In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

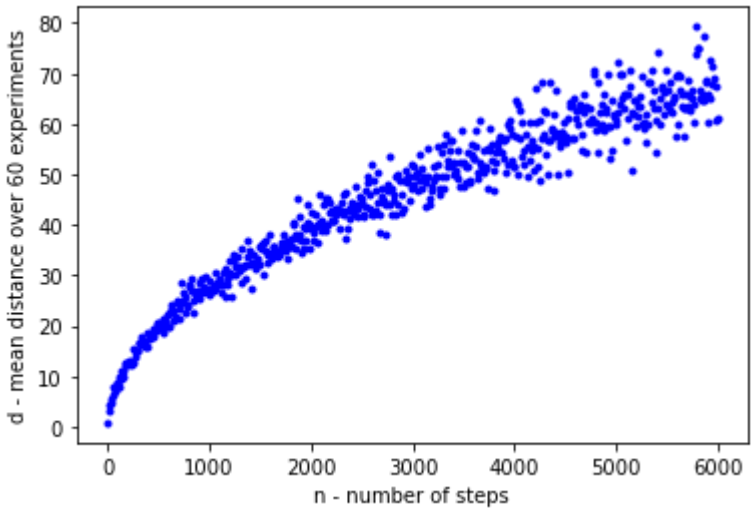
In [2]:
```
# Importing the random walk result generated by the java program
random_walk_df = pd.read_csv("random_walk.csv")
steps = random_walk_df.iloc[:, 0:1].values
distances = random_walk_df.iloc[:, 1].values
random_walk_df
```

Out[2]:

	n	d
0	1	0.839746
1	11	3.001391
2	21	4.186853
3	31	4.901891
4	41	5.628070
...	...	...
595	5951	68.016790
596	5961	69.192001
597	5971	67.597953
598	5981	60.766294
599	5991	61.237792

600 rows × 2 columns

In [3]:
```
plt.plot(steps, distances, "b.",label='result set')
plt.xlabel('n - number of steps')
plt.ylabel('d - mean distance over 60 experiments')
plt.show()
```



In [4]:
```
# this looks like some polynomial expression (probably parabolic), hence I will try pol
from sklearn.preprocessing import PolynomialFeatures
from sklearn.metrics import r2_score
from sklearn.linear_model import LinearRegression
import numpy as np
```

In [5]:
```
# polynomial features applied to linear regression to get polynomial regression
poly = PolynomialFeatures(degree = 2, include_bias = True)
steps_trans = poly.fit_transform(steps)
lr = LinearRegression()
lr.fit(steps_trans, distances)
```

Out[5]:
```
LinearRegression()
```

In [6]:
```
# Plotting the predection together with the random walk data
steps_new = np.linspace(0, 6000, 500).reshape(500, 1)
steps_new_poly = poly.transform(steps_new)
distances_new = lr.predict(steps_new_poly)
plt.plot(steps, distances, "b.",label='result set')
plt.plot(steps_new, distances_new, "r-", linewidth=2, label="Predictions")
plt.xlabel('n - number of steps')
plt.ylabel('d - mean distance over 60 experiments')
plt.legend()
plt.show()
# This prediction seems to fit the random walk data,
# hence the predected relation between d and n is d = a * sqrt(n), where a is a constan
```