Binary Number Lab
MVHS AP Computer Science

AP College Board Standards:
Identify and correct errors : compile-time, run-time, logic; Categorize error: compile-time, run-time, logic; adding extra output statements, Understand and modify existing code;

Lab Description:
Students will practice converting binary numbers and work on hexadecimal conversion as a challenge. Create a **Google Doc** and put your work in there. In order to receive credit, **you must show your wor**k. For example:

For example:

Convert 5 to binary
5 = (1)2^2 + (0)2^1 + (1)2^0 = 101

Convert 110 to decimal
(1)2^2 + (1)2^1 + (0)2^0 = 4 + 2 + 0 = 6

Grading Rubric:

Binary	40
Hexadecimal	40
Challenge	10
Milestone 1 - Complete the Part I (Due Friday)	10
Total Points	**100**

See Next Page for Exercises:

Binary Number - Part I

Convert the following numbers to binary

1) 3
   3 = 1(2)+1(1) = 11
2) 8
   8 = 1(8)+0(4)+0(2)+0(1) = 1000
3) 15
   15 = 1(8)+0(4)+1(2)+1(1) = 1111
4) 27
   27 = 1(16)+1(8)+0(4)+1(2)+1(1) = 11011
5) 78
   78 = 1(64)+0(32)+0(16)+1(8)+1(4)+0(2)+0(1) = 1001100
6) 101
   101 = 1(64)+1(32)+0(16)+0(8)+1(4)+0(2)+1(1) = 1100101
7) 129
   129 = 1(128)+0(64)+0(32)+0(16)+0(8)+0(4)+0(2)+1(1) = 10000001

Convert the following binary to numbers

1) 111
   1*4+1*2+1*1=7
2) 10001
   1*16+0*8+0*4+0*2+1*1=17
3) 11101
   1*16+1*8+1*4+0*2+1*1=29
4) 101000
   1*32+0*16+1*8+0*4+0*2+0*1=40
5) 1011011
   1*64+0*32+1*16+1*8+0*4+1*2+1*1=91
6) 1101111
   1*64+1*32+0*16+1*8+1*4+1*2+1*1=111
7) 11100111
   1*128+1*64+1*32+0*16+0*8+1*4+1*2+1*1=231

Hexadecimal - Part 2

Convert the following hexadecimals to numbers. Show work just like the above for credit..

1) 1D
1*16+13*1=29
2) BA
11*16+10*1=186
3) 14DF
1*4096+4*256+13*16+15=5343
4) 1075
1*4096+0*256+7*16+5*1=4213
5) 145D
1*4096+4*256+5*16+13*1=5213

Convert the following number to hexadecimals
1) 50
50-(3*16=48)=2
32
2) 74
74-(4*16=64)=10
4A
3) 214
214-(13*16=208)=6
D6
4) 1234
1234-(4*256)=210
210-(13*16)=2
4D2
5) 2000
2000-(7*256)=208
208-(13*16)=0
7D0

Challenge
Binary, Octal, and Hexadecimal:
See if you can figure out how Octal works - Link
(Hint: Works just like decimals but instead of 0-9 it goes from 0-7)

Example: 13 to Octal
13 = (__)8^1 + (__)8^0
13 = (1)8^1 + (5)8^0 = **15**

Convert the following decimal number to binary, octal, and hexadecimal. **Show work for credit**

A. 5
   Binary: 5 = 1*4+0*2+1*1 = 101

Octal: 5 = 5*1 = 5
Hexadecimal: 5 = 5*1 = 5

B. 23
Binary: 23 = 1*16+0*8+1*4+1*2+1*1=10111
Octal: 23 = 2*8+7 = 27
Hexadecimal: 23 = 1*16+7=17

C. 62
Binary: 62 = 1*32+1*16+1*8+1*4+1*2+0*1=111110
Octal: 62 = 7*8+6 = 76
Hexadecimal: 62 = 3*16+14=3E

Due: 09/13 by 11:59am