1. What is our independent variable? What is our dependent variable?

Dependent – Time taken to name the ink colors
Independent – The Conditions of the test

2. What is an appropriate set of hypotheses for this task? What kind of statistical test do you expect to perform? Justify your choices.

Null Hypothesis → Population mean time for Congruent test - Population mean time for incongruent = 0

Ho : $\mu c - \mu l = 0$

Alternate Hypothesis → Population mean time for Congruent test - Population mean time for Incongruent test != 0

Ha : $\mu c - \mu l \neq 0$

Type of Statistical test → Dependent t- test for **Two conditions** (we don't know the population parameter).

Justification for using dependent two tailed t test:

1. Population parameters are unknown unlike Z test and t test is used to estimate population using the sample. (for using t test)
2. For sample sizes less than 30 the sample curve is more flatter than the normal distribution, called t distribution.
3. Since same sample of people are used for both conditions, the time taken values are dependent (reason for dependent test)
4. The Alternate hypothesis is that the population means are not equal, not to check if it is one is higher or lower than the other. Hence Two tailed test. (reason for using two tailed test)

3. Report some descriptive statistics regarding this dataset. Include at least one measure of central tendency and at least one measure of variability.

Central tendency:

Congruent:	Incongruent:
Mean = 14.05	Mean = 22.02
Median = 14.36	Median = 21.02

Variability:

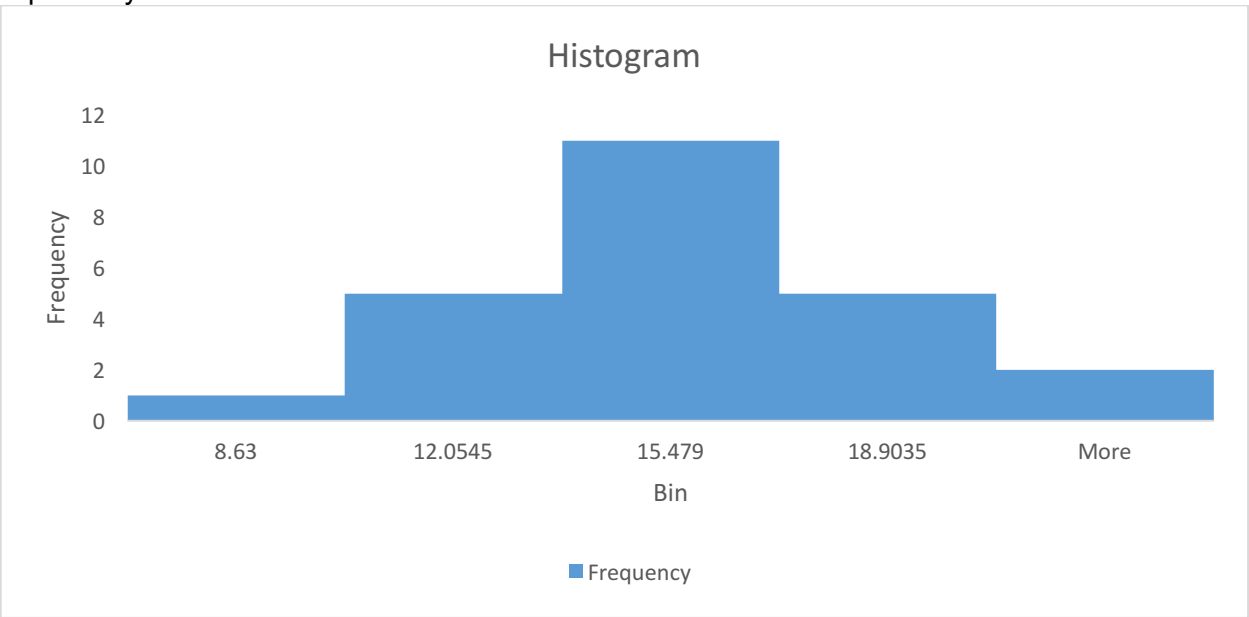
Congruent:	Incongruent:

Std. Deviation = 3.56 Std. Deviation = 4.80

4. Provide one or two visualizations that show the distribution of the sample data. Write one or two sentences noting what you observe about the plot or plots.

