Science Objectives

- Students will investigate the interactions that occur in specific organs of the human body during a “fight or flight” nervous reaction to fear or stress.
- Students will relate each organ to its specific organ system.
- Students will justify the response for each organ.
- Students will relate the “fight or flight” response to a real-life situation.
- Students will compare/contrast the “rest and digest” nervous response.

Vocabulary

- organs: stomach, muscles, heart, eyes, sweat glands, liver, lungs, kidneys, arteries
- organ systems: nervous, circulatory, digestive, muscular, urinary respiratory
- “fight or flight” nervous system response
- “rest and digest” nervous system response

About the Lesson

- In this lesson, students will:
  - Explore body specific reactions to the nervous system’s “fight or flight” response system.
  - Run a simulation involving a baseball player. With each advance of the simulation, they will use a magnifying glass to locate specific organs and their responses to the situation.
  - Students will record their data and apply these data to answer questions.

TI-Nspire™ Navigator™

- Send out the *It_Takes_Guts_.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies: TI- Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software

Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- It_Takes_Guts_Student.doc
- It_Takes_Guts_Student.pdf

TI-Nspire document

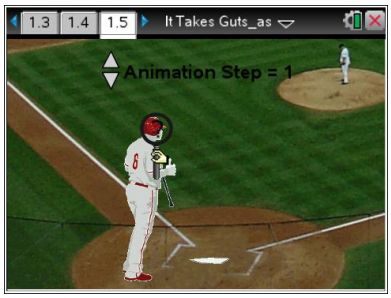
- It_Takes_Guts.tns

Discussion Points and Possible Answers

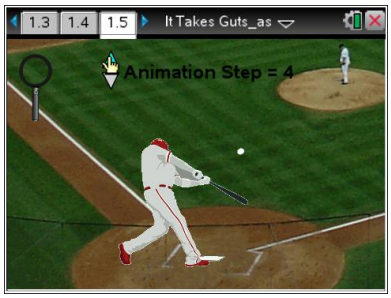
Have students read the background information stated on their activity sheet or in pages 1.2 - 1.4.

Move to page 1.5

1. Students will select and drag the magnifying glass over the body of the player. When they see a question mark appear, they will select the hot spot to see the body response.



2. Students will advance the simulation by selecting the up and down arrows (▼ and ▲). They should repeat these steps until they have explored fourteen body responses. There are two hot-spots in each Animation Step.



Tech Tip: To access the Directions again, select > **Directions.**

Tech Tip: To access the Directions again, select menu or **Document Tools ( ) > It Takes Guts> Directions.**

Q1. Record your data in the table below and/or in the .tns file on page 1.6

ORGAN	RESPONSE
1: Salivary Glands	decreased saliva production; causes dry mouth
2: Stomach	blood is routed to muscles; digestive function decreases
3: Eye	pupil dilates; more light can enter eyes
4: Sweat Glands	increased sweat production and water loss

5: Shoulder Muscles	muscle contractions increase; allows upper body bones to move
6: Arm Arteries	arteries dilate; increased blood flow
7: Lower Back Muscles	muscle contractions increase; allows for spinal rotation
8: Heart	increased contractions; increased blood flow to muscles
9: Kidneys	decreased urine production and water loss
10: Rump Muscles	muscle contractions increase; provides stability and balance
11: Lungs	dilation of airway; increased airflow and O_2 intake
12: Liver	conversion from glycogen to glucose increases; increased flow of glucose to muscles
13: Leg Muscles	muscle contractions increase; allows lower body bones to move
14: Leg Arteries	arteries dilate; increased blood flow

TI-Nspire Navigator Opportunities

Make a student a Live Presenter to demonstrate how they are recording their data.

Q2. Which organ(s) decreased in activity? Choose all that apply.

Answer: stomach, kidneys, salivary glands

Q3. Which system(s) decreased in activity? Choose all that apply.

Answer: digestive, urinary

Q4. Which two organs had opposite responses to maintain water balance?

Answer: kidneys, sweat glands

Q5. This activity focused on the "fight or flight" response in which you either face the challenge or run from it. Briefly describe a situation when you experienced this response.

Sample Answer: Accept any relevant response. Answers may include speaking in front of the class, watching a scary movie, witnessing an accident, etc.

Q6. Your nervous system has an opposite response called “rest and digest” to calm the body down. Which of the following organs would **increase** in activity in this situation?

Answer: stomach

Wrap Up

- Discuss the body’s ability to maintain homeostasis. For example, discuss how processes like digestion and urine production are “put on hold” to conserve energy. Also, discuss how arteries leading to capillary beds near digestive and urinary organs constrict while those leading to muscles dilate.
- Discuss how it really isn’t healthy to “eat on the run.”
- Tape a large outline of the body and have students match the organ with its organ system. Then place up and down arrows to simulation activity during each type of nervous response.

Assessment

- Students can design a graphic organizer, i.e.; concept map or compare/contrast to illustrate the responses that occur during a “fight or flight” vs a “rest and digest” nervous system reaction.