Converting Binary values to Decimal values

Convert binary values to decimal

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Most significant bit							Least significant bit	

All we must do to convert a binary value to a decimal value is:

1. Draw out out binary number table, shown above.
2. Starting at the least significant bit (always furthest to the right), place each digit from our binary value into a separate column.
3. Any column that has a 1 in it add up.
4. The total at the end is your decimal number.

Example 1: Convert the binary value 1011 to its decimal value.

Convert binary values to decimal

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Ignore	Ignore	Ignore	Ignore	1	0	1	1	

Our decimal value is 8 + 2 + 1 as they are the columns containing 1's, 1011 is the binary number of 11.

Example 2: Convert the binary value 1100101 to its decimal value.

Convert binary values to decimal

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Ignore	1	1	0	0	1	0	1	

Our decimal value is 64 + 32 + 4 + 1 as they are the columns containing 1's, 1100101 is the binary number of 101.

Convert decimal values to binary

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Most significant bit							Least significant bit	

All we must do to convert a decimal value to a binary value is:
We will confert the number 20 to binary in this example

1. Draw out out binary number table, shown above.
2. Starting from the left, find the first number that is LESS than the decimal value you must convert. e.g if we convert 20 to binary then we will start at the column with 16 as this is the first number that is less than 20.
3. We place a 1 in this column.
4. Subtract our decimal value to find the difference between the two values, 20-16= 4
5. Now we repeat the process but use the number 4.
6. There is a column with the number 4 in it, so we put a 1 here.
7. Put a 0 in all other columns.

Example 1: Convert the decimal value 20 to its binary value.

Convert decimal values to binary

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Ignore	Ignore	Ignore	1	0	1	0	0	

The binary value for 20 is 10100

Example 2: Convert the decimal value 57 to its binary value.

Convert decimal values to binary

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
128	64	32	16	8	4	2	1	
Ignore	Ignore	1	1	1	0	0	1	

The binary value for 57 is 111001

Example 3: Convert the decimal value 103 to its binary value.

Convert decimal values to binary

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	Each bit doubles the amount of data we can handle, 8 bits can
128	64	32	16	8	4	2	1	

Ignore	1	1	0	0	1	1	1	handle 0-256 characters.
				The binary value for 103 is 1100111				

Table 1

Convert Hex values to decimal				
16^3	16^2	16^1	16^0	Hex is used as a shorthand for long binary values as it can handle lots of characters using less characters than binary.
4096	256	16	1	
			Least significant bit	

Hex number system goes 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. **A** represents the number 10, **B** represents the number 11, **C** represents the number 12, **D** represents the number 13, **E** represents the number 14, **F** represents the number 15

All we must do to convert a hex value to a decimal value is:

1. Draw out out hex number table, shown above.
2. Starting at the least significant bit (always furthest to the right), place each digit from our binary value into a separate column.
3. Any column that has a number in it add up.
4. The total at the end is your decimal number.

Example 1: Convert the hex value 21C to its decimal value.

Convert binary values to decimal				
16^3	16^2	16^1	16^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
4096	256	16	1	
Ignore	2	1	C	

Our decimal value is (2*256) + (1*16) + (12*1) = 540 , Remember C represents the number 12

Example 2: Convert the binary value BA21 to its decimal value.

Convert binary values to decimal				
16^3	16^2	16^1	16^0	Each bit doubles the amount of data we can handle, 8 bits can handle 0-256 characters.
4096	256	16	1	
B	A	2	1	

Our decimal value is (11*4096) + (10*256) + (2*16) + (1*1) = 47649 , Remember A represents the number 10, B represents 11

Table 1

Example 1	To convert a decimal value to a Hex value is slightly more complex. In this example I will convert the decimal value 540 as we have converted it the other way in the other sheet.			
		Quotient	Remainder value	Hex Value
Step 1: Using floor division, divide 540/16, this gives us 33 with a remainder of 12.	540	33	12	C
Step 2: Take the quotient value (33) from your previous calculation and floor divide this value by 16 and find the remainder.	33	2	1	1
Step 3: Keep repeating this process until you get to 0.	2	0	2	2
Step 4: Your remainder values become your hex value, read your hex value from the bottom up.	0	0	0	
	Floor Division:	Floor division is when you divide one number by another and round down your answer if its a decimal. e.g nor mall 5/2 = 2.5, but in floor division we would round down so the answer would be 2.		
	Quotient	is the answer obtained when we divide one number by another		
	The decimal number 540 is represented by 21C in Hex.			
Example 2	Convert decimal value 191 into a hex value			
		Quotient	Remainder value	Hex Value
Step 1: Using floor division, divide 540/16, this gives us 33 with a remainder of 12.	191	11	15	F
Step 2: Take the quotient value (33) from your previous calculation and floor divide this value by 16 and find the remainder.	11	0	11	B
Step 3: Keep repeating this process until you get to 0.	0	0	0	
Step 4: Your remainder values become your hex value, read your hex value from the bottom up.				
	The decimal number 191 is represented by BF in Hex.			
