Lycee Francais,
London, UK

2021

Kenya 2021 VMC

Clock arithmetic

Virtual
MATπS CAMP

x	2	3	4	5	6	7
2	4	6	8	0	2	4
3	6	9	2	5	8	1
4	8	2	6	0	4	8
5	0	5	0	5	0	5

Modulo 10

+	**3**	**8**	**10**	**11**
3	6	11	1	2
8	11	4	6	7
10	1	6	8	9
11	2	7	9	10

Modulo 12

+	**1**	**3**	**4**	**5**
1	2	4	5	0
3	4	0	1	2
4	5	1	2	3
5	0	2	3	4

Modulo 6

x	1	2	6	7
2	2	4	3	5
3	3	6	0	3
5	5	1	3	8
6	6	3	0	8

Modulo 9

x	3	6	8	9
2	6	1	5	7
3	9	7	2	5
5	4	8	7	1
8	2	4	9	6

Modulo 11

Modulo 8

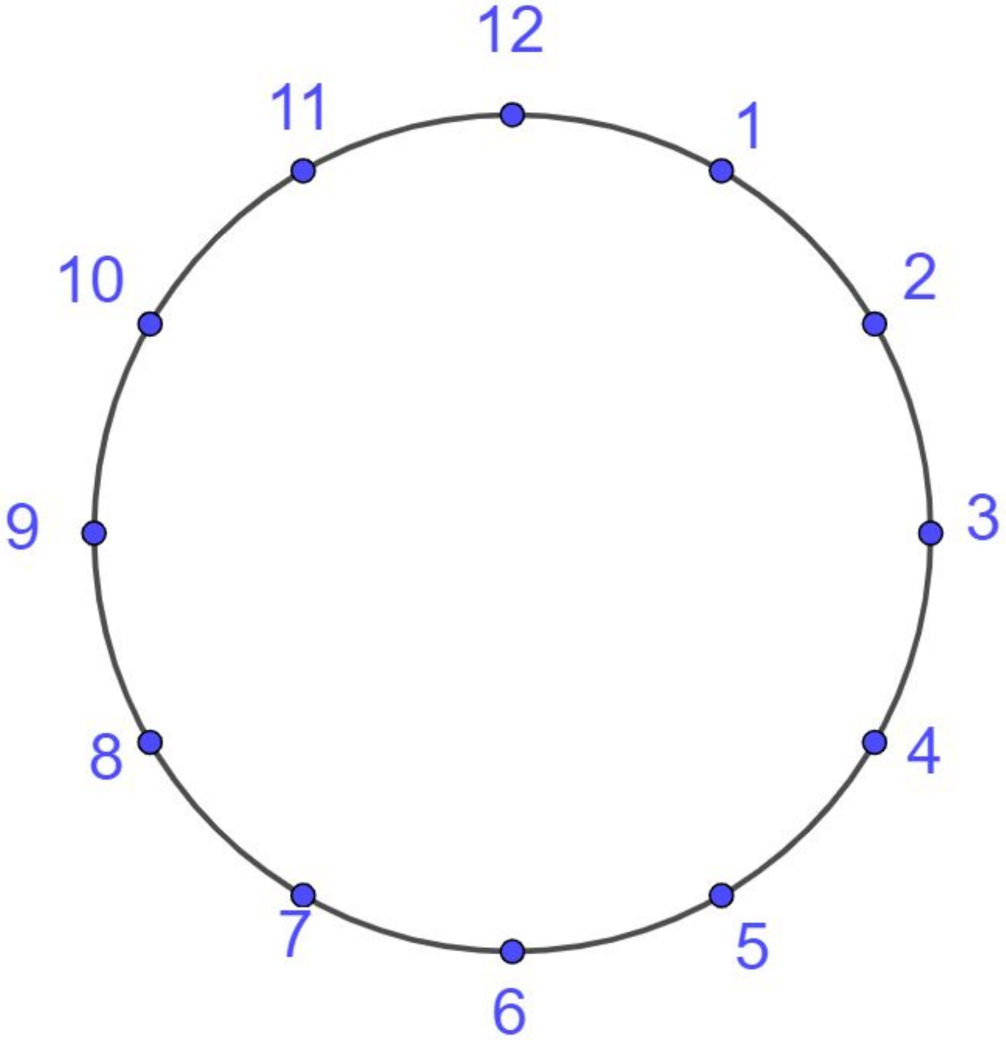
+	3	4	5	6
3				
4				
5				
6				

Clock

