



PG ONLINE

Understanding Binary

Understanding Computers



Starter

- Use the Internet to find out what Binary is



Learning Objectives

- Understand why all data is represented in binary in a computer
- Define a Bit, Byte, Kb, Mb and Gb
- Convert integers to binary numbers
- Convert binary numbers to integers



Decimal Number System

(Sometimes called the Denary system)

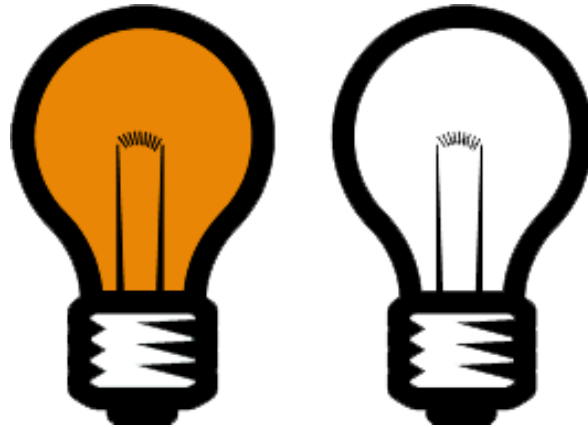
- Why 10 digits?





What about Computers?

- Computer use millions of electronic circuits and switches which can either be **On** or **Off**



- **On** is represented by **1** and **Off** is represented by **0**



Binary – On & Off

- The standard On / Off symbol on a switch is a 1 and a 0:





Bits and Bytes

0 or a 1 = 1 Bit (**B**inary **D**igit)

8 Bits = 1 Byte

1024 Bytes = 1 Kilobyte (Kb)

1024 Kb = 1 Megabyte (Mb)

1024 Mb = 1 Gigabyte (Gb)

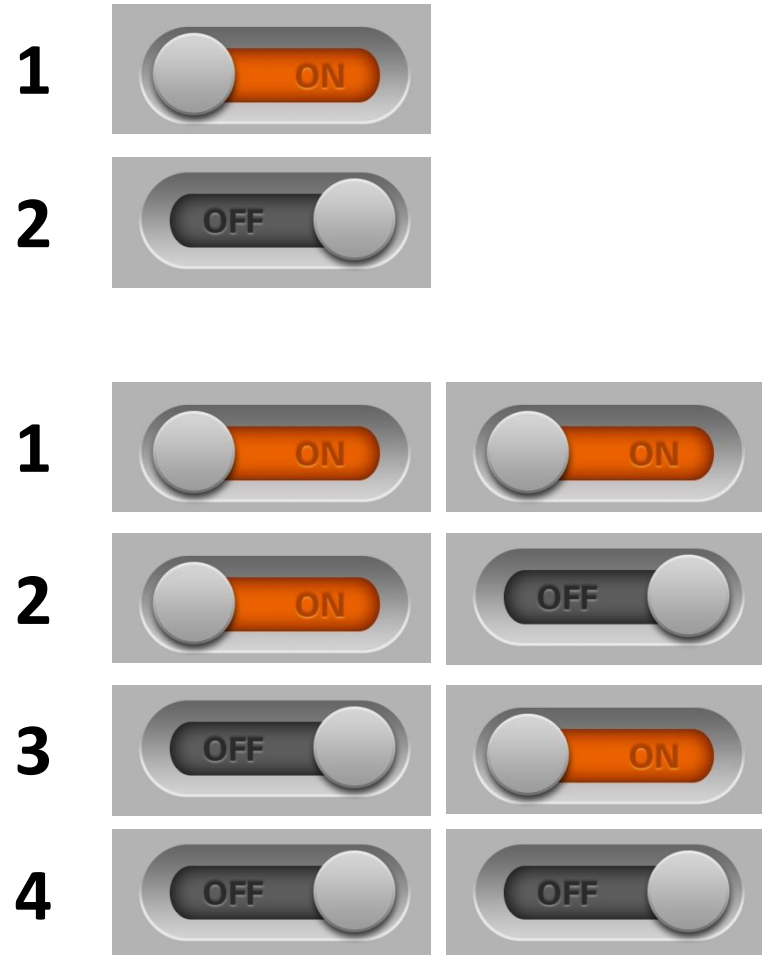
1 Byte = 1 Character of text

- How many Gb in a Terabyte?
- How many bytes in a Megabyte?



