



Hand on a Hot Stove

Core Concept:

Neurons are connected to form pathways that result in reflex responses, conscious sensation, voluntary movement, and memory.

Class time required:

Approximately 2 forty minute class periods

Teacher Provides:

For each student

- Copy of student handout entitled **Hand on a Hot Stove**
- Color copy of **Biology Brief: A Reflex Arc** sheet (page iv). Laminate or put in sheet protector for reuse.

For each team of 2-3 students:

- Color copy of **Body Diagram** (page vi). Laminate or put in sheet protector for reuse.
- Color copy of **Neuron Pathway Damage** (page vii). Laminate or put in sheet protector for reuse.
- Bag containing:
 - 1 red starflake bead—18 or 25 mm (purchase at local or online craft store)
 - *Wikki Stix* cut to specific lengths indicated below and then attached to the plastic transparency. Purchase single color packs from www.WikkiStix.com. One unit of a single color contains 36 *Wikki Stix* and costs \$3.75. Total cost for six colors of *Wikki Stix* is approximately \$24.00 and includes enough materials for 25 sets. *Wikki Stix* may be reused. You will need to prepare *Wikki Stix* to the following lengths:
 - 1 red *Wikki Stix*—add a 2 inch piece of *Wikki Stix* to a 6 inch piece of *Wikki Stix* and press together to make an 8 inch long *Wikki Stix*.
 - 1 dark blue *Wikki Stix*—2 inches long
 - 1 lime green *Wikki Stix*—1 inch long
 - 4 pink *Wikki Stix*—1 inch long
 - 5 light blue *Wikki Stix*—1 inch long
 - 2 yellow *Wikki Stix*—1 inch long
 - Optional: A piece of plastic transparency film to attach *Wikki Stix* for distribution and collection (page v)

Note: Some pilot teachers liked the Wikki Stix. Others found that the Wikki Stix were distracting for students. They preferred to use colored markers to draw the neuron pathways. Instead of Wikki Stix, you may have students draw the neurons using different colors of water soluble markers or dry erase markers.

Note: Some pilot teachers liked having the places in the student instructions where teacher initials were required so that the teacher could check student work. Others found this initialing unnecessary. You may tell students that they do not need to call you over to check their work.

Optional Consider using:

- A **Hand on Hot Stove** Animation is available for downloading from the Life Sciences Learning Center website at <http://lifesciences.envmed.rochester.edu>. This animation may be shown before and/or after students complete work on each part of the activity.

Suggested Class Procedure:

