1 Neurotransmission: *"Nifty Neurons"*

GOAL

The goal of this lesson is to review the structure and function of a neuron, relating it to the reaction time process.

Set-up:

- Reaction Time poster
- Neuron Structure poster
- White 8 x 11 paper
- Class set of pastels
- Small soft ball

PROCEDURE

Engage (10 minutes) Reaction Time Review

- Review the reaction time experiment, using the ball and throwing it from one student to another for each step.
- The teacher can start the process, then throw the ball to a student who identifies the next step. The ball is thrown to successive students until all the steps have been reviewed.

1. The eye sees the ruler drop.
2. The eye sends a message to the visual cortex.
3. The visual cortex sends a message to the motor cortex.
4. The neuron in the motor cortex sends a message to the neuron in the spinal cord.
5. The neuron in the spinal cord sends a message to the muscle cells in the hand.
6. The muscles in your hand contract to catch the ruler.

Explore/Explain (15 minutes) Nerve Cell Review

- Ask students, "How are messages sent from place to place?" (i.e., eye to visual cortex, or visual cortex to motor cortex). Encourage students to consider the role of neurons in this process.
- During the discussion, reveal facts about neurons such as the ones below.
  - Neurons carry messages in our bodies.
  - There are neurons that connect each point in the reaction time pathway.
  - Neurons are the building blocks of our nervous system.
  - The human brain contains about 100 billion neurons, each of which communicates with thousands of other nerve cells that together, control

PROCEDURE

our every perception and movement.

- Neurons allow us to breathe, move, feel, learn, remember, etc.

• Ask students to recall what they learned about neuron structure in the 3rd grade. Have students brainstorm the neuron terms that they know and write them on the board.

• Students may remember that a neuron/nerve cell has several parts: dendrites, axon, cell body, nucleus, axon terminal, neurotransmitters, neurotransmitter, and receptors.

• Use the neuron structure poster to review and discuss neuron structure.

Evaluate (30 minutes) Nerve Cell Drawing

• Students draw and label neurons using white paper and pastels.

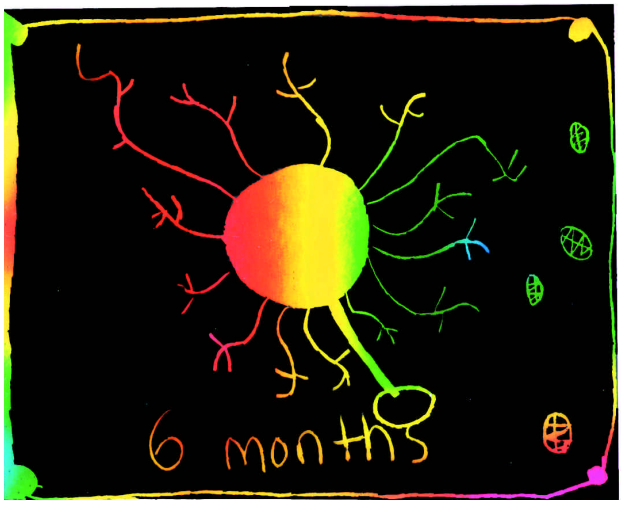
• Remind students that an important job of scientists is to record what they have learned. Sometimes scientists do this by creating a drawing or sketch. Like a scientist, the students are recording what they know about neurons, and it is important to be as accurate as possible.

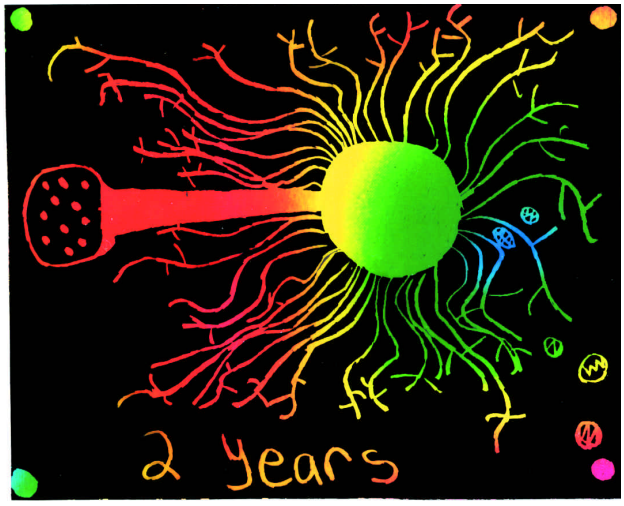
Extension (discussion/artwork) Differences in Nerve Cells

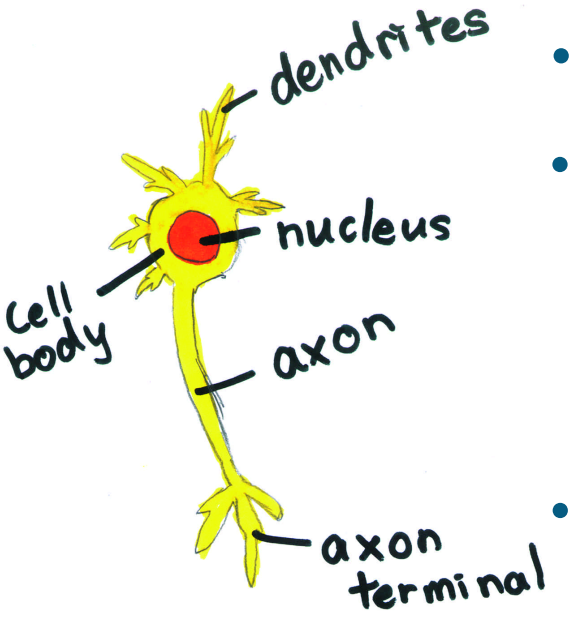
• Ask students, "Why might some nerve cells have different numbers of dendrites than others?"

