Modeling Travel Times to Determine Shortest Path - in Doc

June 1, 2022

Kristina Wilson and Noah Dahle

Modeling Travel Times to Determine Shortest Path

Experimenting with a potential model.

Implementing functions that have stored in the google maps traffic simulation data.

This is a model based on google maps traffic conditions. (AKA T = D*S + R)

Hopefully I can develop one with more variables later on!

[1]:
```
import math
```

Goal: make a list defining the times and nodes, then create a list with all info. (Times in 24HR)

0.1 Times List

[36]:
```
# having a for loop will be more helpful when we have a whole day's worth of␣
 ↪data.
# Or if we want to change how much data we are putting in our function.
times = []
val = 600
for i in range(0, 17):
    if (val % 100) == 60:
        val += 40
    times.append(val)
    val += 15
times
```

[36]:
```
[600,
 615,
 630,
 645,
 700,
 715,
 730,
 745,
 800,
 815,
 830,
```

```
 845,
 900,
 915,
 930,
 945,
 1000]
```

We need to account for one way roads in our edge list. So those would not need to be in the list. (Later)

0.2 Edges List

[8]:
```
input1 = [('1', 'A', 'B'), ('2', 'B', 'D'), ('3', 'B', 'E'), ('4', 'A', 'C'),␣
↪('5', 'D', 'M'), ('6', 'C', 'F'), ('7', 'F', 'G'), ('8', 'G', 'H'), ('9',␣
↪'H', 'I'), ('10', 'I', 'J'), ('11', 'I', 'K'), ('12', 'J', 'L'), ('13', 'D',␣
↪'K'), ('14', 'K', 'L'), ('15', 'L', 'M'), ('16', 'M', 'N'), ('17', 'E',␣
↪'N'), ('18', 'N', 'O'), ('19', 'D', 'F'), ('20', 'G', 'K')]
```

[9]:
```
def edgeslist(input):
    output=[]
    length = len(input)
    for i in range(0, 2*length):
        output.append(input[math.floor(i/2)][0]+input[math.floor(i/2)][(i%2) +␣
↪1])
    return output
```

[20]:
```
edges = edgeslist(input1)
```

[31]:
```
def traffic(times, edges):
    output = []
    for j in range(len(times)):
        print('You are entering conditions for', times[j])
        for i in range(len(edges)):
            condition = input("Enter the traffic condition for edge "+␣
↪edges[i]+ ": ")
            element = [times[j], edges[i], condition]
            output.append(element)
    return output
```