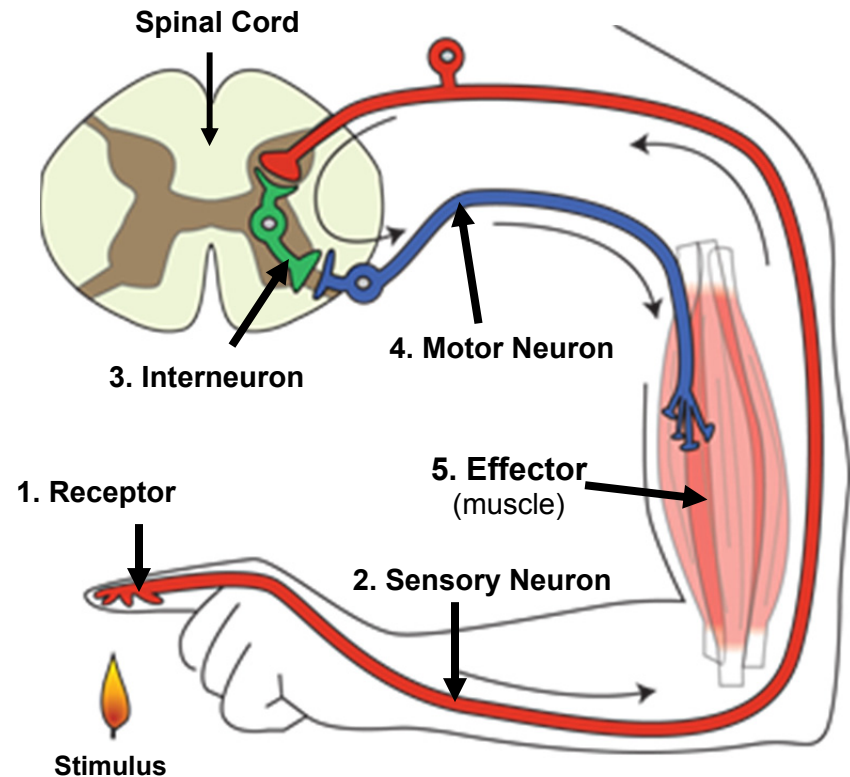
1. Distribute a copy of the student handout entitled **Hand on a Hot Stove**.
2. Ask students to work individually to complete the **Introduction**. They should read the Introduction and write numbers to indicate the order of events that occur when a person accidentally puts a hand on a hot stove. The Introduction may be done for homework.
3. Ask students to work individually or in teams to complete Part 1 using the information in Biology Brief: What is a Reflex? Part 1 may be done for homework.
4. Ask several students to share their answers to the Introduction and Part 1. You may need to clarify the difference between “your hand moves automatically” (happens automatically without even thinking about it) and “you move your hand voluntarily” (you think and move your hand voluntarily)
5. Distribute the **Body Diagram** and **Biology Brief: A Reflex Arc**
6. Explain that students (teams of 2-3) will use the Body Diagram make a model to help them understand and remember what happens during a “hand on a hot stove” reflex.
7. Distribute bag containing *Wikki Stix* and bead to each team. Explain that these sticks, if pressed firmly to the body diagram, will stick to the paper or sheet protector. Also explain that these *Wikki Stix* will be reused for additional classes so they should not be balled up or played with!
8. Students work in teams to complete **Part 2: A Reflex Arc**. As students work, encourage them to use the information in the **Biology Brief: A Reflex Arc**. *Check student work and initial.*
9. Students work in teams to complete **Part 3: Using Your Brain**. *Check student work and initial.*

10. Review using the Hand on a Hot Stove animation available from the Life Sciences Learning Center website.
11. Distribute **Neuron Pathway Damage** diagram sheet.
12. Students complete **Part 4: What's Wrong with the Patient?** This part may be done in class or as homework. *Check student work and initial.*

Biology Brief: A Reflex Arc

A reflex occurs when nerve impulses travel over a simple neuron pathway called a **reflex arc**. Reflex arcs have five basic parts: receptors, sensory neurons, interneurons, motor neurons, and effectors.

1. **Receptors** located in the skin or sense organs detect a stimulus and create an impulse.
2. **Sensory neurons** conduct nerve impulses towards the central nervous system (brain and spinal cord). A single sensory neuron carries messages from a receptor to the spinal cord.
3. **Interneurons** in the central nervous system (brain and spinal cord) connect sensory neurons to motor neurons. One or more interneurons in the spinal cord carry messages from a sensory neuron to a motor neuron.
4. **Motor neurons** conduct nerve impulses from the central nervous system (brain and spinal cord) to an effector. A single motor neuron carries messages from the spinal cord to an effector.
5. **Effectors** respond to the impulses by contracting (if the effector is a muscle fiber) or secreting enzymes or hormones (if the effector is a gland).

