YEAR 9

Computing @ turton

CS

Theme 1

Data Representation

HOMEWORK BOOKLET

Name

Form

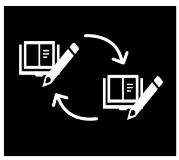
Introduction

During theme 1, we will explore the inner workings of a computer at it's most basic. Binary – a collection of off and off switches that dictate all functioning within our machines. We will know, understand and be able to analyse how binary is used to store and manipulate various pieces of data in our devices including: Numbers, Images, Characters & Instructions

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!

If you see this on a homework. There will be an Edmodo Quiz based on the homework next lesson.
SO MAKE SURE YOU REVISE AND READ THE INFORMATION CAREFULLY!



If you see this on a homework it means you will be peer assessing the homework next lesson with another student.
MAKE SURE 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 you MUST catch-up on any incomplete homework.

Stuck? Got a question? Email your teacher.

Mr Rifai *(Head of Computing)*	**rifaim@turton.uk.com**
Miss Davison	davisone@turton.uk.com
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Help Tools for Theme 1

Binary Conversion Tool

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

Binary Addition Rules

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 0 carry 1
1 + 0 +1 = 0 carry 1
0 +1 + 1 = 0 carry 1
1 + 1 + 1 = 1 carry 1
0 + 0 + 1 = 1

Hexadecimal Conversion Tool

8	*4*	*2*	*1*

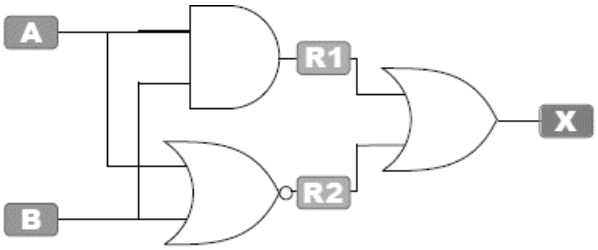
8	*4*	*2*	*1*

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
										10	11	12	13	14	15

H/W 1: Logic Gates – Truth Tables

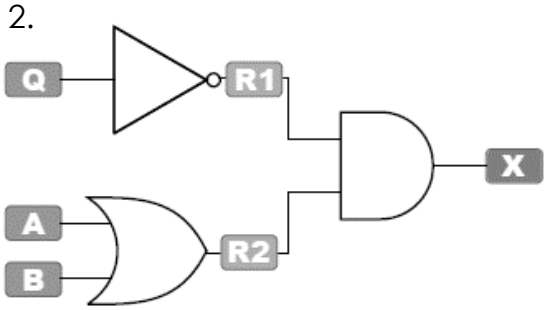
Due Date:

1.



A	B	R1	R2	X
0	0			
0	1			
1	0			
1	1			

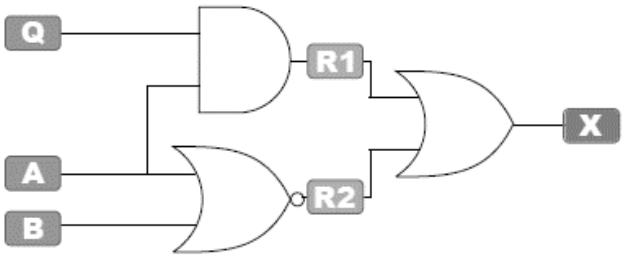
2.



Q	A	B	R1	R2	X
0	0	0			
0	0	1			
0	1	0			
1	0	1			
1	1	0			
0	1	1			
1	1	1			

Challenge

3.



Q	A	B	R1	R2	X
	1	1	1		
	1	0	1		
	1	1	0		
	0	1	0		
	1	0	0		
	0	1	0		
	0	0	0		

	WWW:	***EBI:***	***Total:*** ____ / 54

H/W 2 : *Binary – Denary Conversions*

Due Date:

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

1. **13**

2. **26**

3. **98**

4. **138**

5. **245**

6. **01100110**

7. **01111010**

8. **01100001**

9. **11111010**

10. **11111111**

Challenge

11. **324**

12. **Convert 31 using a 5 bit binary digit.**

13. **101110011**

14. **0110.**

15. **Describe one advantage and one disadvantage of binary for a programmer.**

	WWW:	***EBI:***	***Total:*** ***____ / 30***

H/W 3 : *Binary Addition*

Due Date:

1. **0110 + 0110**

2. **11101 + 11001**

3. **11011 + 01101**

4. **110111 + 011101**

5. **101110 + 011010**

6. **1110111 + 0100111**

7. **11001101 + 00111011**

8. **01101111 + 01111001**

Challenge

9. **11011 + 101101**

10. **101111 + 01110111**

	***WWW:***	***EBI:***	***Total:*** ***____ / 20***

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H/W 4 : *Hexadecimal Conversions*

Due Date:

1. **B2 to binary.**

2. **AA to binary.**

3. **to binary.**

4. **3A to binary.**

5. **7E to binary.**

6. **11110110 to hex.**

7. **00111101 to hex.**

8. **01101110 to hex.**

9. **01110110 to hex.**

10. **11111111 to hex.**

Challenge

11. **123 to hex.**

12. **201 to hex.**

13. **6A to denary.**

14. **BB to denary.**

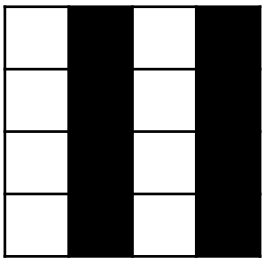
15. **Give two reasons why programmers would use hex instead of binary.**

	WWW:	***EBI:***	***Total:*** ***____ / 30***

H/W 5: Images

Due Date:

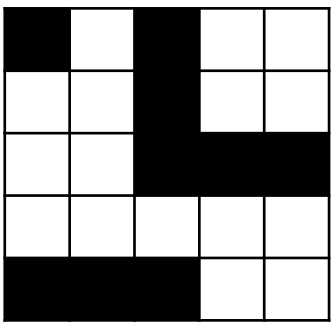
For each image:
1. State the bit pattern.
2. State the resolution.
3. RLE each image and identify how many bits it has compressed by.



