

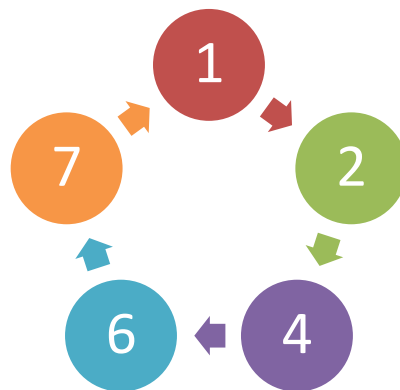
THEORY OF CYCLES

Summary- This paper speaks about the Theory of Cycles and how to use it. It also contains solved examples regarding the same.

This article is authored by V. Abhay Rangan studying in 10th standard, in Poorna Prajna Education Centre, Indiranagar, Bangalore, India. The following is his Theory of Cycles-

The Theory of Cycles states that any n (3 and above) digit number with its digits in ascending order, when cycled, will give numbers which are cycles too, when the numbers so formed are subtracted from each other.

Ex- 12467



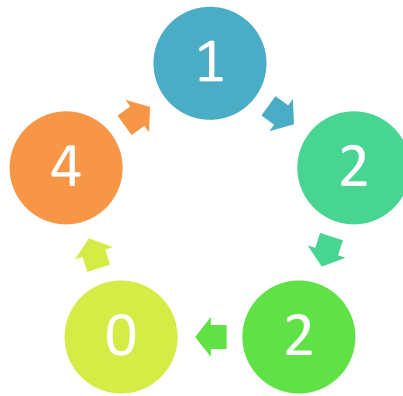
When 12467 is cycled, we get

12467
24671
46712
67124
71246

When we subtract these numbers from each other, we get-

24671-12467=12204
46712-24671=22041
67124-46712=20412
71246-67124=04122

12204, 22041, 20412, 04122 are cyclic



This holds true for all numbers falling under the given conditions. Here are some solved examples-

Ex-124

When 124 is cycled, we get

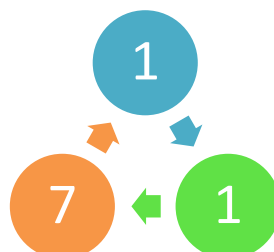


124
241
412

When we subtract these numbers from each other, we get-

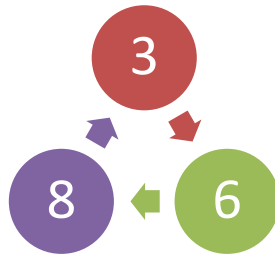
$241 - 124 = 117$
 $412 - 241 = 171$

117 and 171 are cyclic



Ex-368

When 368 is cycled, we get

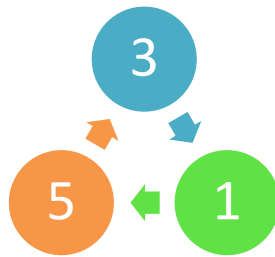


368
683
836

When we subtract these numbers from each other, we get-

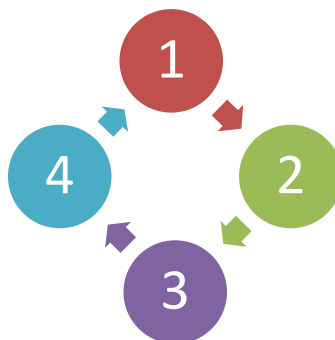
$683 - 368 = 315$
 $836 - 683 = 153$

315 and 153 are cyclic



Ex-1234

When 1234 is cycled, we get



1234
2341
3412
4123

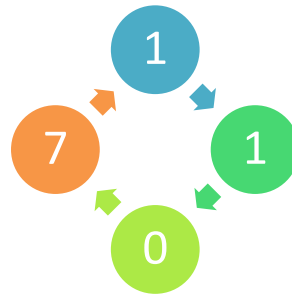
When we subtract these numbers from each other, we get-

