

NOTE: Use of internet is not permitted, calculators are permitted and your answers must include worked solutions. If you require extra sheet(s) please write your name and student number at the top of each additional sheet.

## Part A

## Objective

## Convert decimal numbers to binary showing in detail the conversion process

- Convert the number of days in a leap year  $366_{10}$  to  $\text{Base}_2$

256	128	64	32	16	8	4	2	1
1	0	1	1	0	1	1	1	0

0001 0110 1110

basically checking if the number divides into the remainder, then subtracting that number from it and continuing

366 - 256 - 64 - 32 - 8 - 4 - 2

- Convert the number of available seats in the new Páirc Uí Chaoimh  $45,000_{10}$  to  $\text{Base}_2$

	32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2
1															
0	1	0	1	0	1	1	1	1	1	1	0	0	1	0	0

1010 1111 1100 1000


## Part B

### Objective

Convert numbers base<sub>n</sub> to hexadecimal showing in detail the conversion process

- Convert the number 181336782<sub>10</sub> to Base<sub>16</sub>

16777216	1048576	65536	4096	256	16	1
A	C	E	F	A	C	E

same as above pretty much but using the single-digit number values of hexadecimal

- Convert the number C0FF.EE<sub>16</sub> to Base<sub>10</sub> directly

1048576	65536	4096	256	16	1
C	0	F	F	E	E

(1048576 \* 12) + (4096 \* 15) + (256 \* 15) + (16\*14) + (1\*14)

= 12648430

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## Part C

### Objective

Convert numbers  $\text{base}_n$  to  $\text{base}_n$  showing in detail the conversion process

<ul style="list-style-type: none"><li>What is the <math>\text{Base}_{16}</math> value of 8 bit 2's complement number <math>1001\ 0101_2</math></li></ul>
<p>1001 0101 subtract 1</p> <p>1001 0100 0110 1011</p> <p>break into 4's make each block of 4 a hexadecimal</p> <p>0110    1011   6       B</p>
<ul style="list-style-type: none"><li>Subtract <math>13_{10}</math> from <math>42_{10}</math> using 8 bit 2's complement and convert to <math>\text{Base}_8</math></li></ul>
<p><math>42 - 13 = 29</math></p> <p>00001101</p> <p>0010 1010 - 0000 1101</p> <p>0000 1101 + 1 = 0000 1100 1111 0011 inversed</p>

0010 1010  
 +1111 0011    2's complement  
 =1 0001 1101 = 29

Octal =

64   8   1  
      3   5

## Part D

### Objective

Convert numbers base<sub>n</sub> to hexadecimal showing in detail the conversion process

- Add  $-32_{10}$  to  $61_{10}$  using 8 bit 2's complement

0010 0000 = 32  
 0011 1101 = 61

$1101\ 1111 + 1 = 1110\ 0000$

1110 0000  
 +0011 1101  
 =1 0001 1101 = 29

0001 = 1    1101 = 13  
 1            D

- Add  $-4_{10}$  to  $46_{10}$  using 8 bit 2's complement

0010 1110 = 46  
 0000 0100 = 4

$1111\ 1011 + 1 = 1111\ 1100$

0010 1110  
+1111 1100  
= 0010 1010

0010 1010  
2 A

Hand up this practical report at the end of session and ensure it has been checked

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<b>Date</b>	12/11/2020	<b>Checked</b>	
<b>Group</b>	<b>A / B</b>		