Activity 1.7

- 1 Using software on your computer (for example, text colour option in Word), find out what colours would be represented by the following RGB denary value combinations:
 - **b** Red 201 Red 53 c Red 12 Green 55 Green 122 Green 111 Blue Blue 139 204 Blue 81
- 2 Convert each of the above denary numbers into hexadecimal.

1.1.4 Addition of binary numbers

This section will look at the addition of two 8-bit positive binary numbers.

Note the following key facts when carrying out addition of two binary digits:

binary addition	carry	sum
0+0	0	0
0+1	0	1
1+0	0	1
1+1	1	0

This can then be extended to consider the addition of three binary digits:

binary digit	carry	sum
0+0+0	0	0
0+0+1	0	1
0+1+0	0	1
0+1+1	1	0
1+0+0	0	1
1+0+1	1	0
1+1+0	1	0
1+1+1	1	1

For comparison: if we add 7 and 9 in denary the result is: carry = 1 and sum = 6; if we add 7, 9 and 8 the result is: carry = 2 and sum = 4, and so on.

Advice

Here's a quick recap on the role of carry and sum. If we want to add the numbers 97 and 64 in decimal, we:

- add the numbers in the right hand column first
- if the sum is greater than 9 then we carry a value to the next column
- we continue moving left, adding any carry values to each column until we are finished.

For instance:

97

+ 64

11 CARRY VALUES

161 SUM VALUES

Adding in binary follows the same rules except that we carry whenever the sum is greater than 1.

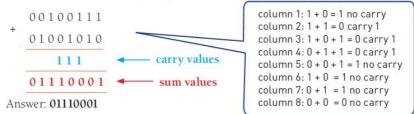
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1 DATA REPRESENTATION

? Example 1

Add 00100111 + 01001010

We will set this out showing carry and sum values:



Example 2

- a Convert 126 and 62 into binary.
- b Add the two binary values in part a and check the result matches the addition of the two denary numbers

```
62 = 0 0 1 1 1 1 1 0
   126 = 0 1 1 1 1 1 1 0 and
                                                      column 1: 0 + 0 = 0 no carry
                                                      column 2: 1 + 1 = 0 carry 1
b
        01111110
                                                      column 3: 1 + 1 + 1 = 1 carry 1
       00111110
                                                      column 4: 1 + 1 + 1 = 1 carry 1
                                                      column 5: 1 + 1 + 1 = 1 carry 1
        111111

    carry values

                                                      column 6: 1 + 1 + 1 = 1 carry 1
                                                      column 7: 1 + 0 + 1 = 0 carry 1
        10111100 ← sum values
                                                      column 8: 0 + 0 + 1 = 1 no carry
   Answer: 10111100
```

1 0 1 1 1 1 0 0 has the equivalent denary value of 128 + 32 + 16 + 8 + 4 = 188 which is the same as 126 + 62.

Activity 1.9

Convert the following denary numbers into binary and then carry out the binary addition of the two numbers and check your answer against the equivalent denary sum:

```
    a 98+15
    b 29+88
    c 49+100
    d 51+171
    g 19+139
    h 203+30
    i 66+166
```

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