**Representation of numbers in GCSE computer science**

**Handout 1 – Covering between number types**

**Task 1 – Binary Shifting (Left and Right)**

Q1 i) Complete a 2 place right shift on the binary number 11001000.

|  |
| --- |
| 00110010 |

ii) What is the effect of the binary shift:

|  |
| --- |
| Dividing the number by 4 (/2 for each place moved to the right) |

Q2 i) Complete a 3 place left shift on the binary number 11001011.

|  |
| --- |
| 01011000 |

ii) What is the effect of the binary shift:

|  |
| --- |
| Multiplied the number by 8 (\*2 for each place moved to the left) |

Q3 Complete a 1 place left shift on the binary number 01001001.

|  |
| --- |
| 10010010 |

ii) What is the effect of the binary shift:

|  |
| --- |
| Dividing the number by 2 (/2 for each place moved to the right)  Loss of precision – odd number divided by 2 – only the integer part represented |

Q4 Explain the effect of performing a 2-place shift to the right on the binary number 11001101.

|  |
| --- |
| Divide the number by 4  Loses precision due to binary overflow |

Q5 A binary shift can be performed on a binary integer. Identify which shift will multiply a number by 8

|  |
| --- |
| LEFT 3 Places |

**Task 2 – Binary to Hexadecimal**

Q1 Give **two** reasons why computer scientists use hexadecimal to represent numbers instead of binary.

|  |
| --- |
| * Easier and quicker to communicate (enter, write, read) * Less chance of inputting errors * Easier to find errors * They are shorter so easier to remember * Easy to convert between binary and Hexadecimal |

Q2Convert the binary number 11100011 to Hexadecimal

|  |
| --- |
| E3 |

Q3 Convert the binary number 11000111 to Hexadecimal

|  |
| --- |
| C7 |

Q4 Convert the binary number 10110000 to Hexadecimal

|  |
| --- |
| B0 |

**Task 3 – Hexadecimal to Binary**

Q1Convert the Hexadecimal number 0F to Binary

|  |
| --- |
| 00001111 |

Q2 Convert the Hexadecimal number 3A to Binary

|  |
| --- |
| 00111010 |

Q3 Convert the Hexadecimal number 96 to Binary

|  |
| --- |
| 10010110 |

**Task 4 – Denary to Hexadecimal**

Q1 Convert the Denary number 62 to Hexadecimal

|  |
| --- |
| 62/16 = 3 r14 = 3E |

Q2 Convert the Denary number 250 to Hexadecimal

|  |
| --- |
| 250 / 16 = 15 r 10 = FA |

Q3 Convert the Denary number 128 to Hexadecimal

|  |
| --- |
| 128 / 16 =8 r0 = 80 |

**Task 5 – Hexadecimal to Denary**

Q1 Convert the hexadecimal number 3E into a decimal number.

|  |
| --- |
| (3\* 16) + 14 = 62  OR  00111110 = 62 |

Q2 Convert the Hex number 62 to Denary

|  |
| --- |
| (6 \* 16) + 2 OR 0110 0010  = 98 |

Q3Convert the Hexadecimal number A3 to Denary

|  |
| --- |
| 163 |

**Extension**

Complete the table below

|  |  |  |
| --- | --- | --- |
| **Denary** | **8-bit binary** | **Hexadecimal** |
| 15 | **00001111** | **0F** |
| **48** | 00110000 | **30** |
| **102** | **01100110** | 66 |
| 255 | **11111111** | **FF** |