EXPERIMENT 12

Algorithm:

1. Import the NumPy and SciPy libraries.
2. Define the sample data and the hypothesized population mean.
3. Compute the sample mean and standard deviation.
4. Calculate the Z-statistic using the Z-test formula.
5. Compute the p-value corresponding to the Z-statistic.
6. Compare the p-value with the significance level (α = 0.05) to accept or reject the null hypothesis.

Code:

```
import numpy as np
import scipy.stats as stats

sample_data = np.array([
  152, 148, 151, 149, 147, 153, 150, 148, 152, 149,
  151, 150, 149, 152, 151, 148, 150, 152, 149, 150,
  148, 153, 151, 150, 149, 152, 148, 151, 150, 153
])
population_mean = 150

sample_mean = np.mean(sample_data)
sample_std = np.std(sample_data, ddof=1)
n = len(sample_data)

z_statistic = (sample_mean - population_mean) / (sample_std / np.sqrt(n))
p_value = 2 * (1 - stats.norm.cdf(np.abs(z_statistic)))

print(f"Sample Mean: {sample_mean:.2f}")
print(f"Z-Statistic: {z_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
```

```
alpha = 0.05

if p_value < alpha:

    print("Reject the null hypothesis: The average weight is significantly different from 150 grams.")

else:

    print("Fail to reject the null hypothesis: There is no significant difference in average weight from 150 grams.")
```

Output:

```
Sample Mean: 150.20

Z-Statistic: 0.6406

P-Value: 0.5218

Fail to reject the null hypothesis: There is no significant difference in average weight from 150 grams.
```

Result:

Thus, the Z-test was performed successfully, and it was concluded that there is no significant difference between the sample mean and the population mean of 150 grams.