Computing @Turton

HOMEWORK BOOKLET

YEAR 8

Theme 1

Data Representation

Name

Form

H/W 8.1

Introduction

Throughout this theme you will learn how to carry out mathematical calculations using only the numbers 1 and 0!

That is exactly how computers perform calculations. Electricity can either be flowing or it isn't, we use the number 1 to show electricity is flowing and the number 0 for when it isn't! You will also learn how images are represented by computers.

At the bottom of each homework, you will see an icon which will tell you how the homework will be assessed.
See below to find out what the icons mean:

Self Assessment: You will mark your work at the start of next lesson.
ENSURE YOU COMPELTE HOMEWORK AS MARKS WILL BE COLLECTED IN!

Teams Assessment: There will be a Teams Quiz based on the homework next lesson.
ENSURE YOU REVISE AND READ THE INFORMATION CAREFULLY!

Peer Assessment: You will be peer assessing the homework next lesson with another student.
ENSURE YOU HAVE YOUR HOMEWORK COMPLETED SO YOU CAN SWAP WITH ANOTHER PUPIL!

Failure to submit homework on time will result in a 45-minute detention.

If you lose your homework booklet you will be charged for a replacement and MUST catch-up on any incomplete homework.

Stuck? Got a question? Email your teacher or get in touch on MS Teams

Mr Rifai ***(Head of Computing)***	**rifaim@turton.uk.com**
Mr Iqbal	iqbalb@turton.uk.com
Mr Clayson	claysond@turton.uk.com
Mr Sykes	sykesm@turton.uk.com

H/W1 Data

Due Date:

Read and digest the information below. You will be quizzed next lesson!

What is Data?

Any set of characters gathered and translated for some purpose.

How computers see the world

There are a number of very common needs for a computer, including the need to store and view **data**.

Computers use electrical signals that are on or off, so they have to see everything as a series of **binary** numbers. This data is represented as a sequence of 1s and 0s (on and off).

All data that we want a computer to process needs to be converted into this binary format.

What is binary?

Binary is a number system that only uses two digits: 1 and 0. All information that is processed by a computer is in the form of a sequence of 1s and 0s. Therefore, all data that we want a computer to process needs to be converted into binary.

The binary system is known as a '**base 2**' system. This is because:

- there are only two digits to select from (1 and 0)
- when using the binary system, data is converted using the power of two.

What is denary?

Denary is a number system that uses 10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

This is called a '***base-10***' number system, because there are ten symbols involved.

Here are some examples of denary numbers:

5 8715

249 316

Quiz Score attained: ____ / ____

H/W2 Binary to Denary

Using the binary place values table. Convert the binary numbers below into denary (decimal)

128	64	32	16	8	4	2	1

BINARY	Working Out	DENARY
0011	$\begin{array}{cccc} 8 & 4 & 2 & 1 \\ \hline 0 & 0 & 1 & 1 \end{array}$ 2 + 1 = 3	3
0101		
0111		
1010		
10000		
10011		
01011		
101101		
110011		

Due Date:

01001111		
10101010		
11000110		
11111110		

What is the highest number that can be represented with 8 bits? ____________

How well did I do? ______________________________

____

What do I need to work on? _________________________

____

How would you rate your effort for this homework?

Excellent ☐ Good ☐ Inconsistent ☐ Poor ☐

H/W3 Denary to Binary

Using the binary place values table. Convert the denary numbers below into binary (decimal)

128	64	32	16	8	4	2	1

DENARY	Working Out	BINARY
9	$\begin{array}{cccc} 8 & 4 & 2 & 1 \\ \hline 1 & 0 & 0 & 1 \end{array}$ 8 + 1 = 9	1001
15		
12		
25		
34		
77		

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Due Date:

80		
101		
192		
204		
255		

WWW: ______________________________

____

____

EBI: ______________________________

____

Peer assessed by:

____

____

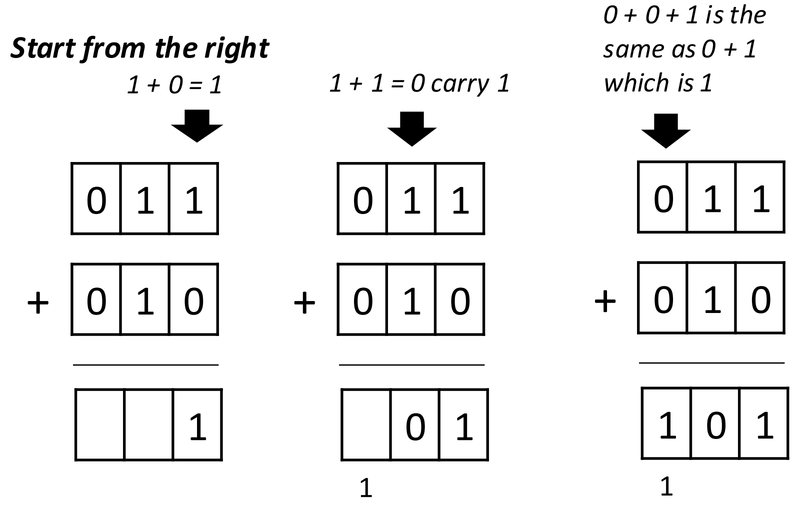
H/W4 Binary Addition

Carry out binary addition on the calculations below. You must show all your working out.

