Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_\_\_\_\_ Score\_\_\_\_\_\_\_\_

A Bit about Bytes and the Binary System

Define the following:



1. Bit or b=
2. . Byte or B=
3. Kilobyte or KB =
4. Megabyte or MB =
5. Gigabyte or GB =

Look at these numbers. What is their pattern?

128 64 32 16 8 4 2 1

Each one of these numbers is a ***bit,*** and eight bits equals a ***byte***. They are **base ten** numbers and we need to change them into **base two** numbers.

Base two numbers are like a switch; they are either **on (1)** or **off (0).** Each bit represents a place in our number pattern. To change a byte into base ten numbers you need to look at the following example:

Notice that 16, 4 and 2 are on (1) and 128, 64, 32, 8, 1 are off (0)

0 0 0 1 0 1 1 0

128 64 32 16 8 4 2 1

To change the binary (base two) number to base ten (our number system), all you need to do is add the numbers that correspond with the 1s in the binary number. These would be 16, 4, and 2. Now add these together (16+4+2) and you get the correct answer which is 22.

Let’s try another one.

0 1 0 0 1 1 0 1

128 64 32 16 8 4 2 1

What numbers are on 1? \_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_\_. Added together, they equal? \_\_\_\_\_

Assignment: *Change the following Base 2 (binary) numbers to Base 10 (decimal)*:

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

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

*Find and write the Base 2 (binary) numbers for the following Base 10 (decimal)numbers.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **14=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **25=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **36=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **49=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **57=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **84=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **100=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **106=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **115=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **127=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **128=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **0=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **1=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **2=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **3=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **4=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **5=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **6=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **7=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **8=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **9=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |
| **10=** | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|  |  |  |  |  |  |  |  |