  |  |  |  |  | **4** | 96 |
| a | a | a | a | a | a |  |  |  | **5** | 252 |
|  |  | a |  |  |  |  |  |  | **6** | 32 |
|  |  | a | a |  |  | a | a |  | **7** | 51 |
|  |  |  | a | a | a | a |  |  | **8** | 30 |

# Task 2: Converting hexadecimal values

1. The following colour code **#2A17A5** is represented in hexadecimal. Convert the Red, Green and Blue components into their decimal equivalents.

|  |  |  |
| --- | --- | --- |
| **Red: 2A** | **Green: 17** | **Blue: A5** |

1. Red: 10 \* 1 + 2 \* 16 = 42
2. Green: 7 \* 1 + 1 \* 16 = 23
3. Blue: 5 \* 1 + 10 \* 16 = 165
4. Convert the following three decimal RGB colour values into their full hexadecimal equivalent in the table below:

|  |  |  |  |
| --- | --- | --- | --- |
|  | a) Red 5810 | b) Green 12610 | c) Blue 20210 |
| **#** | 0011 1010  3 10  3 A  3A | 0111 1110  7 14  7 E  7E | 1100 1010  12 10  C A  CA |

1. Convert the following binary ASCII values for the word ‘**Jam**’ into their hexadecimal equivalents:

|  |  |  |  |
| --- | --- | --- | --- |
|  | a) **J** | b) **a** | c) **m** |
| Binary values: | 01001010 | 01100001 | 01101101 |
| Hexadecimal values: | 4 10  4A | 6 1  61 | 6 13  6D |

1. Convert the following three hexadecimal values into 8-bit binary equivalents:
2. 1616 1 = 0001 6 = 0110 therefore 00010110
3. D716 D = 13 = 1101 7 = 0111 therefore 11010111
4. FF16 F = 15 = 1111 therefore 11111111