Bit pattern

Resolution

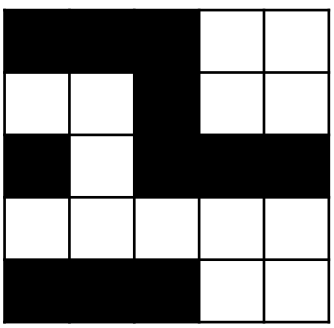
RLE



Bit pattern

Resolution

RLE



Bit pattern

Resolution

RLE

WWW:

EBI:

Peer assessed by:

H/W 6:

Characters

Due Date:

	Char.	ASCII Code	Binary
1.	F	70	
2.	A	65	
3.	G	71	
4.	d	100	
5.	y	121	
6.	?		01111111
7.	n		01101110
8.	V		01010110
9.	e		01100101
10.			01000010

Challenge

Convert the follow Unicode values (in hex) to binary (4 bits).

11.	😃	1F603	1 =	F =	6 =	0 =	3 =
12.	😍	1F60D	1 =	F =	6 =	0 =	D =
13.	😊	1F637	1 =	F =	6 =	3 =	7 =

	WWW:	***EBI:***	***Total Score:*** / ***25***

Computing @ turton

Theme 1

Images

File Type	Description
Vector Image	Image made up of lines and shapes with properties e.g. fill colour, line style etc. (Used with basic graphics).
Bitmap Image	"Map of bits". – Image made using bits of data.
Resolution	The total number of pixels in the image. No of pixels across * no of pixels down

Character set

Any characters found on a computer (letters, numbers, symbols).

ASCII Character Set

Uses 7 bits of data to store all characters in a character set.
128 characters in total can be stored.

Extended ASCII Character Set

Increased to 8 bits of data.
Stores up to 256 characters.

Unicode Character Set

Uses 32 bits of data.
Stores up to 4 billion characters and symbols for all languages in the world.

Binary Addition Rules:

1) 0 + 0 = 0
2) 0 + 1** = 1
3) 1 + 1 = 0 carry 1
4) 1 + 1 + 0** = 0 carry 1
5) 1 + 1 + 1 = 1carry 1

**Any other combination of them values

Binary to Denary

128	64	32	16	8	4	2	1

Example – 00010110

Draw out the table above and place the binary value into the table.

Add up the values turned "on".

16 + 4 + 2 = 22

Hex to Binary

4E

1. Split in half: 4 and E.
2. Use below table to calculate binary value of each:

4 =

8	4	2	1
0	1	0	0

E = (11)

8	4	2	1
1	0	1	1

3. Combine

Answer: 01001011

Knowledge Organiser

Binary to Denary

128	64	32	16	8	4	2	1

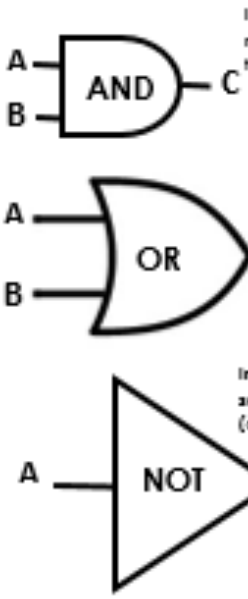
Example – 56

Fill the table with 1's for values you want to use to make 56 and 0's with those you don't.

Check it (using Bin-Den method)

32 + 16 + 8 = 56 ✓

Logic Gates



Truth Tables

A	B	C
1	1	1
1	0	0
0	1	0
0	0	0

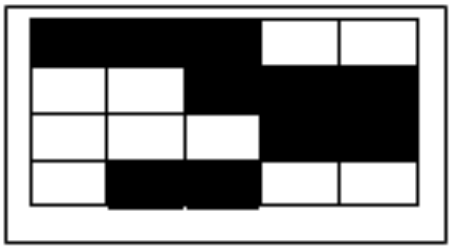
A	B	C
1	1	1
1	0	1
0	1	1
0	0	0

A	B
1	0

Run Length Encoding Compression

1 = white

0 = black



Uncompressed = 00011, 11000, 11100,

To Compress using RLE

Pair alike colours together .g *3 black = 30 (0 meaning the black bit value).*

Compressed: 30 21, 21 30, 31 20, 11 20 21

*Used on simple, small images with basic patterns.

Binary to Hex

0110 1110

1. Split in half 0110 and 1110
2. Use below table to calculate hex value for each (follow denary rules)

0110 =

8	4	2	1
0	1	1	0

= 6

1110 =

8	4	2	1
1	1	1	0

= 14 (E)

3. Combine Answer: 6E

Hex

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
										10	11	12	13	14	15