



### Science Objectives

- Students will collect and assess vital health data.
- Students will determine factors that influence blood pressure and connect those influences to physiological changes.
- Students will compare collected data to normal ranges for healthy blood pressure.

### Vocabulary

- blood pressure
- cardiovascular
- systolic
- diastolic
- pulse

### About the Lesson

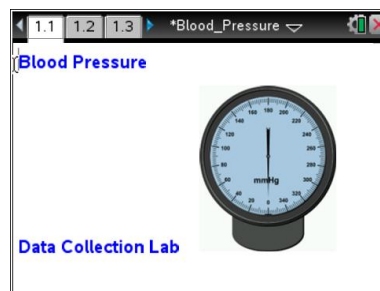
- Using a Blood Pressure Sensor, students will assess blood pressure under changing conditions and make conclusions about the data they have collected. Assessments are embedded in the activity to engage discussion and gauge learning.
- As a result, students will:
  - Learn to use the blood pressure sensor to collect data.
  - Learn about the small factors that can influence blood pressure.

### TI-Nspire™ Navigator™

- Send out the *Blood\_Pressure.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to have students demonstrate how to negotiate the simulations and to spotlight student answers.
- Collect student responses from assessment items that are embedded throughout the document.

### Activity Materials

- *Blood\_Pressure.tns* document
- TI-Nspire™ Technology
- Vernier Blood Pressure Sensor
- Data collection interface (EasyLink)



### TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Use DataQuest application to read data collection results
- Answer assessment questions within a document

### Tech Tip:

Access free tutorials at

<http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

### Lesson Files:

*Student Activity*

- Blood\_Pressure\_Student.doc
- Blood\_Pressure\_Student.pdf

*TI-Nspire document*

- Blood\_Pressure.tns

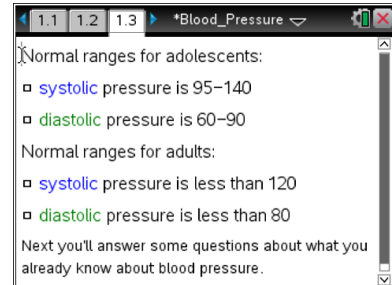


## Discussion Points and Possible Answers

Allow students to read the background information on the student activity sheet.

### Move to pages 1.2 – 1.3.

1. Students should read the background information on pages 1.2 and 1.3. Following those pages, there are several questions that assess the students' general knowledge of blood pressure before they start the data collection. These would make good discussion questions.



### Move to pages 1.4 – 1.6.

Have students answer questions 1-3 on the handheld, the activity sheet, or both.

- Q1. Which factors do you think influence blood pressure? (Select all that apply.)

**Answer:** A. diet, B. genetics, C. age, and D. race

Diet influences blood pressure, a high fat diet causes veins to thicken and have more friction, which increases pressure. Genetics and race have both been shown to be factors in blood pressure. Blood pressure generally increases with age.

- Q2. Blood pressure is a vital sign that can tell doctors about \_\_\_\_\_. (Select all that apply.)

**Answer:** B. respiratory health, C. heart health, D. diseases

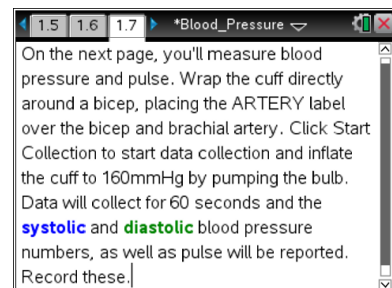
Many factors influence blood pressure and the effects of high BP are potentially vast. A class discussion should include why the student thinks their answer is correct.

- Q3. Blood pressure changes depending on the activity the person is performing.

**Answer:** Strongly agree

### Move to page 1.7.

2. Students will read instructions to complete the first blood pressure data collection. It is easiest for students to work in pairs or small groups, one student measuring the blood pressure of another.

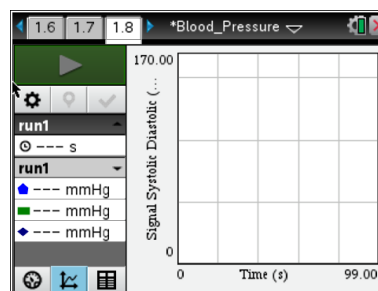




To set up the data collection, students must connect the blood pressure sensor to the Data Collection interface, such as EasyLink. They can then connect it to the TI-Nspire handheld. The handheld should automatically recognize the sensor.

