Today you will use CODAP to investigate the parachute descent times you collected during Lesson 2: Construct-a-Chute.

Part 1: Organize the Data

1. Open the Parachutes Data File your teacher shares with you.

2. In the **time** column of rows 21-40, enter the times your group collected using your modified parachute to the nearest hundredth.

3. In the **type** column of rows 21-40 change "P2" to a name that fits your modification. For example if you changed the canopy of your parachute so it has an area that is half, change "P2" to "half_square" and if you changed the canopy to a circle with an area of 144 square inches, enter "large_circle".

4. Rename the file to "Large Square vs [name of your modified parachute]" and save a copy of the file.

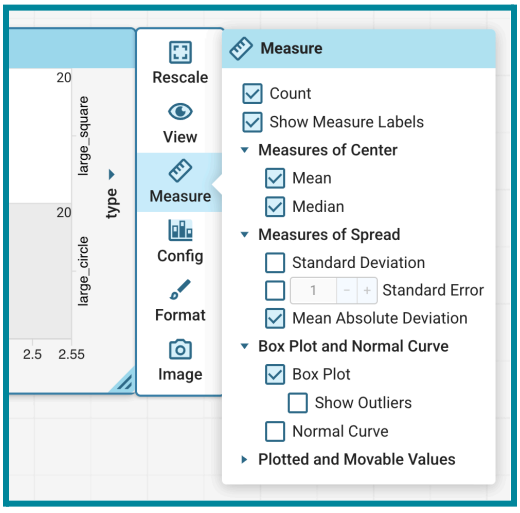
Part 2: Analyze the Data

5. Create a new Graph on the CODAP document, click on **Cases** in the graph title and name it following the format **Large Square vs** "use the name of your modification here such as Half Square or Large Circle".

6. Drag the **time** attribute to the *x*-axis of the graph.

7. To separate the data into two plots stacked vertically, drag the **type** attribute to the *RIGHT* side of the graph. Make sure the bar on the right is yellow before dropping the attribute.

8. In the Measure section, check the boxes for **Count**, **Show Measure Labels, Mean, Median**, **Mean Absolute Deviation**, and **Box Plot**.



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9. Answer the following questions:

    a. What was the modification your group made to the canopy?

    b. What differences do you see between the plot for the Large Square parachute (P1) and the plot for the modified parachute? What similarities do you see?

    c. How does a typical landing with your design differ from a typical landing with the Large Square canopy design (Parachute P1)?

    d. Which parachute design results in a safer descent? Why? What visual or descriptive evidence from your CODAP analysis supports your claim?

    e. Which parachute design is more reliable? Why? What visual or descriptive evidence from your CODAP analysis supports your claim?

    f. If you had to use your parachute for a high-stakes jump right now, how confident would you feel about hitting your median time? Point to a specific visual feature of the plot to justify how confident you are.

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Part 3: Numerical Summaries

Statistical Question: Is the difference between the modified parachute and the parachute with a large square canopy a real, meaningful change or just chance variation?

To answer this question we use measures of center and spread. Record the following measures from the graph in CODAP. You will use these when you prepare the report in Part 4.

	Parachute P1 Large Square Canopy	Your Group's Modified Parachute
Mean		
Median		
MAD		
Range		

Part 4: Preparing the Report

As Lead Engineers, prepare a report for the CEO and the Board of Directors. Use the plots and answers from Part 2 and the Number Summaries from Part 3 to determine if your design modification should be adopted. Support your conclusions. Your report must address the following:

- **Graphical Evidence:** Include a screenshot of the stacked boxplots you created in CODAP.
- **Design Comparison:** How does the design of your modified parachute compare to the Large Square parachute (P1)?
- **Typical Performance:** How did your modification affect the typical speed of the fall?
- **Reliability:** How did your modification affect the reliability of the parachute?
- **The Statistical Verdict:** Do you think the difference between Parachute P1 and your modified parachute is meaningful?
- **Final Recommendation:** Based on the evidence, should the company adopt your modification, reject it, or do more testing? Justify your decision using your data.

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