Have a look at the example which demonstrates how you should answer each question.

REMEMBER THE RULES:
1 + 0 = 1 OR 0 + 1 = 1
1 + 1 = 1 carry 1
1 + 1 + 1 = 1 carry 1

Example:



1)
0 1 1 0
+ 0 1 0 1

2)
0 0 1 0
+ 0 1 1 1

3)
0 0 1 1
+ 0 0 1 1

4)
0 0 1 0
+ 1 0 0 1

5)
0 1 1 0
+ 0 1 1 0

6)
0 1 0 1
+ 0 1 1 1

Due Date:

Convert numbers to denary

7)

	0	0	1	1	0	1	0	1
+	0	1	0	1	0	0	1	0

____

____

____

8)

	0	0	1	0	0	0	1	1
+	1	0	0	1	1	0	0	1

____

____

____

9)

	0	0	1	1	0	1	1	0
+	0	0	0	0	1	1	0	1

____

____

____

How well did I do? ______________________________

____

What do I need to work on? ________________________

____

How would you rate your effort for this homework?

Excellent ☐ Good ☐ Inconsistent ☐ Poor ☐

H/W5 Character Sets

Due Date:

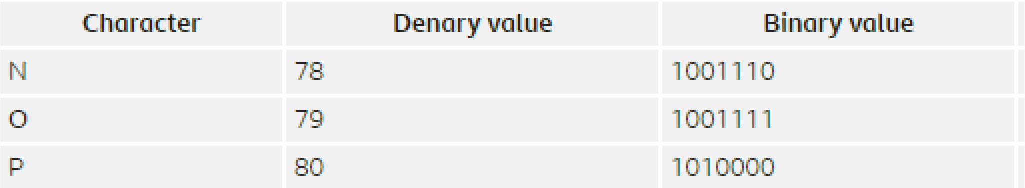
Read through the article below. You will be quizzed on this next lesson:

Every word is made up of symbols or characters. When you press a key on a keyboard, a number is generated that represents the symbol for that key. This is called a character code. A complete collection of characters is a character set. Different languages use different keyboard layouts. For example, a French keyboard has an é. If we were writing in Japanese or Arabic, we would need even more choices of characters. Two standard character sets are ASCII and Unicode.

ASCII

The **ASCII** character set is a **7-bit** set of codes that allows **128** different characters. That is enough for every upper-case letter, lower-case letter, digit and punctuation mark on most keyboards. ASCII is only used for the English language.

This table shows some examples of letters represented using the ASCII character set:



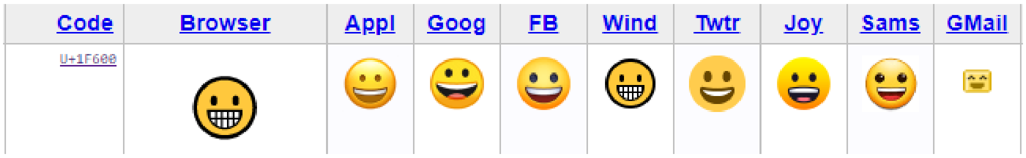
Character	Denary value	Binary value
N	78	1001110
O	79	1001111
P	80	1010000

Extended ASCII

Extended ASCII code is an 8-bit character set that represents 256 different characters, making it possible to use characters such as é or ©. Extended ASCII is useful for European languages.

Unicode

Unicode uses between 8 and 32 bits per character, so it can represent characters from languages from all around the world. It is commonly used across the internet. As it is larger than ASCII, it might take up more storage space when saving documents. Emoji's are present in the Unicode character set so every emoji has a particular numeric value. Different companies will make the emojis look slightly different but the value is always the same. E.g. for the smiling face emoji:



Code	Browser	Appl	Goog	FB	Wind	Twtr	Joy	Sams	GMail
U+1F600	😀	😀	😀	😀	😀	😀	😀	😀	😀

Teams Quiz Score: ______ / _______

H/W6 Representing Images

Due Date:

Create 2 black and white bitmap images.
Then convert the image into binary and then denary!

Binary *Denary*

Binary *Denary*

WWW:	***EBI:***	***Peer assessed by:***

01000011 01101111 01101101 01110000 01110101 01110100 01101001 01101110
01100111 01000000 01110100 01110101 01110010 01110100 01101111 01101110

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SCAN ME

Theme 1

Data Representation Knowledge Organiser

"I need to make sure I revise for the end of theme test!"

My Revision Checklist
Include a ✓ in the relevant boxes when revised.

I understand that there are different number bases and can recognise numbers in bases 2 and 10.	
I can show evidence of converting binary numbers into denary and show my working out.	
I can show evidence of converting denary numbers into binary and show my working out.	
I can successfully order units of information correctly from a bit up to a terabyte (TB).	
I can show evidence of carrying out binary addition on two binary numbers and show my working out with bits that have been carried over	
I can explain the difference between ASCII and Unicode.	
I can show that I am able to convert a black and white pixelated image into binary and vice versa.	