**The Welch t-test** is used when you have two independent samples, and you want to test the null hypothesis that the population means of the two groups are equal, **without assuming equal variances.**

The choice between a t-test and a z-test depends on the characteristics of your data and the assumptions you can make. Here are some guidelines to help you decide when to use each test:

**### T-Test:**

Use a t-test when:

**1. Sample Size is Small:**

- T-tests are generally more appropriate when the sample size is small (typically less than 30) because they account for the uncertainty introduced by estimating the population standard deviation from the sample.

**2. Unknown Population Standard Deviation:**

- When the population standard deviation is unknown, and you need to estimate it from the sample. The t-test uses the sample standard deviation to account for this uncertainty.

**3. Data Follows a Normal Distribution:**

- T-tests assume that the data come from a normal distribution. While t-tests are reasonably robust to deviations from normality, they are most accurate when the assumption is met, especially with smaller sample sizes.

**4. Comparing Means of Two Groups:**

- When comparing the means of two groups, either in independent samples (two-sample t-test) or within the same group (paired or dependent samples t-test).

**### Z-Test:**

Use a z-test when:

1. Large Sample Size:

- Z-tests are appropriate when the sample size is large (typically when the sample size is greater than 30). As the sample size increases, the t-distribution approaches the normal distribution, and the distinction between t-tests and z-tests diminishes.

2. Known Population Standard Deviation:

- When the population standard deviation is known. Z-tests use the known population standard deviation and do not rely on estimating it from the sample.

3. Comparing Means of Two Groups:

- For large sample sizes, the results of a z-test and a t-test can be very similar. If the sample size is sufficiently large, using a z-test might be more convenient.

**### Additional Considerations:**

- Equal Variances:

- For comparing means of two groups, if you are assuming equal variances and have large sample sizes, a z-test can be used. If you are not assuming equal variances, a Welch's t-test may be more appropriate.

- Type of Data:

- For proportions or percentages, a z-test is often used.

- Sample Size Impact:

- With very large sample sizes, the t-test approaches the z-test, and in practice, the choice between them may have negligible impact.

In practice, the decision between a t-test and a z-test often involves considering the assumptions, the nature of the data, and the sample size. If you are unsure, conducting both tests and comparing the results can be a reasonable approach.