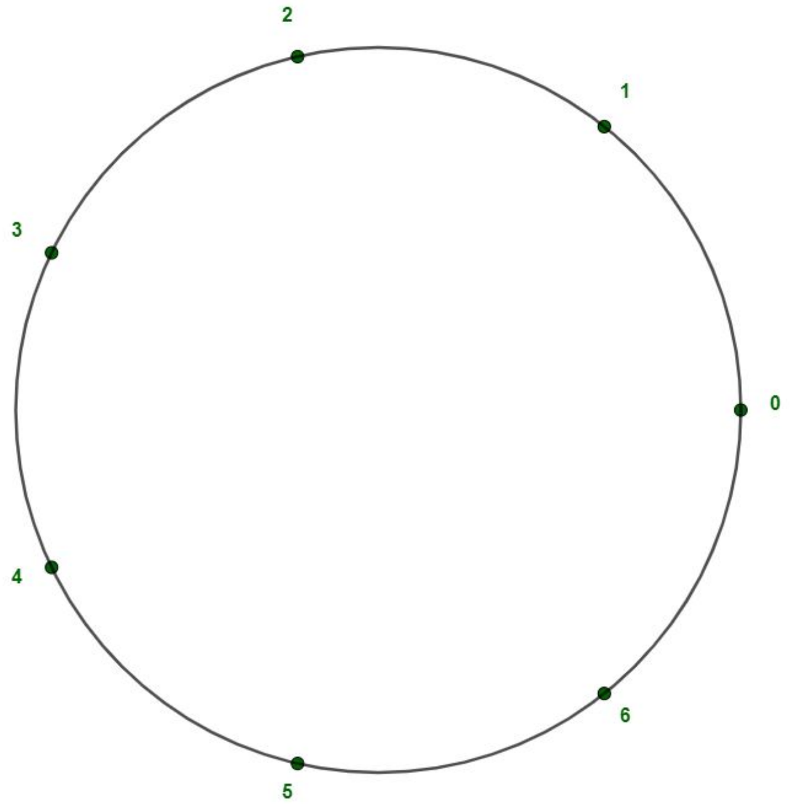
Another way to

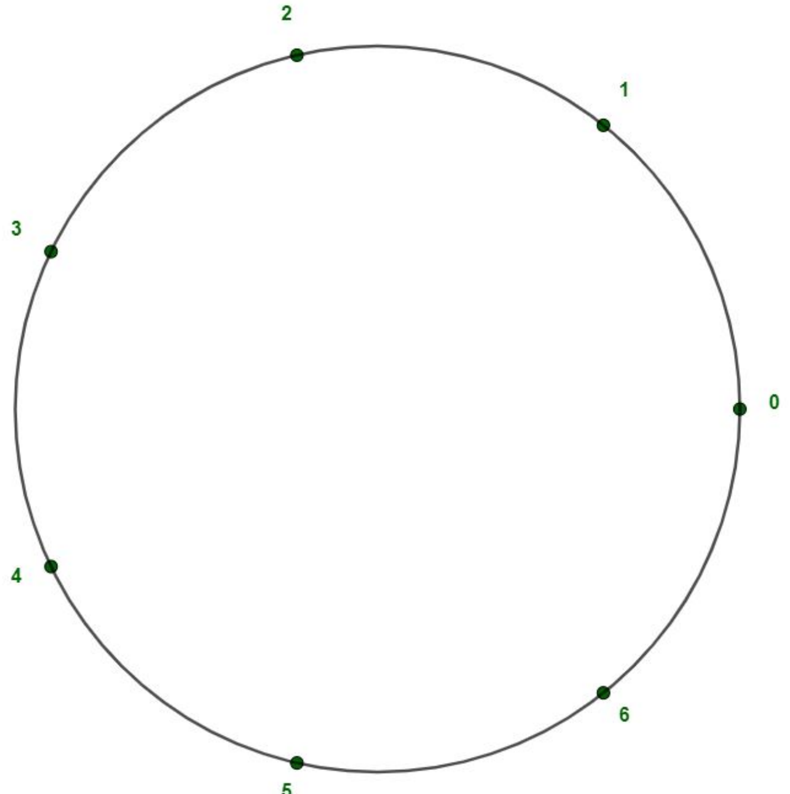
think about

these calculations

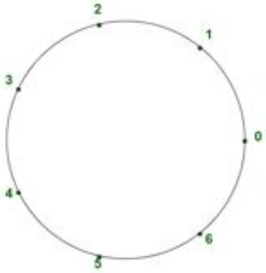


Imagine only 14 hours in the day .. so a 7 hour clock!

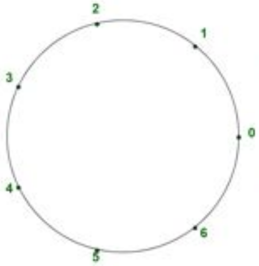




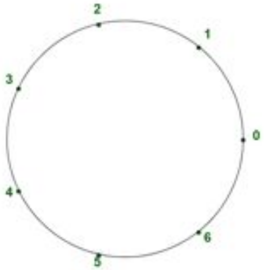
x0



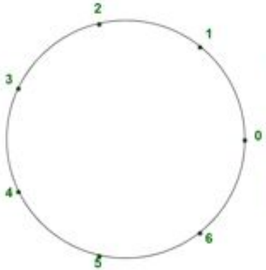
x1



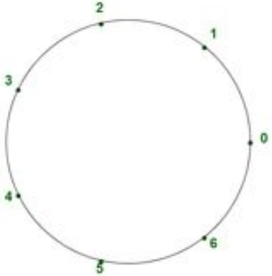
x2



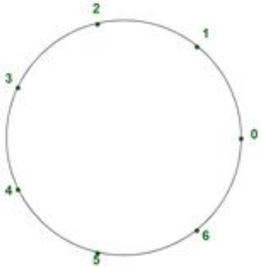
x3



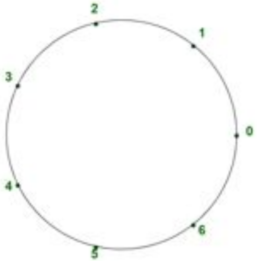
x4



x5



x6



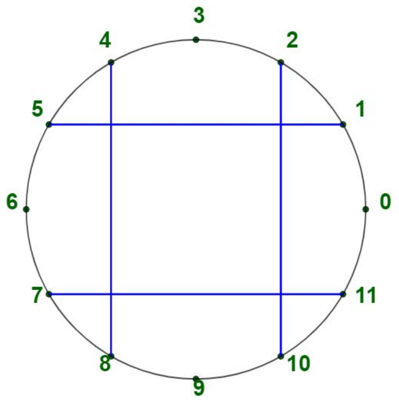
Challenge questions to think about

On a 7 hour clock:

- Adding 1 or adding 8 to a number gives the same result. Why?
- When multiplying by 7 we always go back to zero. Why?
- Why does multiplying by 2 give the same result as multiplying by 9?
- Square the numbers on the modulus clock. Are there any unobtainable numbers?

In general:

- What multiplication is this:



Geogebra app

https://www.geogebra.org/m/ez8snvf5

Find the Remainder when divided by 7

$$3^{2001} = \underbrace{3 \times 3 \times 3 \ldots \times 3}_{2001\ of\ these!}$$