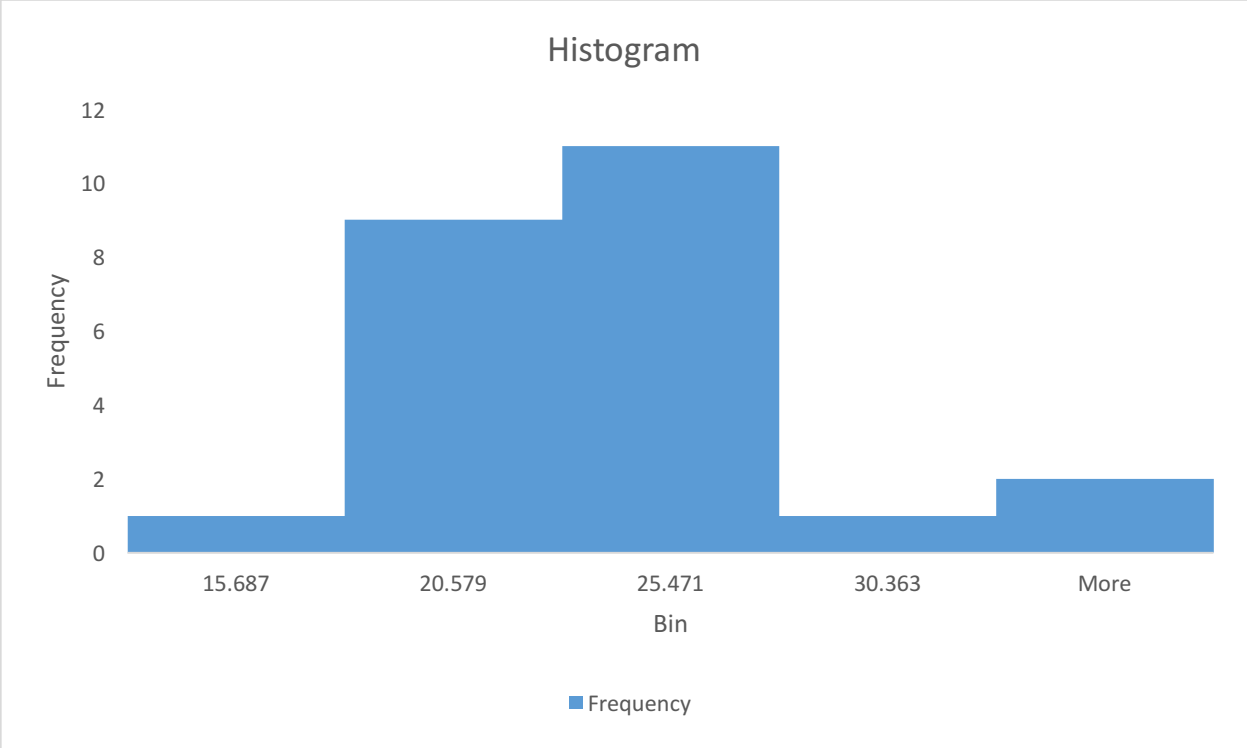
Congruent:

A perfectly normal bell curve with skewness.



Incongruent

Less normal and positively skewed



5. Now, perform the statistical test and report your results. What is your confidence level and your critical statistic value? Do you reject the null hypothesis or fail to reject it? Come to a conclusion in terms of the experiment task. Did the results match up with your expectations?

Hypothesis Test:

Two condition t – Test (0.05)
t-statistic = -8.03
t-critical = +- 2.069
DF = 23
P-value < .00001
Two –Tailed Test

t(23) = -8.03, P < .00001, two-tailed.

Note: I did sort the data initially to find the Median. My apologies.

Decision: Reject the Null

Conclusion: Difference in time taken between 2 tests do not occur by chance and the condition imposed has had a statistically significant effect.

The Results matched the expectation.

6. Optional: What do you think is responsible for the effects observed? Can you think of an alternative or similar task that would result in a similar effect? Some research about the problem will be helpful for thinking about these two questions!

We are trained to read letters and not worry about the color of the letter quite often.

So when the colors matched the words, participants took very less time because they were actually reading the words and did not bother about the color (same result)

So obviously enough the incongruent took more time because every time we see the word, we try to read it (habitual), instead of actually coming up with the color.

I could think of an experiment where the participants can be given 2 conditions

C1. Answer the question asked normally
C2. Answer the previous question for the current question (like answer Q1 when you are asked Q2 and so on)

Note: I recollected this from one of the television program.