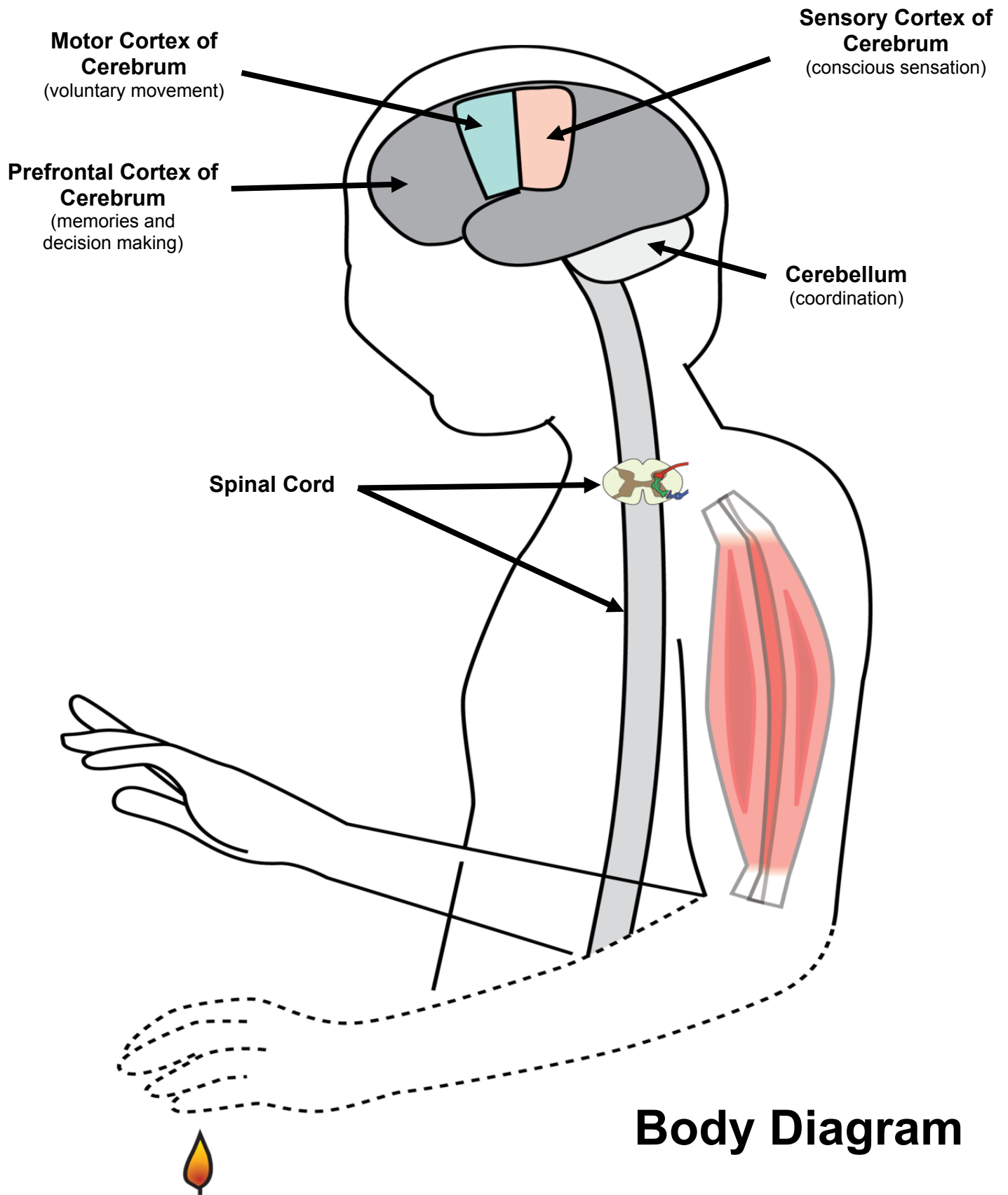


Wikki Stix

Red				
Dark Blue		Green	Yellow	Yellow
Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Pink	Pink	Pink	Pink	

Wikki Stix

Red				
Dark Blue		Green	Yellow	Yellow
Light Blue	Light Blue	Light Blue	Light Blue	Light Blue
Pink	Pink	Pink	Pink	



Neuron Pathway Damage

Black Boxes = Neuron Damage