[60]:
```
HodgesNeyland
```

[60]:
```
[[600, '1A', 'NA'],
 [600, '1B', 'NA'],
 [600, '2B', 'GREEN'],
 [600, '2D', 'ORANGE'],
 [600, '3B', 'ORANGE'],
 [600, '3E', 'ORANGE'],
 [600, '4A', 'NA'],
```

```
[600, '4C', 'NA'],
[600, '5D', 'GREEN'],
[600, '5M', 'GREEN'],
[600, '6C', 'ORANGE'],
[600, '6F', 'GREEN'],
[600, '7F', 'GREEN'],
[600, '7G', 'GREEN'],
[600, '8G', 'GREEN'],
[600, '8H', 'GREEN'],
[600, '9H', 'NA'],
[600, '9I', 'NA'],
[600, '10I', 'NA'],
[600, '10J', 'NA'],
[600, '11I', 'GREEN'],
[600, '11K', 'ORANGE'],
[600, '12J', 'ORANGE'],
[600, '12L', 'NA'],
[600, '13D', 'ORANGE'],
[600, '13K', 'GREEN'],
[600, '14K', 'ORANGE'],
[600, '14L', 'NA'],
[600, '15L', 'ORANGE'],
[600, '15M', 'NA'],
[600, '16M', 'GREEN'],
[600, '16N', 'NA'],
[600, '17E', 'NA'],
[600, '17N', 'NA'],
[600, '18N', 'GREEN'],
[600, '18O', 'GREEN'],
[600, '19D', 'GREEN'],
[600, '19F', 'GREEN'],
[600, '20G', 'ORANGE'],
[600, '20K', 'NA'],
[615, '1A', 'NA'],
[615, '1B', 'NA'],
[615, '2B', 'GREEN'],
[615, '2D', 'ORANGE'],
[615, '3B', 'ORANGE'],
[615, '3E', 'GREEN'],
[615, '4A', 'NA'],
[615, '4C', 'NA'],
[615, '5D', 'GREEN'],
[615, '5M', 'GREEN'],
[615, '6C', 'ORANGE'],
[615, '6F', 'GREEN'],
[615, '7F', 'GREEN'],
[615, '7G', 'GREEN'],
```

```
[615, '8G', 'GREEN'],
[615, '8H', 'GREEN'],
[615, '9H', 'NA'],
[615, '9I', 'GREEN'],
[615, '10I', 'NA'],
[615, '10J', 'NA'],
[615, '11I', 'GREEN'],
[615, '11K', 'ORANGE'],
[615, '12J', 'ORANGE'],
[615, '12L', 'NA'],
[615, '13D', 'ORANGE'],
[615, '13K', 'GREEN'],
[615, '14K', 'ORANGE'],
[615, '14L', 'NA'],
[615, '15L', 'ORANGE'],
[615, '15M', 'NA'],
[615, '16M', 'GREEN'],
[615, '16N', 'NA'],
[615, '17E', 'NA'],
[615, '17N', 'NA'],
[615, '18N', 'GREEN'],
[615, '18O', 'GREEN'],
[615, '19D', 'GREEN'],
[615, '19F', 'GREEN'],
[615, '20G', 'ORANGE'],
[615, '20K', 'NA'],
[630, '1A', 'NA'],
[630, '1B', 'NA'],
[630, '2B', 'GREEN'],
[630, '2D', 'GREEN'],
[630, '3B', 'ORANGE'],
[630, '3E', 'GREEN'],
[630, '4A', 'NA'],
[630, '4C', 'NA'],
[630, '5D', 'GREEN'],
[630, '5M', 'GREEN'],
[630, '6C', 'ORANGE'],
[630, '6F', 'GREEN'],
[630, '7F', 'GREEN'],
[630, '7G', 'GREEN'],
[630, '8G', 'GREEN'],
[630, '8H', 'GREEN'],
[630, '9H', 'GREEN'],
[630, '9I', 'G'],
[630, '10I', 'NA '],
[630, '10J', 'NA'],
[630, '11I', 'GREEN'],
```

```
[630, '11K', 'ORANGE'],
[630, '12J', 'RED'],
[630, '12L', 'NA'],
[630, '13D', 'ORANGE'],
[630, '13K', 'GREEN'],
[630, '14K', 'GREEN'],
[630, '14L', 'NA'],
[630, '15L', 'ORANGE'],
[630, '15M', 'NA'],
[630, '16M', 'GREEN'],
[630, '16N', 'NA'],
[630, '17E', 'NA'],
[630, '17N', 'NA'],
[630, '18N', 'GREEN'],
[630, '18O', 'GREEN'],
[630, '19D', 'GREEN'],
[630, '19F', 'GREEN'],
[630, '20G', 'GREEN'],
[630, '20K', 'NA'],
[645, '1A', 'NA'],
