generate a collection of data.

**Objectives**

- Use the LabQuest to automatically collect data
- Become familiar with different probes and sensors, and how to adjust their settings
- Learn how to collect, store, and review multiple data sets
- Determine and input appropriate data collection intervals
- Analyze data graphically and perform curve-fitting

**Equipment**

- LabQuest handheld unit
- Blood Pressure Sensor
- Temperature Probe
- Calorimeter with lid
- Two beakers
- Crushed ice and hot water

**Activity 1: Check Your Pressure**

1. Attach the blood pressure cuff to the sensor. Screw it in securely, but do not over-tighten.
2. Turn the LabQuest on, and plug the Blood Pressure Sensor into Channel 1. You should see the LabQuest automatically recognize the sensor, and display a screen which looks like the picture on the right. Your default location is the Meter tab.
3. Slide the stylus from the back of the unit, and use it to select items on the screen. Alternatively, navigate using the push buttons on the front of the unit.
4. You should not have to change any of the sensor settings, but you should zero the cuff pressure. The Sensor menu (under the Meter tab) has a Zero option.
5. Attach the cuff to the upper arm of your lab partner. Wrap the cuff securely, but not overly tightly. The sensor lead and the pressure bulb should both face up. If you are having your blood pressure taken, you should sit still and not move your arm.
6. Navigate to the Graph tab of the LabQuest screen. Start the data run by clicking the Go button at the bottom left of the screen. Rapidly squeeze the pressure bulb until the cuff pressure is between 150 and 170 mm Hg. Please do not exceed 170mm; your lab partner might find it uncomfortable.
7. Set the bulb on the table (don’t press the release valve just yet) and watch the LabQuest screen. Pay attention to the cuff pressure, and when it drops to 50 mm, click the Stop button (bottom left again) to stop the trial. Release the cuff pressure by pressing the release valve near the squeeze bulb.
8. You should see your results appear automatically on the screen next to the graph: systolic pressure, diastolic pressure, heart rate, and mean arterial pressure. If the calculated values for systolic and diastolic pressure do not appear automatically, don’t panic. Occasionally, this pressure sensor is finicky and you may have to simply repeat the measurement.
9. On your lab worksheet, record this data (systolic and diastolic pressures) and make a sketch of the graph next to it. Try to capture the shape of the graph and do not worry about scaling it.
10. On the Graph tab, tap the File Cabinet icon to save the data. It will automatically save as Run 1, and the screen will change to show you Run 2 (which is the next trial you will be performing).
11. Check the blood pressure of everyone in your lab group. Make sure to record the results on your worksheet, and also to save each data run before moving on to the next one. Notice that you can toggle between the runs by tapping the Run Box (next to the File Cabinet icon) which shows you which data you are viewing.
**ACTIVITY 2: CHECK THE TEMPERATURE**

1. Get a beaker and fill it with ice from the cooler. While someone is doing this, another person should be getting a second beaker of hot water from the provided pitchers. Do not use water from the tap; it will not be hot enough.

2. Attach the Temperature Probe to the LabQuest. It should automatically recognize the probe, and you should see the room temperature displayed (about 22°C).

3. Adjust the data collection interval. Under the **Meter** tab, the **Sensor** menu has a **Data Collection** option. Select this, or simply tap one of the boxes on the right (Mode, Rate, or Length). This will open the **Data Collection** window as well. Change the units on the **Length** from seconds (s) to minutes (min). To change the number of minutes, swipe the stylus across the number on the screen to highlight it. This opens the keyboard, and you can tap the number with your stylus. Make the Length equal to **10 minutes**.

4. Now change the **Rate** to **10 samples/min**, then tap **OK**. This means that when you tap the **Go** button, the LabQuest will collect and record data 10 times a minute (every 6 seconds) for ten minutes. During data collection, you can tap the Stop button at any time to halt a data run, but you **cannot resume your trial if you stop** (Stop means stop, it does not mean pause). You should not click Stop before the end of a run unless you are certain (maybe you have all the information you need, or maybe you really do need to start over).

5. Insert the Temperature Probe through the stopper of the calorimeter lid. Fill the inner calorimeter cup with ice, then pour in the hot water. Leave about a half inch of space at the top of the cup (do not overfill). Place the lid on the calorimeter. The Temperature Probe should be in the ice water.

6. Press the **Go** button to start the data collection.

7. While the LabQuest records data, you should be getting your quiz worksheet ready. You will make a graph of temperature vs time, so construct and label your axes. **Time** is on the x-axis, temperature is on the y-axis (this is how it appears on the LabQuest screen as well). You do not need to over-worry about accurately scaling the axes, but you will want to carefully capture the shape of the curve.

8. When the data collection interval is over, analyze your graph. Under the **Graph** tab, the **Analyze** menu has a **Curve Fit** option. Select this, and you will see your graph displayed on the left, and the curve fit choices on the right. Pull down the **Fit Equation** menu, and select a curve fit. Start at the top, and try each of the choices until you get a fit which closely matches the data.

9. Sketch the graph on your lab worksheet, making sure you show its shape (do not worry about matching the scale precisely). Write down the equation of the best fit curve. Is it a line? Are there several curve fits that seem pretty good, or is there only one which matches well with your data?

10. Please be sure to complete the quiz worksheet and submit it before you leave. No worksheets will be accepted for credit after the end of the lab period.