Data Representation

Lesson 3 – Hexadecimal - Denary

Learning Purpose

Previous Learning

- Understanding the binary number system
- Converting between binary and denary
- Convert between hexadecimal and binary

By the end of this lesson I will be able to:

- Converting between denary and hexadecimal

PFuture Learning

Data Representation:

End of topic test

Subject Specific Vocabulary: hexadecimal, nibble, byte, bit

Hexadecimal

○ The following table shows the relationship between hexadecimal, binary and denary.

Hex	Bin	Denary
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7

Hex	Bin	Denary
8	1000	8
9	1001	9
A	1010	10
B	1011	11
C	1100	12
D	1101	13
E	1110	14
F	1111	15

Converting Denary to Hexadecimal

○ Example: convert denary **78** into hexadecimal

○ To convert denary to hexadecimal, we should

    ○ **Step 1** - convert the **denary** value into **binary**

    ○ Using bucket filling from left to right

128	64	32	16	8	4	2	1
0	1	0	0	1	1	1	0

○ Therefore **78** is equivalent to **0100 1110**

Converting Denary to Hexadecimal

○ **Step 2** - convert the **binary** value into **hexadecimal**

○ Group the nibbles and calculate the 2 hexadecimal values

8	4	2	1	8	4	2	1
0	1	0	0	1	1	1	0
4					E			

○ Therefore **0100 1110** is equivalent to 4E

○ **So, the answer is 78 = 4E**

Exercises – Denary to Hex

O Convert the following from denary into hexadecimal:

1. 45 **2D**
2. 72 **48**
3. 111 **6F**
4. 200 **C8**
5. 251 **FB**

Worksheet – Den – Hex

Worksheet – Den – Hex

Answer 1 = 0C

Answer 2 = 15

Answer 3 = 24

Answer 4 = 2C

Answer 5 = 4E

Answer 6 = 5A

Answer 7 = 5C

Answer 8 = 6B

Answer 9 = 88

Answer 10 = 8C

Converting Hexadecimal to Denary

○ Example: convert hexadecimal **A2** into denary

○ To convert hexadecimal to denary to, we should

  ○ **Step 1** - convert the **hexadecimal** value into **binary**

A				2			
8	4	2	1	8	4	2	1
1	**0**	**1**	**0**	**0**	**0**	**1**	**0**

○ Therefore **A2** is equivalent to **1010 0010**

Converting Hexadecimal to Denary

○ **Step 2** - convert the **binary** value into **denary**

○ Add all the denary values where the bit is a logic 1

128	64	32	16	8	4	2	1
1	0	1	0	0	0	1	0

○ Total = 128 + 32 + 2 = **162**

○ Therefore **1010 0010** is equivalent to **162**

○ **So, the answer is A2 = 162**

Exercises – Hex to Denary

○ Convert the following from hexadecimal into denary:

1. 45   **69**
2. 10   **16**
3. 56   **86**
4. AC   **172**
5. E0   **224**

Worksheet – Hex - Den

Worksheet – Hex - Den

Answer 1 = 3

Answer 2 = 15

Answer 3 = 21

Answer 4 = 45

Answer 5 = 66

Answer 6 = 88

Answer 7 = 111

Answer 8 = 119

Answer 9 = 141

Answer 10 = 148