[645, '1B', 'NA'],
[645, '2B', 'GREEN'],
[645, '2D', 'GREEN'],
[645, '3B', 'ORANGE'],
[645, '3E', 'GREEN'],
[645, '4A', 'NA'],
[645, '4C', 'NA'],
[645, '5D', 'GREEN'],
[645, '5M', 'GREEN'],
[645, '6C', 'ORANGE'],
[645, '6F', 'GREEN'],
[645, '7F', 'ORANGE'],
[645, '7G', 'GREEN'],
[645, '8G', 'GREEN'],
[645, '8H', 'GREEN'],
[645, '9H', 'GREEN'],
[645, '9I', 'GREEN'],
[645, '10I', 'GREEN'],
[645, '10J', 'NA'],
[645, '11I', 'GREEN'],
[645, '11K', 'ORANGE'],
[645, '12J', 'RED'],
[645, '12L', 'NA'],
[645, '13D', 'ORANGE'],
[645, '13K', 'GREEN'],
[645, '14K', 'GREEN'],
[645, '14L', 'NA'],
```

```
[645, '15L', 'ORANGE'],
[645, '15M', 'NA'],
[645, '16M', 'GREEN'],
[645, '16N', 'NA'],
[645, '17E', 'NA'],
[645, '17N', 'NA'],
[645, '18N', 'GREEN'],
[645, '18O', 'GREEN'],
[645, '19D', 'GREEN'],
[645, '19F', 'GREEN'],
[645, '20G', 'GREEN'],
[645, '20K', 'NA'],
[700, '1A', 'NA'],
[700, '1B', 'NA'],
[700, '2B', 'GREEN'],
[700, '2D', 'RED'],
[700, '3B', 'RED'],
[700, '3E', 'GREEN'],
[700, '4A', 'NA'],
[700, '4C', 'NA'],
[700, '5D', 'GREEN'],
[700, '5M', 'GREEN'],
[700, '6C', 'ORANGE'],
[700, '6F', 'G'],
[700, '7F', 'O'],
[700, '7G', 'G'],
[700, '8G', 'G'],
[700, '8H', 'G'],
[700, '9H', 'G'],
[700, '9I', 'G'],
[700, '10I', 'G'],
[700, '10J', 'G'],
[700, '11I', 'G'],
[700, '11K', 'G'],
[700, '12J', 'R'],
[700, '12L', 'NA'],
[700, '13D', 'G'],
[700, '13K', 'G'],
[700, '14K', 'NA'],
[700, '14L', 'NA'],
[700, '15L', 'O'],
[700, '15M', 'G'],
[700, '16M', 'O'],
[700, '16N', 'G'],
[700, '17E', 'NA'],
[700, '17N', 'NA'],
[700, '18N', 'R'],
```

```
[700, '18O', 'NA'],
[700, '19D', 'G'],
[700, '19F', 'G'],
[700, '20G', 'G'],
[700, '20K', 'NA'],
[715, '1A', 'NA'],
[715, '1B', 'NA'],
[715, '2B', 'G'],
[715, '2D', 'R'],
[715, '3B', 'O'],
[715, '3E', 'G'],
[715, '4A', 'NA'],
[715, '4C', 'NA'],
[715, '5D', 'G'],
[715, '5M', 'G'],
[715, '6C', 'O'],
[715, '6F', 'O'],
[715, '7F', 'G'],
[715, '7G', 'G'],
[715, '8G', 'G'],
[715, '8H', 'G'],
[715, '9H', 'G'],
[715, '9I', 'G'],
[715, '10I', 'G'],
[715, '10J', 'G'],
[715, '11I', 'G'],
[715, '11K', 'G'],
[715, '12J', 'R'],
[715, '12L', 'NA'],
[715, '13D', 'G'],
[715, '13K', 'G'],
[715, '14K', 'NA'],
[715, '14L', 'NA'],
[715, '15L', 'O'],
[715, '15M', 'G'],
[715, '16M', 'O'],
[715, '16N', 'G'],
[715, '17E', 'NA'],
[715, '17N', 'NA'],
[715, '18N', 'R'],
[715, '18O', 'NA'],
[715, '19D', 'G'],
[715, '19F', 'G'],
[715, '20G', 'G'],
[715, '20K', 'NA'],
[730, '1A', 'NA'],
[730, '1B', 'NA'],
```

```
[730, '2B', 'G'],
[730, '2D', 'G'],
[730, '3B', 'G'],
[730, '3E', 'G'],
[730, '4A', 'NA'],
[730, '4C', 'NA'],
[730, '5D', 'G'],
[730, '5M', 'G'],
[730, '6C', 'O'],
[730, '6F', 'G'],
[730, '7F', 'O'],
[730, '7G', 'G'],
[730, '8G', 'G'],
[730, '8H', 'G'],
