Lesson 1: Binary & Denary

- ★ Understand how to break problems down into smaller tasks in order to solve the.
- ★ Learn how to think like a computer.
- ★ Understand what binary means in computing.

Denary is a ___ number system - the numbers are:

_____

Binary is a ___ number system - the numbers are:

_____

My computer thinks in _____ that are either _____ or _____.

My computer computer reads and stores data in this way, including:

I_____

V_____

A_____

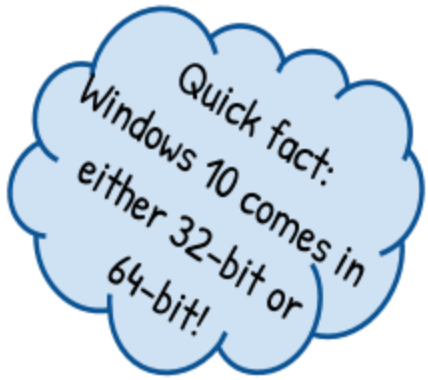
G_____

G_____

W_____ and n_____.

Date: _____

So how do we convert denary numbers?



Each 1 and 0 is called a "Bit."

We are going to start off with a 4-bit system to convert denary numbers to binary. We do this by adding up!

Each bit has a denary value assigned to it starting at 1. Each value is the value before MULTIPLIED BY 2.

So we start with 1, x2 gives us 2, x2 gives us 4, x2 gives us 8! (Oh! And we write them from right to left!)

<u>The table below shows you how our 4-bit system works:</u>

These numbers are our "placeholders".They are values we can add together!

8	4	2	1
0	0	0	1
0	0	1	0
0	0	1	1

The numbers in the white boxes tell us which numbers to use (think of 1 which is ON as YES and 0 which is OFF as NO!)

So this number is ONE because it is one lot of 1.

So this number is 2 because it is one lot of 2.

However this number is 3 because
one lot of 1 + one lot of 2 =3

Try the puzzles on the next few pages to get used to doing this!

Date: _____

Convert the **denary** numbers into **binary** numbers.

The place holders have been put in the table below to help you:

8	4	2	1

1) Convert 3 into binary _ _ _ _

2) Convert 5 into binary _ _ _ _

3) Convert 7 into binary _ _ _ _

4) Convert 9 into binary _ _ _ _

5) Convert 11 into binary _ _ _ _

6) Convert 13 into binary _ _ _ _

7) Convert 15 into binary _ _ _ _

Date: _____

How to convert Denary numbers to Binary numbers

Write out the place holders in the table below to help you:

Denary Value	Binary Value
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Date: _____

Now convert back from binary to denary

Binary	Denary
0101	
0110	
1010	
1111	
0000	
0111	
0001	
0010	
0100	
1000	

Extension:

1. What is the highest denary value you can have in a 4-bit binary system? Explain why.

_____

_____

_____

Date: _____

2. What is the smallest denary value you can have in a 4-bit binary system? Explain why.

_____

_____

_____

3. What different types of data does a computer store? List 4

_____

_____

_____

Date: _____

Coded Message

Can you work out the coded message on the grid below by figuring out the numbers and then writing the correct letter in the gap?

To challenge you we will be using a 5-bit system...

16	8	4	2	1

These are your letters!!

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

And here is the code...

0	1	1	0	1	
0	0	0	0	1	
1	0	0	1	0	
0	1	1	0	0	
0	0	1	0	1	
1	1	0	0	1	
0	1	1	0	1	
0	1	1	1	1	
0	1	1	1	1	
0	0	0	1	1	
0	0	0	0	1	
1	0	1	0	0	

Date: _____

Date: _____