SUMMARY MEASURES

1. Exercises “Diets”

Diet	n	Mean (kg)	SD (kg)
A	50	5.341	2.536
B	50	3.710	2.769

Interpretation

Diet A shows a higher mean weight loss (5.341 kg) than Diet B (3.710 kg). Standard deviations are similar, so variability is comparable. These results suggest that **Diet A is more effective overall**, producing greater average loss without higher variability.

2. Exercises “Diets”

Diet A		Diet B	
Statistic	**Value**	**Statistic**	**Value**
Median	5.642	Median	3.440
Q1	3.867	Q1	1.938
Q3	7.152	Q3	5.165
IQR	3.285	IQR	3.227

Interpretation:

Both diets show positive weight loss, but Diet A has:

- Higher **median** (5.642 vs 3.440)
- Higher **upper quartile**
- Similar IQR values

This indicates that **participants on Diet A consistently lost more weight across the distribution**, confirming greater effectiveness.

3. Exercises “Brandperfs”

AREA 1			AREA 2		
Brand	**Frequency**	**Percentage**	**Brand**	**Frequency**	**Percentage**
A	11	15.7%	**A**	**19**	21,1%
B	17	24.3%	**B**	**30**	33,3%
Other	42	60.0%	**Other**	**41**	45,6%
Total	70	100%	**Total**	70	100%

Interpretation:

- Area 2 shows slightly higher preferences for A and B than Area 1.
- Area 1 has a stronger preference for "Other" brands.
- Patterns differ, implying **demographic influence on brand choice**.

HYPOTHESIS TESTING

1. The Related Samples T Test

Batch	Agent1	Agent2
1	7,7	8,5
2	9,2	9,6
3	6,8	6,4
4	9,5	9,8
5	8,7	9,3
6	6,9	7,6
7	7,5	8,2
8	7,1	7,7
9	8,7	9,4
10	9,4	8,9
11	9,4	9,7
12	8,1	9,1

	Agent1	*Agent2*
Mean	8,25	8,683333333
Variance	1,059090909	1,077878788
Observations	12	12
Pearson Correlation	0,901055812	
Hypothesized Mean Difference	0	
df (Degrees of Freedom)	11	
t Stat	-3,263938591	
P(T ≤ t) one-tail	0,003772997	
t Critical one-tail	1,795884819	
P(T ≤ t) two-tail	0,007545995	
t Critical two-tail	2,20098516	

***Difference in Means*.**	-0,433333333

Two-tailed test:
The paired t-test shows a statistically significant difference between the two filtration agents (t = -3.264, p = 0.00755 < 0.05). This indicates that the mean impurity levels differ reliably between Agent 1 and Agent 2.

One-tailed test (testing if Agent 1 is more effective):
Because the sample mean for Agent 1 (8.25) is lower than for Agent 2 (8.683), the appropriate one-tailed p-value is 0.00377, which is highly significant at the 1% level. This provides strong evidence that Agent 1 is more effective than Agent 2 in reducing impurity.

Conclusion:
The results clearly suggest that Agent 1 performs better, with an average reduction of 0.433 impurity units compared with Agent 2. This difference is both statistically significant and practically meaningful, indicating that Agent 1 should be preferred for filtration.

2. The INDEPENDENT Samples T Test

F-Test Two-Sample for Variances

	Variable 1	*Variable 2*
Mean	52,91333	44,23333333
Variance	233,129	190,1758192
Observations	60	60
df	59	59
F	1,22586	
P(F<=f) one-tail	0,218246	
F Critical one-tail	1,539957	
p2	0,436492	

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	*Variable 2*
Mean	52,91333	44,23333333
Variance	233,129	190,1758192
Observations	60	60
Pooled Variance	211,6524	
Hypothesized Mean Difference	0	
df	118	
t Stat	3,2679	
P(T<=t) one-tail	0,00071	
t Critical one-tail	1,65787	
P(T<=t) two-tail	0,001419	
t Critical two-tail	1,980272	

Difference in Mens	8,68

Interpretation

An independent-samples t-test was conducted to determine whether the population mean income for males exceeds that for females. Prior to the t-test, an F-test for equality of variances was performed to assess whether the assumption of homogeneity of variance was satisfied. The results of the F-test indicated no statistically significant difference between the variances of the two groups ($F = 1.2259$, $p = 0.2182$). Since the p-value exceeded the 0.05 threshold, the null hypothesis of equal variances could not be rejected, supporting the use of the pooled-variance t-test.

Using the equal variances t-test, the results revealed a statistically significant difference between male and female income means. The mean income for males ($M = 52.91$) was higher than that of females ($M = 44.23$), with an observed difference of 8.68 units. The one-tailed t-test, appropriate for examining whether male income exceeds female income, yielded a t statistic of 3.2679 with 118 degrees of freedom. The corresponding p-value ($p = 0.00071$) was well below the conventional significance level of 0.05. Therefore, the null hypothesis that male income is less than or equal to female income was rejected in favour of the alternative hypothesis. These results provide strong statistical evidence that the population mean income for males is significantly higher than that of females.

Several assumptions underpin this analysis. The independent samples t-test assumes that observations are independent, the data within each group are approximately normally distributed, and population variances are equal. Given the sample size ($n = 60$ per group), the test is robust to minor deviations from normality due to the Central Limit Theorem. The F-test results further support the assumption of equal variances. Taken together, these findings suggest that the conclusions drawn from the t-test are reliable and valid within the context of the study.