$$2341-1234=1107$$

$$3412-2341=1071$$

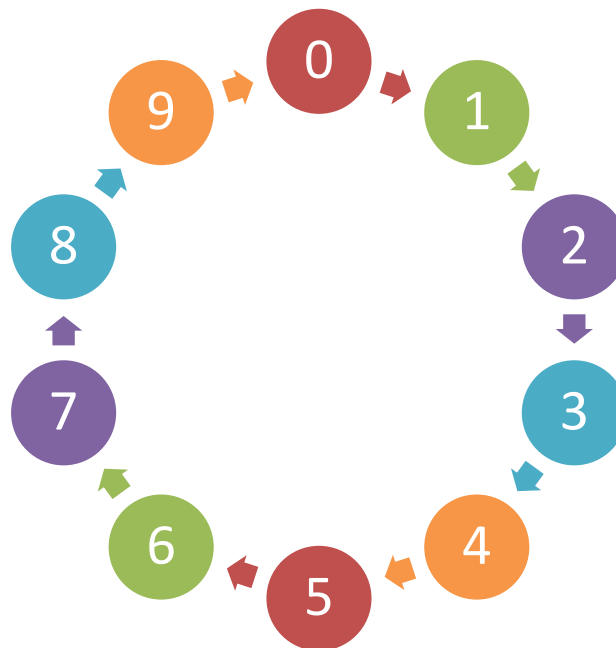
$$4123-3412=0711$$

1107, 1071 and 0711 are cyclic



Ex-0123456789

When 0123456789 is cycled, we get

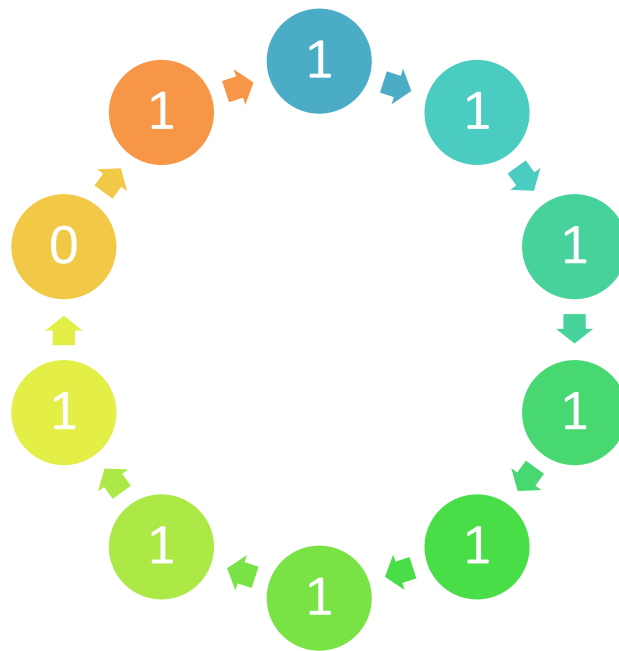


0123456789
1234567890
2345678901
3456789012
4567890123
5678901234
6789012345
7890123456
8901234567
9012345678

When we subtract these numbers from each other, we get-

1234567890-0123456789=1111111101
 2345678901-1234567890=1111111011
 3456789012-2345678901=1111110111
 4567890123-3456789012=1111101111
 5678901234-4567890123=1111011111
 6789012345-5678901234=1110111111
 7890123456-6789012345=1101111111
 8901234567-7890123456=1011111111
 9012345678-8901234567=0111111111

1111111101, 1111111011, 1111110111, 1111011111, 1110111111, 1101111111, 1101111111, 1011111111, 0111111111 are cyclic



Ex-1346789

When 1346789 is cycled, we get

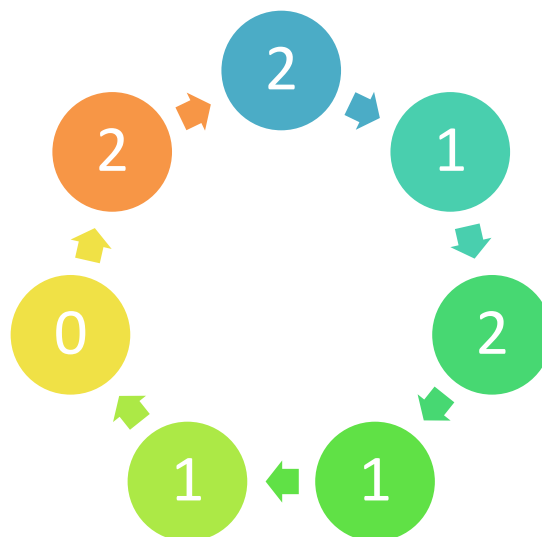


1346789
 3467891
 4678913
 6789134
 7891346
 8913467
 9134678

When we subtract these numbers from each other, we get-

3467891-1346789=2121102
 4678913-3467891=1211022
 6789134-4678913=2110221
 7891346-6789134=1102212
 8913467-7891346=1022121
 9134678-8913467=0221211

2121102, 1211022, 2110221, 1102212, 1022121 and 0221211 are cyclic



In general, if abc [Note: $a < b < c$] is a cyclic number, then bca and cab will be the possible cyclic numbers. Then, if we subtract bca from cab , we get-

$$\begin{array}{r} cab \\ -bca \\ \hline (c-1-b)(a+10-c)(b-a) \end{array}$$

$(c-1-b)(a+10-c)(b-a)$ is the number which we get. If we subtract abc from bca , we get

$$\begin{array}{r} bca \\ -abc \\ \hline (b-a)(c-1-b)(a+10-c) \end{array}$$

$(c-1-b)(a+10-c)(b-a)$ and $(b-a)(c-1-b)(a+10-c)$ are cyclic numbers

Thank you