**Move to page 1.8.**

3. The partner will strap on the cuff to the arm of the other student and inflate the cuff to 160mmHg. They need to click the Start Collection button (▶). The pressure in the cuff will slowly reduce while blood pressure data is collected.



The handheld will collect data at 25 samples per second for 99 seconds. Once the data collection stops, the handheld will calculate the systolic and diastolic pressures.

**Move to page 1.9.**

Have students answer question 4 on the handheld, the activity sheet, or both.

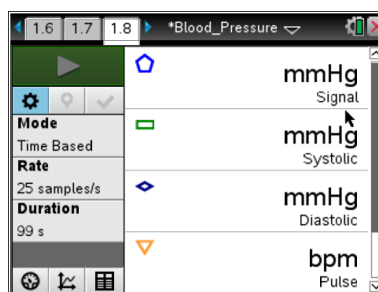
Q4. What are your systolic and diastolic pressures? What was your pulse rate?

**Sample Answer:** 105.4 mmHg, 53.3 mmHg, 40.54 bpm

Blood pressure is often reported as systolic/diastolic, such as 120/70 (read one twenty over eighty). Pulse should be reported in beats per minute.

**Move to pages 2.1 – 2.3.**

4. Students will receive a brief introduction to the next data collection on page on page 2.3. They will repeat a blood pressure and pulse data collection after lying down for one minute. This should result in a decrease in blood pressure and pulse.



**Move to pages 2.4 – 2.6.**

Have students answer questions 5-7 on the handheld, the activity sheet, or both.



Q5. What are your systolic and diastolic pressures? What was your pulse rate?

**Answer:** Answers will vary. The pressures and pulse rate should be lower than the first reading.

Q6. Did your pressures and/or pulse rate change from the first reading? If so, by how much did the values change?

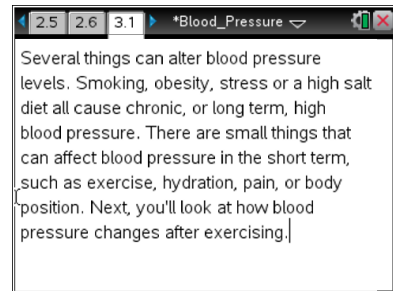
**Suggested Answer:** It's expected that both would decrease slightly from the first reading. If a different student is being tested for blood pressure, it may not be a realistic comparison..

Q7. Based on your readings in Question 5, is your blood pressure in the healthy range? Look back at page 1.3 for the ranges.

**Suggested Answer:** This number will likely drop, probably not out of the healthy range. However, the "healthy range" is for resting adults sitting upright.

**Move to pages 3.1 – 3.3.**

5. Students are to read the instructions for the final part of the activity. They need to do 3 minutes of intense activity immediately before collecting their blood pressure data. Direct them to complete the activity of your choice, such as running in place or jumping jacks. It is important that students conduct the data collection within one minute of complete the exercise. Have one person in each pair complete the exercise and after the data collection is complete, switch and have the partner complete the exercise.



**Move to pages 3.4 – 3.6.**

Have students answer questions 8-10 on the handheld, the activity sheet, or both.

Q8. What are your systolic and diastolic pressures? What was your pulse rate?

**Answer:** Answers will vary. The pressures and pulse rate should be higher than the first two readings.



Q9. Is this blood pressure reading still in the healthy range? Does this mean you are unhealthy? Explain your reasoning.

**Answer:** It is expected that this number will increase significantly compared to the previous two readings. Again, the “healthy range” is for resting, seated adults.

Students may be interested to continue monitoring blood pressure to see how long it takes to return to the original reading.

Q10. Of the three factors you have been recording, pulse, systolic pressure, and diastolic pressure, which factor changes most quickly? Explain.

**Suggested Answer:** Encourage students to look at the numbers they’ve recorded to make this assessment. Typically pulse is the most variable.

By collecting data as students create it to make comparisons of each blood pressure condition or the amount of change for each condition.

### TI-Nspire™ Navigator™ Opportunities

Choose a student to be a Live Presenter to demonstrate the data collection. The questions in the activity may be distributed as Quick Polls or used as a formative or summative assessment

### Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire™ Navigator™. Save grades to Portfolio. Discuss activity questions using Slide Show.

### Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.