Binary representation

- One switch can only represent 2 possible states
 - **On** or **Off**.
- Two switches can represent 4 states
 - **On & On**
 - **On & Off**
 - **Off & On**
 - **Off & Off**





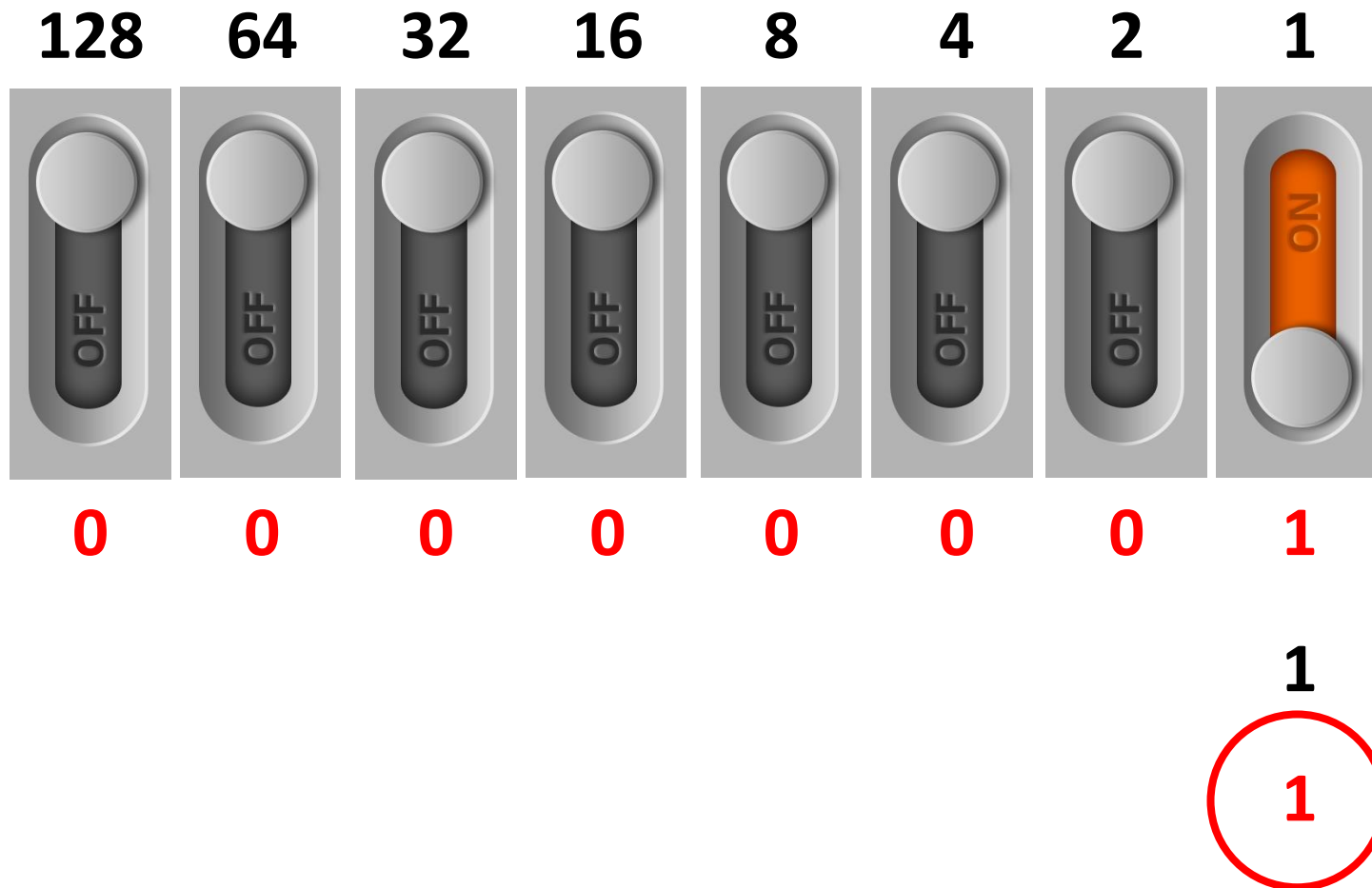
Binary Table

- Draw the below Table on the paper provided

128	64	32	16	8	4	2	1

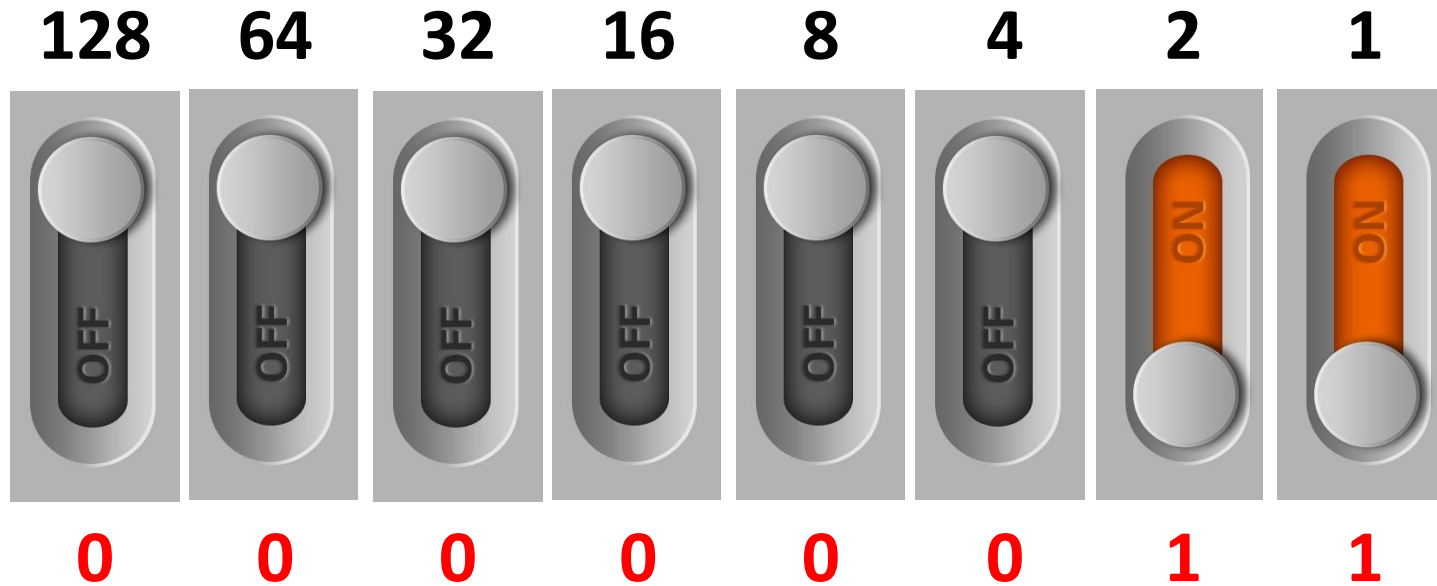


Binary to Denary Conversion





Binary to Denary Conversion



=

2 + 1

=

3



Try the following Binary to Denary
using your Table

• 0 0 0 0 1 1 0 1

• 1 0 1 0 0 1 0 1

• 1 0 1 0 1 1 1 1



Try the following Binary to Denary
using your Table

$$\bullet 00001101 = 13$$

$$\bullet 10100101 = 165$$

$$\bullet 10101111 = 175$$



Binary to Decimal Conversion

- Work out the Binary numbers from 0 to 10 using the paper provided

Decimal	Binary
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	



Decimal to Binary

- Convert 28 to Binary
- Method
 - Working right to left write out the numbers 1, 2, 4, 8 and so on doubling each time to 128.

128	64	32	16	8	4	2	1



Decimal to Binary

- Convert 28 to Binary

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

- Largest number that goes in 28 is **16**
- **28 – 16 = 12**
- Largest number that goes in 12 is **8**
- **12 – 8 = 4**
- Largest number that goes in 4 is **4**



Activity

- Use Worksheet 4 to convert binary numbers to and from decimal numbers
- If you finish, try the Extension task



Exit ticket

- I will say a number in either binary or denary, you will give the conversion answer
 - If I say Binary 1 1 0 your answer in denary should be 6
 - If I say Denary 6 your answer in binary should be 1 1 0