[730, '9H', 'G'],
[730, '9I', 'G'],
[730, '10I', 'NA'],
[730, '10J', 'G'],
[730, '11I', 'G'],
[730, '11K', 'G'],
[730, '12J', 'O'],
[730, '12L', 'NA'],
[730, '13D', 'G'],
[730, '13K', 'G'],
[730, '14K', 'NA'],
[730, '14L', 'NA'],
[730, '15L', 'O'],
[730, '15M', 'R'],
[730, '16M', 'O'],
[730, '16N', 'G'],
[730, '17E', 'NA'],
[730, '17N', 'G'],
[730, '18N', 'R'],
[730, '18O', 'G'],
[730, '19D', 'G'],
[730, '19F', 'G'],
[730, '20G', 'G'],
[730, '20K', 'NA'],
[745, '1A', 'NA'],
[745, '1B', 'NA'],
[745, '2B', 'GREEN'],
[745, '2D', 'GREEN'],
[745, '3B', 'GREEN'],
[745, '3E', 'GREEN'],
[745, '4A', 'NA'],
[745, '4C', 'NA'],
[745, '5D', 'GREEN'],
```

```
[745, '5M', 'GREEN'],
[745, '6C', 'O'],
[745, '6F', 'G'],
[745, '7F', 'O'],
[745, '7G', 'G'],
[745, '8G', 'G'],
[745, '8H', 'G'],
[745, '9H', 'G'],
[745, '9I', 'G'],
[745, '10I', 'NA'],
[745, '10J', 'G'],
[745, '11I', 'G'],
[745, '11K', 'G'],
[745, '12J', 'O'],
[745, '12L', 'NA'],
[745, '13D', 'G'],
[745, '13K', 'G'],
[745, '14K', 'NA'],
[745, '14L', 'NA'],
[745, '15L', 'R'],
[745, '15M', 'R'],
[745, '16M', 'R'],
[745, '16N', 'O'],
[745, '17E', 'NA'],
[745, '17N', 'G'],
[745, '18N', 'R'],
[745, '18O', 'G'],
[745, '19D', 'G'],
[745, '19F', 'G'],
[745, '20G', 'NA'],
[745, '20K', 'NA'],
[800, '1A', 'NA'],
[800, '1B', 'NA'],
[800, '2B', 'O'],
[800, '2D', 'G'],
[800, '3B', 'G'],
[800, '3E', 'G'],
[800, '4A', 'NA'],
[800, '4C', 'NA'],
[800, '5D', 'G'],
[800, '5M', 'G'],
[800, '6C', 'O'],
[800, '6F', 'G'],
[800, '7F', 'O'],
[800, '7G', 'O'],
[800, '8G', 'G'],
[800, '8H', 'G'],
```

```
[800, '9H', 'G'],
[800, '9I', 'O'],
[800, '10I', 'G'],
[800, '10J', 'G'],
[800, '11I', 'G'],
[800, '11K', 'O'],
[800, '12J', 'R'],
[800, '12L', 'NA'],
[800, '13D', 'O'],
[800, '13K', 'G'],
[800, '14K', 'G'],
[800, '14L', 'NA'],
[800, '15L', 'R'],
[800, '15M', 'G'],
[800, '16M', 'R'],
[800, '16N', 'G'],
[800, '17E', 'G'],
[800, '17N', 'G'],
[800, '18N', 'R'],
[800, '18O', 'G'],
[800, '19D', 'G'],
[800, '19F', 'G'],
[800, '20G', 'G'],
[800, '20K', 'NA'],
[815, '1A', 'NA'],
[815, '1B', 'NA'],
[815, '2B', 'O'],
[815, '2D', 'G'],
[815, '3B', 'G'],
[815, '3E', 'O'],
[815, '4A', 'NA'],
[815, '4C', 'NA'],
[815, '5D', 'G'],
[815, '5M', 'G'],
[815, '6C', 'O'],
[815, '6F', 'G'],
[815, '7F', 'G'],
[815, '7G', 'O'],
[815, '8G', 'G'],
[815, '8H', 'G'],
[815, '9H', 'G'],
[815, '9I', 'O'],
[815, '10I', 'G'],
[815, '10J', 'G'],
[815, '11I', 'G'],
[815, '11K', 'O'],
[815, '12J', 'R'],
```

```
[815, '12L', 'NA'],
[815, '13D', 'O'],
[815, '13K', 'G'],
[815, '14K', 'G'],
[815, '14L', 'NA'],
[815, '15L', 'R'],
[815, '15M', 'G'],
[815, '16M', 'R'],
[815, '16N', 'G'],
[815, '17E', 'G'],
[815, '17N', 'G'],
[815, '18N', 'R'],
[815, '18O', 'G'],
[815, '19D', 'G'],
