Silver - Bits to numbers

# Problem 1 It’s all bits to me

Convert each binary number into a decimal number.

1. Multiply each binary digit with its multiplier.

(There’s space below the digits to keep track of which multipliers to include.)

1. Add up the products to work out the decimal number.

Here is an **example**:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Binary number | | | | | ▹ | Decimal number |
| 16 | 8 | 4 | 2 | 1 |  |  |
| **1** | **1** | **0** | **1** | **0** |  | 26 |
| 16 | 8 |  | 2 |  |  | 16+8+2 |

Now, try these on your own:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Binary numbers | | | | | ▹ | Decimal numbers |
| 16 | 8 | 4 | 2 | 1 |  |  |
|  |  |  | **1** | **0** |  |  |
|  |  |  |  |  |  |  |
|  |  | **1** | **1** | **0** |  |  |
|  |  |  |  |  |  |  |
|  | **1** | **0** | **1** | **1** |  |  |
|  |  |  |  |  |  |  |
| **1** | **0** | **0** | **1** | **0** |  |  |
|  |  |  |  |  |  |  |

# Problem 2 Birthday bits

You have a friend who loves binary numbers. You ask her when her birthday is, and she writes the following on a piece of paper:

11001

1100

Then, you ask her how old she is, and she draws a birthday cake with binary candles!



cake image derived from [Tux Paint birthday cake.svg](https://commons.wikimedia.org/wiki/File:Draw_this_birthday_cake.svg) [[CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0)]

|  |  |
| --- | --- |
| **Questions** | **Your answer** |
| When is your friend’s birthday? |  |
| How old is she?  Hint: Think of the candles as binary digits. |  |

# Explorer task .

If you have finished these problems and there is still time remaining, ask your teacher to assign an explorer task to you.