

**Reaction Time vs Reflex Time** **Grades 9 to 12 - Biology**

<b>Post Activity - Neuroscience</b>	Assessment	
	Cross-curricular	Neuroscience

**Learning Goals**  
 Students will understand the difference between a reflex and a conscious reaction to a stimulus.

**Specific Expectations**  
 There are no specific curriculum links to this program or post activity, but it is an easy way to introduce students to the basics of the nervous system.

**Description**  
 In this post activity to the school program, Neuroscience, students will learn the difference between reaction and reflex neural pathways. They will simulate what happens in their body during a reaction and during a reflex to better understand why there is a difference between the two.

**Materials**

- Computer
- Wireless Mouse

**Safety Notes**  
 Clear enough space in the room to allow the students to move freely throughout the classroom.

## Introduction

1. Ask students if they know the difference between a reflex and a reaction.
  2. Reactions are voluntary responses whereas reflexes are involuntary or unintentional (and not subject to conscious control in most cases).
  3. Explain that a reflex and a reaction each take a different neural pathway. This will result in different periods of time for reflexes as opposed to reactions.
  4. Go over each pathway. The Neural Pathways handout has examples of both pathways.
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## Action

1. Go to: <https://www.humanbenchmark.com/tests/reactiontime>
  2. This website will calculate the average time it takes for you to click the mouse when the light turns from red to green.
  3. Ask students if this is measuring a reflex or a reaction. (It is measuring reaction time because you are making a conscious decision to click the button when you see the light turn from red to green.)
  4. Get the students to try the Reaction Time activity. Ask them if they can get faster with practice. (Probably, up to a point.)
  5. Now, students are going to become the nerves of the neural pathways, and simulate how a reflex works versus a regular reaction to a stimulus. Use the Neural Pathways handout to determine the roles of each student.
  6. For the reflex time simulation:
    - a. You will need groups of **three** students, and a computer with a wireless mouse for each group.
    - b. Students will be using the reaction time website as a stimulus, but the student seeing the colour change will not be clicking the mouse.
    - c. One student will see the colour change (simulating the dorsal root ganglion). This student will relay when the screen is green to the next student. Student number two will write on a piece of paper, “Click”.
    - d. Student number two will simulate the relay neuron (interneuron) and pass the paper with the information from the previous student to the ventral root motor neuron and the brain.
    - e. Student number three will simulate the ventral root motor neuron and press the button to stop the simulation
    - f. Record the time taken
    - g. NOTE: this works best if the third student does not see the screen. This can be done with a wireless mouse.
  7. For the reaction time simulation:
    - a. You will need groups of **five** students, and a computer with a wireless mouse for each group.
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- b. One student will see the colour change (simulating the dorsal root ganglion). This student will relay when the screen is green to the next student. Student number two will write on a piece of paper, “Click”.
  - c. Student number two will simulate the Thalamus and pass the information from the first student to the third student (Sensory area of the cortex).
  - d. Student number three will simulate the Sensory area of the cortex and pass the information of the previous student to the fourth student (Motor Area of the cortex).
  - e. Student number four will simulate the Motor area of the cortex and pass the information of the previous student to the fifth student (Ventral root nerve).
  - f. Student number five will simulate the Ventral root nerve and press the button when they receive the signal.
  - g. Record the time taken.
  - h. NOTE: this works best if the last student does not see the screen. This can be done with a wireless mouse.
8. Complete both tests several times to obtain several results. With these results you can calculate the mean, median and mode of each pathway.
  9. Get the student to compare the differences between the two pathways and explain why reflex time is shorter than reaction time.
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### **Consolidation/Extension**

Discuss with the students about nerve cells and their size. Neurons are some of the longest cells in the body. The examples in the activity are generic pathways for a reaction and a reflex. There are many different reaction and reflex pathways. Have students explore and research different reflex and reaction pathways, using specific neural terminology and body parts.

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### **Resources**

Use the Neural Pathway handout to assign roles.

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