[815, '19F', 'G'],
[815, '20G', 'G'],
[815, '20K', 'NA'],
[830, '1A', 'NA'],
[830, '1B', 'NA'],
[830, '2B', 'O'],
[830, '2D', 'G'],
[830, '3B', 'G'],
[830, '3E', 'O'],
[830, '4A', 'O'],
[830, '4C', 'NA'],
[830, '5D', 'G'],
[830, '5M', 'G'],
[830, '6C', 'R'],
[830, '6F', 'G'],
[830, '7F', 'O'],
[830, '7G', 'G'],
[830, '8G', 'G'],
[830, '8H', 'G'],
[830, '9H', 'O'],
[830, '9I', 'G'],
[830, '10I', 'O'],
[830, '10J', 'G'],
[830, '11I', 'G'],
[830, '11K', 'O'],
[830, '12J', 'O'],
[830, '12L', 'G'],
[830, '13D', 'O'],
[830, '13K', 'G'],
[830, '14K', 'G'],
[830, '14L', 'NA'],
[830, '15L', 'G'],
[830, '15M', 'G'],
```

```
[830, '16M', 'G'],
[830, '16N', 'G'],
[830, '17E', 'NA'],
[830, '17N', 'G'],
[830, '18N', 'O'],
[830, '18O', 'G'],
[830, '19D', 'G'],
[830, '19F', 'G'],
[830, '20G', 'G'],
[830, '20K', 'NA'],
[845, '1A', 'NA'],
[845, '1B', 'NA'],
[845, '2B', 'R'],
[845, '2D', 'G'],
[845, '3B', 'G'],
[845, '3E', 'R'],
[845, '4A', 'O'],
[845, '4C', 'NA'],
[845, '5D', 'G'],
[845, '5M', 'G'],
[845, '6C', 'R'],
[845, '6F', 'G'],
[845, '7F', 'G'],
[845, '7G', 'G'],
[845, '8G', 'G'],
[845, '8H', 'G'],
[845, '9H', 'O'],
[845, '9I', 'G'],
[845, '10I', 'O'],
[845, '10J', 'G'],
[845, '11I', 'G'],
[845, '11K', 'O'],
[845, '12J', 'O'],
[845, '12L', 'G'],
[845, '13D', 'O'],
[845, '13K', 'G'],
[845, '14K', 'G'],
[845, '14L', 'NA'],
[845, '15L', 'G'],
[845, '15M', 'G'],
[845, '16M', 'G'],
[845, '16N', 'G'],
[845, '17E', 'NA'],
[845, '17N', 'G'],
[845, '18N', 'O'],
[845, '18O', 'G'],
[845, '19D', 'G'],
```

```
[845, '19F', 'G'],
[845, '20G', 'G'],
[845, '20K', 'NA'],
[900, '1A', 'NA'],
[900, '1B', 'NA'],
[900, '2B', 'O'],
[900, '2D', 'G'],
[900, '3B', 'O'],
[900, '3E', 'G'],
[900, '4A', 'O'],
[900, '4C', 'NA'],
[900, '5D', 'G'],
[900, '5M', 'G'],
[900, '6C', 'O'],
[900, '6F', 'G'],
[900, '7F', 'O'],
[900, '7G', 'G'],
[900, '8G', 'G'],
[900, '8H', 'G'],
[900, '9H', 'O'],
[900, '9I', 'G'],
[900, '10I', 'O'],
[900, '10J', 'G'],
[900, '11I', 'G'],
[900, '11K', 'O'],
[900, '12J', 'O'],
[900, '12L', 'G'],
[900, '13D', 'O'],
[900, '13K', 'G'],
[900, '14K', 'O'],
[900, '14L', 'NA'],
[900, '15L', 'G'],
[900, '15M', 'G'],
[900, '16M', 'G'],
[900, '16N', 'G'],
[900, '17E', 'NA'],
[900, '17N', 'G'],
[900, '18N', 'O'],
[900, '18O', 'G'],
[900, '19D', 'G'],
[900, '19F', 'G'],
[900, '20G', 'O'],
[900, '20K', 'NA'],
[915, '1A', 'NA'],
[915, '1B', 'NA'],
[915, '2B', 'O'],
[915, '2D', 'G'],
```

```
[915, '3B', 'O'],
[915, '3E', 'G'],
[915, '4A', 'O'],
[915, '4C', 'NA'],
[915, '5D', 'G'],
[915, '5M', 'G'],
[915, '6C', 'O'],
[915, '6F', 'G'],
[915, '7F', 'O'],
[915, '7G', 'G'],
[915, '8G', 'G'],
[915, '8H', 'G'],
[915, '9H', 'O'],
[915, '9I', 'G'],
[915, '10I', 'O'],
[915, '10J', 'G'],
