Testing the Difference – What we've covered so far.

Mean	Variance	Proportion
Large independent Samples	P-Value Method	
Small Independent Samples and $\sigma_1^2 \neq \sigma_2^2$		
Small Independent Samples and $\sigma_1^2 = \sigma_2^2$		

In the Spacelab Life Sciences 2 payload, 14 male rats were sent to space. Upon there return, the red blood cell mass of the rats was determined. A control group of rats held in the same conditions on Earth also had there red blood cell mass determined when the space rat returned. The data are in this table.

Test the claim that the flight animals have a different red blood cell mass from the control animals. Use the $\alpha = 0.05$ level of significance, and assume the data are normally distributed.

Flight				Control			
8.59	8.64	7.43	7.21	8.65	6.99	8.40	9.66
6.87	7.89	9.79	6.85	7.62	7.44	8.55	8.70
7.00	8.80	9.30	8.03	7.33	8.58	9.88	9.90
6.39	7.54			7.14	9.14		

Testing the Difference – What's next?

Mean

Variance

Proportion

Large independent Samples

P-Value Method

Small Independent Samples
and $\sigma_1^2 \neq \sigma_2^2$

Small Independent Samples
and $\sigma_1^2 = \sigma_2^2$

Small Dependent Samples

Testing the Difference between Two Small Means for Small Dependent Samples

If you want to test before and after effects of experiences or experiments on the same subjects, or if you want to test two variables on the same subject, left and right handedness for example, then this test is for you. Remember you are testing two values for each subject for a difference. not whether one "set" is different from the other "set".

Step 1 State the hypotheses and identify the claim.

Step 2 Find the critical value(s).

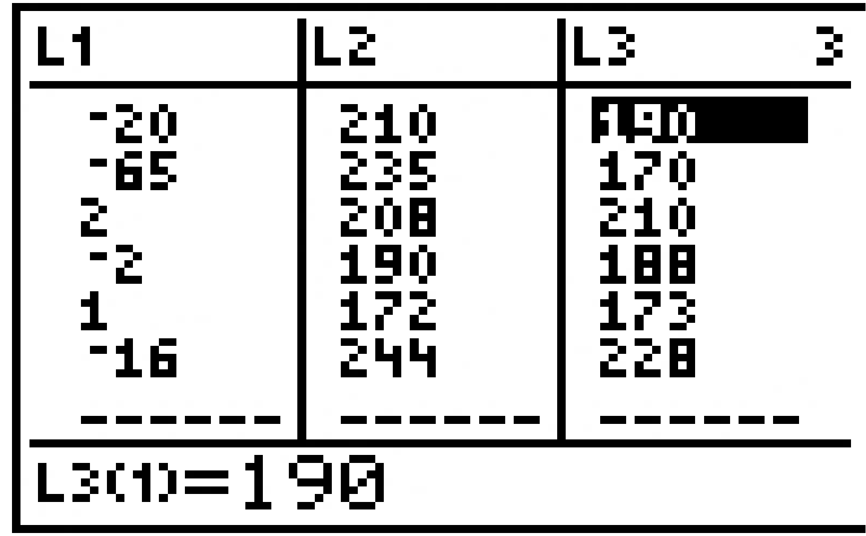
Step 3 Compute the test value.

Step 4 Make the decision.

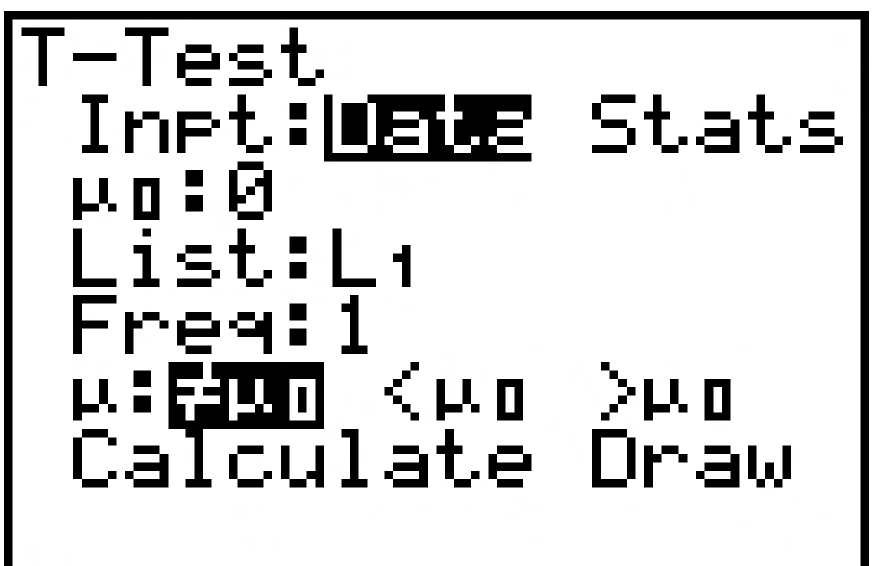
Step 5 Summarize the result.

