**Binary Numbers Task**

*How to convert binary numbers to denary numbers?*

Binary numbers are represented in the following way:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |

The example above is the denary number 28. A zero means that the number above will NOT be added. A one means that the number will be added. So, 16+8+4 = 28.

Try the following examples:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 1** |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 2** |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 3** |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 4** |
| 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 5** |
| 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 6** |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 7** |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 8** |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |  | **Ans 9** |
| 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |  |  |

*How to convert denary numbers into binary?*

A bit trickier this time…

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Dec** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 57 |  | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |

This time you see if any of the numbers above can fit into the denary number, starting with 128.

Does 128 fit into **57**? No. So we put a 0.

Does 64 fit into **57**? No. So we put a 0.

Does 32 fit into **57**? Yes. We put a 1. BUT we now use a different number. 57 – 32 = 25.

Does 16 fit into **25**? Yes. We put a 1. Again we use a different number. 25 – 16 = 9.

Does 8 fit into **9**? Yes. We put a 1. Again use the different number. 9 – 8 = 1.

Does 4 fit into **1**? No. So we put a 0.

Does 2 fit into **1**? No. So we put a 0.

Does 1 fit into **1**? Yes. We put a 1. To double check, add up the 1s and see if it = 57.

Try the following examples:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 1** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 7 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 2** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 31 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 3** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 56 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 4** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 80 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 5** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 99 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 6** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 100 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Den 7** |  | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| 108 |  |  |  |  |  |  |  |  |  |