[915, '11I', 'O'],
[915, '11K', 'G'],
[915, '12J', 'O'],
[915, '12L', 'G'],
[915, '13D', 'G'],
[915, '13K', 'O'],
[915, '14K', 'O'],
[915, '14L', 'NA'],
[915, '15L', 'G'],
[915, '15M', 'G'],
[915, '16M', 'G'],
[915, '16N', 'G'],
[915, '17E', 'NA'],
[915, '17N', 'G'],
[915, '18N', 'G'],
[915, '18O', 'G'],
[915, '19D', 'G'],
[915, '19F', 'G'],
[915, '20G', 'O'],
[915, '20K', 'NA'],
[930, '1A', 'NA'],
[930, '1B', 'NA'],
[930, '2B', 'O'],
[930, '2D', 'G'],
[930, '3B', 'O'],
[930, '3E', 'O'],
[930, '4A', 'O'],
[930, '4C', 'NA'],
[930, '5D', 'G'],
[930, '5M', 'G'],
[930, '6C', 'O'],
```

```
[930, '6F', 'G'],
[930, '7F', 'O'],
[930, '7G', 'O'],
[930, '8G', 'G'],
[930, '8H', 'G'],
[930, '9H', 'O'],
[930, '9I', 'G'],
[930, '10I', 'O'],
[930, '10J', 'G'],
[930, '11I', 'G'],
[930, '11K', 'O'],
[930, '12J', 'O'],
[930, '12L', 'G'],
[930, '13D', 'O'],
[930, '13K', 'G'],
[930, '14K', 'O'],
[930, '14L', 'NA'],
[930, '15L', 'O'],
[930, '15M', 'G'],
[930, '16M', 'G'],
[930, '16N', 'O'],
[930, '17E', 'O'],
[930, '17N', 'O'],
[930, '18N', 'G'],
[930, '18O', 'G'],
[930, '19D', 'G'],
[930, '19F', 'G'],
[930, '20G', 'O'],
[930, '20K', 'NA'],
[945, '1A', 'NA'],
[945, '1B', 'NA'],
[945, '2B', 'O'],
[945, '2D', 'G'],
[945, '3B', 'O'],
[945, '3E', 'O'],
[945, '4A', 'O'],
[945, '4C', 'NA'],
[945, '5D', 'G'],
[945, '5M', 'G'],
[945, '6C', 'O'],
[945, '6F', 'G'],
[945, '7F', 'O'],
[945, '7G', 'O'],
[945, '8G', 'G'],
[945, '8H', 'O'],
[945, '9H', 'O'],
[945, '9I', 'G'],
```

```
[945, '10I', 'O'],
[945, '10J', 'G'],
[945, '11I', 'G'],
[945, '11K', 'O'],
[945, '12J', 'O'],
[945, '12L', 'G'],
[945, '13D', 'O'],
[945, '13K', 'G'],
[945, '14K', 'O'],
[945, '14L', 'NA'],
[945, '15L', 'O'],
[945, '15M', 'G'],
[945, '16M', 'G'],
[945, '16N', 'O'],
[945, '17E', 'O'],
[945, '17N', 'O'],
[945, '18N', 'G'],
[945, '18O', 'G'],
[945, '19D', 'G'],
[945, '19F', 'G'],
[945, '20G', 'O'],
[945, '20K', 'NA'],
[1000, '1A', 'NA'],
[1000, '1B', 'NA'],
[1000, '2B', 'O'],
[1000, '2D', 'G'],
[1000, '3B', 'G'],
[1000, '3E', 'O'],
[1000, '4A', 'O'],
[1000, '4C', 'NA'],
[1000, '5D', 'G'],
[1000, '5M', 'G'],
[1000, '6C', 'O'],
[1000, '6F', 'G'],
[1000, '7F', 'O'],
[1000, '7G', 'O'],
[1000, '8G', 'G'],
[1000, '8H', 'G'],
[1000, '9H', 'G'],
[1000, '9I', 'G'],
[1000, '10I', 'G'],
[1000, '10J', 'G'],
[1000, '11I', 'G'],
[1000, '11K', 'O'],
[1000, '12J', 'O'],
[1000, '12L', 'G'],
[1000, '13D', 'O'],
```

```
[1000, '13K', 'G'],
[1000, '14K', 'O'],
[1000, '14L', 'NA'],
[1000, '15L', 'O'],
[1000, '15M', 'G'],
[1000, '16M', 'G'],
[1000, '16N', 'O'],
[1000, '17E', 'O'],
[1000, '17N', 'O'],
[1000, '18N', 'G'],
[1000, '18O', 'G'],
[1000, '19D', 'G'],
[1000, '19F', 'G'],
[1000, '20G', 'O'],
[1000, '20K', 'NA']]
```