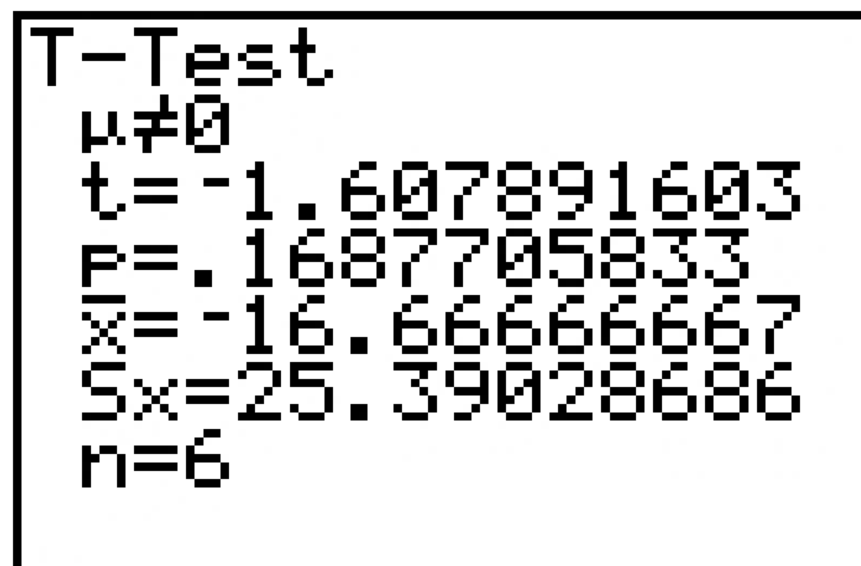
Step 2, 3, and 4 need more explanation.

Step 3 Computing the Test Value – Using the TI Calculator.



Step 1 Enter data from sample 1 into **L2**
Step 2 Enter data from sample 2 into **L3**
Step 3 At the home screen enter **L3 – L2 STO> L1**
Step 4 Press **STAT** and move the cursor to **TESTS**
Step 5 Select **2:T-Test**
Step 6 Select **Data** and press **ENTER**
Step 7 Make sure **μ0:** is **0, Lists:** is **L1, and Freq:** is **1**
Step 8 Select the appropriate alternative hypotheses
Step 9 Select **Calculate** and press **ENTER**





Step 4 Making the Decision

From your calculator screen you can use the t-test score (*t*=) and perform the traditional method, or use the p-value (*p*=) and perform the p-value test. Your choice.

If you choose to use the traditional method you will need to complete step 2 and find the critical value.

If you choose to use the p-value method you can compare the p-value directly to α.

Are these independent or dependent?

1. Height of identical twins.

2. Test scores of the same students in English and in Math.

3. The effectiveness of two brands of pain killer.

4. The effect of a drug on a driver's vehicle braking times.

5. Testing the efficacy of a new diet drug by using the drug on a random sample and a placebo on a control group.

6. Testing whether a new diet helps people keep their weight down for longer than their old diet.

7. Finding out whether the basketball team's new coach is improving the teams scoring.

A program for reducing the number of days missed by kitchen staff at a certain restaurant was put in place by the owners. The owners hypothesized that after the program workers would miss fewer days.

The table shows the number of days missed by the 10 workers before and then after completing the program. Note that the data is **paired**.

1. Look at the numbers and make a guess, has the program reduced the number of days missed?

2. Test whether there is a significant difference. Use the $\alpha = 0.05$ level of significance, and assume the data are normal.

Workers:	1	2	3	4	5	6	7	8	9	10
Before:	2	3	6	7	4	5	3	1	0	0
After:	1	4	3	8	3	3	1	0	1	0

A coach believes he can improve the strength of his players by giving them a special vitamin supplement. To prove his claim he gives his players a bench press test, then after two weeks taking the vitamins, he gives them the same test. The **paired** results are in the table. Test his claim at the $\alpha = 0.05$ level of significance, and assume the data are normal.

Max number of pounds each althete can bench press.

Athlete:	1	2	3	4	5	6	7	8
Before:	210	230	182	205	262	253	219	216
After:	216	236	179	204	270	250	222	216