In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import binom,poisson
```

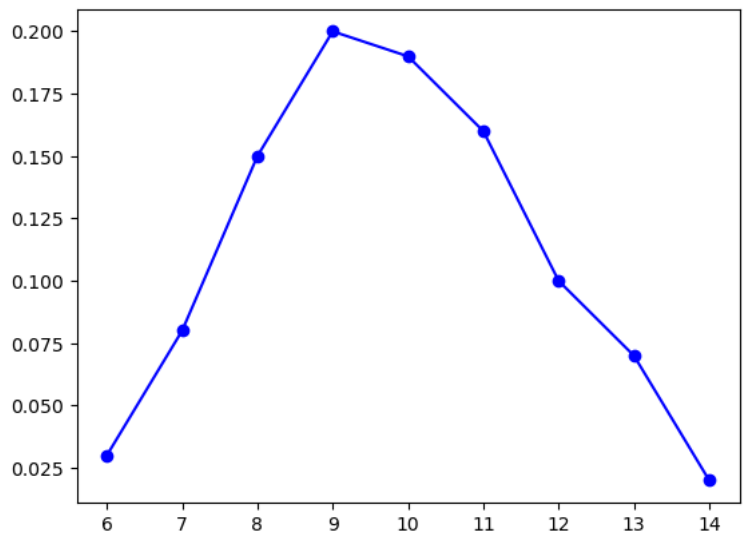
In [2]:
```
X=[6,7,8,9,10,11,12,13,14]
Px=[0.03,0.08,0.15,0.20,0.19,0.16,0.10,0.07,0.02]
```

Task1: To find probability the few days lost due to weather does not exceed 9 days

In [3]:
```
print("The probability of losing days less than 9 in summer is =",sum(Px[:3]))
print("The probability of losing 7 to 13 days in summer is = ",sum(Px[1:8]))
print("The probability of not losing days at all = ",0)
print("The Mean and standard dev respectively = ",np.mean(X)," and ",np.std(X))
print()
print("The mean and median is 10 which  means the data distribution is not skewed at all with standard dev as 2.5 every data is well dsitributed from the mean")
plt.plot(X,Px,"o-",color="blue");
```

```
The probability of losing days less than 9 in summer is = 0.26
The probability of losing 7 to 13 days in summer is =  0.95
The probability of not losing days at all =  0
The Mean and standard dev respectively =  10.0  and  2.581988897471611

The mean and median is 10 which  means the data distribution is not skewed at all with standard dev as 2.5 every data is well dsitributed from the mean
```



Task2: U.S company problem binomial distribution

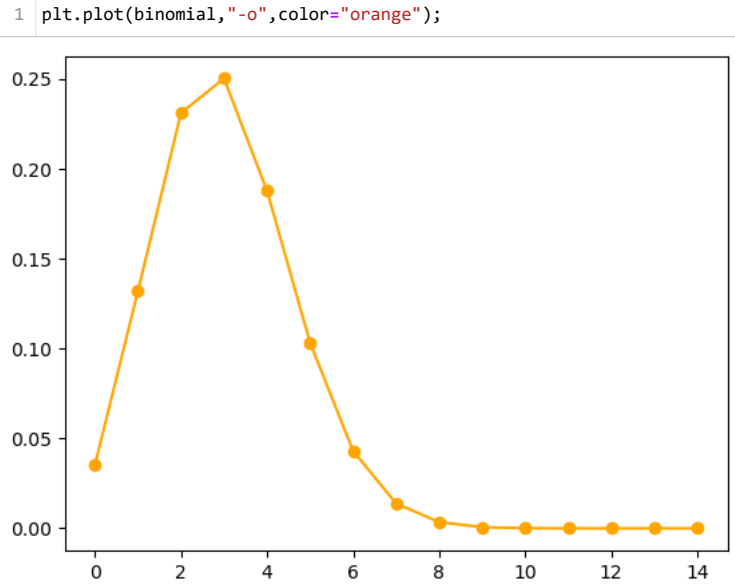
In [4]:
```
p=0.2
n=15
k=np.arange(0,15)
binomial= binom.pmf(k,n, p)
binomial
```

Out[4]:
```
array([3.51843721e-02, 1.31941395e-01, 2.30897442e-01, 2.50138895e-01,
       1.87604171e-01, 1.03182294e-01, 4.29926226e-02, 1.38190573e-02,
       3.45476432e-03, 6.71759729e-04, 1.00763959e-04, 1.14504499e-05,
       9.54204160e-07, 5.50502400e-08, 1.96608000e-09])
```

In [5]:
```
print("Probability of getting exactly 5 overseas = ",binomial[5])
print("Probability of getting more than 9 overseas = ",sum(binomial[9:]))
print("Probability of getting none of the overseas = ",binomial[0])
print("Probability of getting 4 to 7 of the overseas = ",sum(binomial[4:8]))
```

```
Probability of getting exactly 5 overseas =  0.10318229431910408
Probability of getting more than 9 overseas =  0.0007849853583360012
Probability of getting none of the overseas =  0.03518437208883203
Probability of getting 4 to 7 of the overseas =  0.3475981457162242
```

In [6]:
```
plt.plot(binomial,"-o",color="orange");
```



In [7]:
```
print("The graph clearly shows binomial distribution and clearly we can see the probability of getting 5 overseas is the highest amongst all beyond which is a steady downhill")
```

```
The graph clearly shows binomial distribution and clearly we can see the probability of getting 5 overseas is the highest amongst all beyond which is a steady downhill
```

Task3: Amusement park problem poisson distribution

In [8]:
```
rate=0.548
rate2=rate*6
rate3=rate*12
n=np.arange(0,20)
poisson_data=poisson.pmf(n,rate)
poisson_data2=poisson.pmf(n,rate2)
poisson_data3=poisson.pmf(n,rate3)
poisson_data
```

Out[8]:
```
array([5.78104865e-01, 3.16801466e-01, 8.68036016e-02, 1.58561246e-02,
       2.17228907e-03, 2.38082882e-04, 2.17449032e-05, 1.70231528e-06,
       1.16608597e-07, 7.10016788e-09, 3.89089200e-10, 1.93837165e-11,
       8.85189720e-13, 3.73141513e-14, 1.46058249e-15, 5.33599471e-17,
       1.82757819e-18, 5.89125204e-20, 1.79355895e-21, 5.17300161e-23])
```

In [9]:
```
print("Probability of family not going on a trip = ",poisson_data[0])
print("Probability of family taking exactly one trip = ",poisson_data[1])
print("Probability of family taking two or more trips = ",sum(poisson_data[2:]))
print("Probability of family taking 3 or less trips in 3 years = ",sum(poisson_data2[:4]))
print("Probability of family taking 4 trips in 6 years = ",poisson_data3[4])
```

```
Probability of family not going on a trip =  0.5781048646705196
Probability of family taking exactly one trip =  0.3168014658394448
Probability of family taking two or more trips =  0.10509366949003565
Probability of family taking 3 or less trips in 3 years =  0.5829905671691648
Probability of family taking 4 trips in 6 years =  0.10857140636039216
```

In [12]:
```
fig,ax=plt.subplots(3,1,figsize=(10,10))
ax[0].plot(poisson_data,"-o")
ax[0].set_title("Poisson_data1")
ax[1].plot(poisson_data2,"-o")
ax[1].set_title("Poisson_data2")
ax[2].plot(poisson_data3,"-o")
ax[2].set_title("Poisson_data3")
plt.show()
```