• Students may discuss their hypotheses. Reveal that younger brains (0 to 2yrs) have fewer dendrites than adolescent or adult brains because as you learn and use new thought processes, you require more dendrites and connections between cells.

• In the artwork extension, students use Scratch Light™ paper to depict the increasing complexity of neurons as a child grows.







- **Key Cognitive Skills:**
  Drawing/labeling

- **Vocabulary Terms:**
  Cell Body
  Dendrites
  Axon
  Axon Terminal
  Neurotransmitters
  Receptors
  Action Potential

- **Specific Outcomes:**
  Students will review, draw, and label the neuron. Students review vocabulary., learn about the growth process and study the body as a system.

PROJECT 2061 BENCHMARKS FOR SCIENTIFIC LITERACY

5C Some organisms' cells ... perform very different roles in the organism.

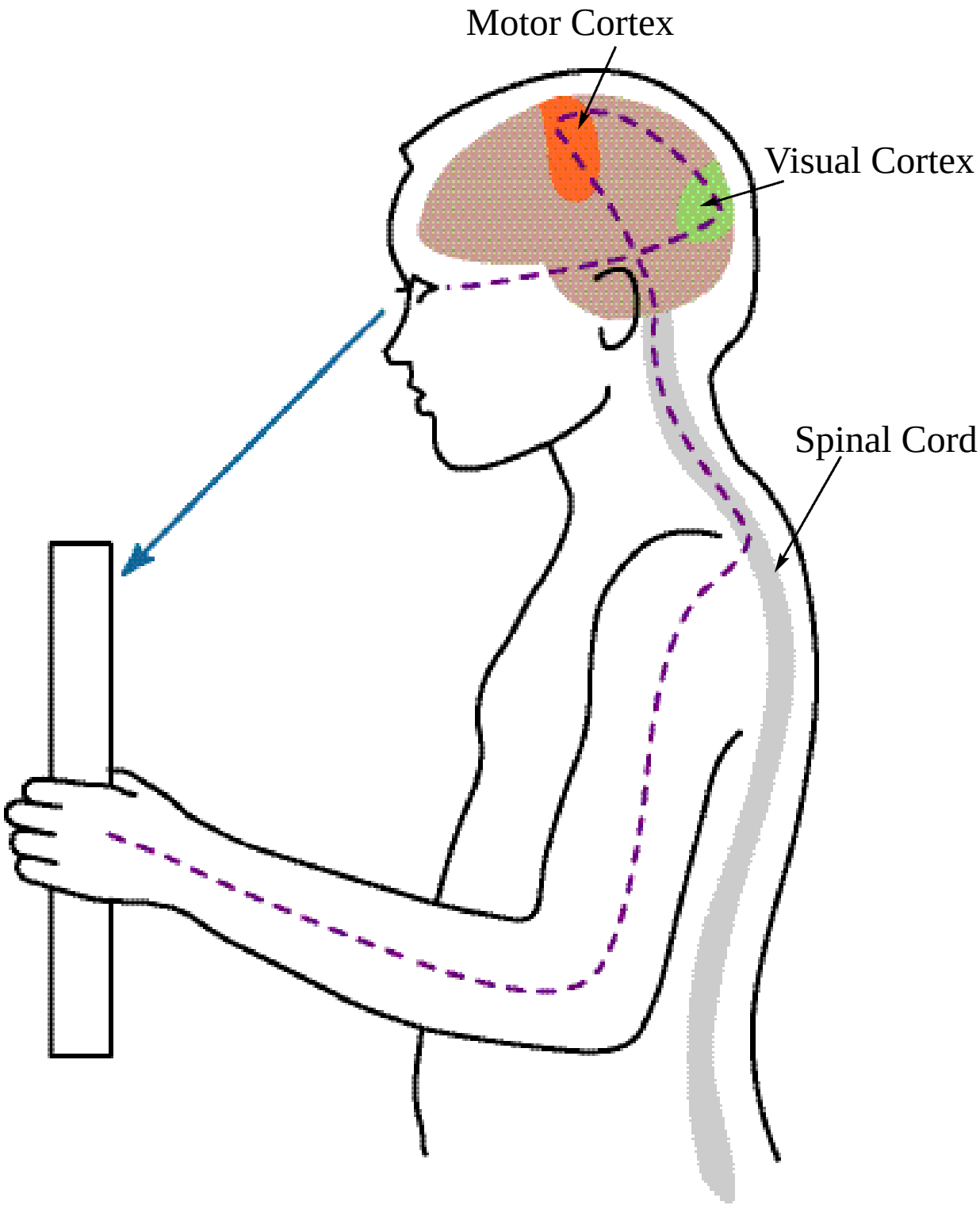
6C Basic Functions
The brain gets signals from all parts of the body telling it what is going on there. The brain also sends signals to parts of the body to influence what they do.

11A Systems
In something that consists of many parts, the parts usually influence one another.

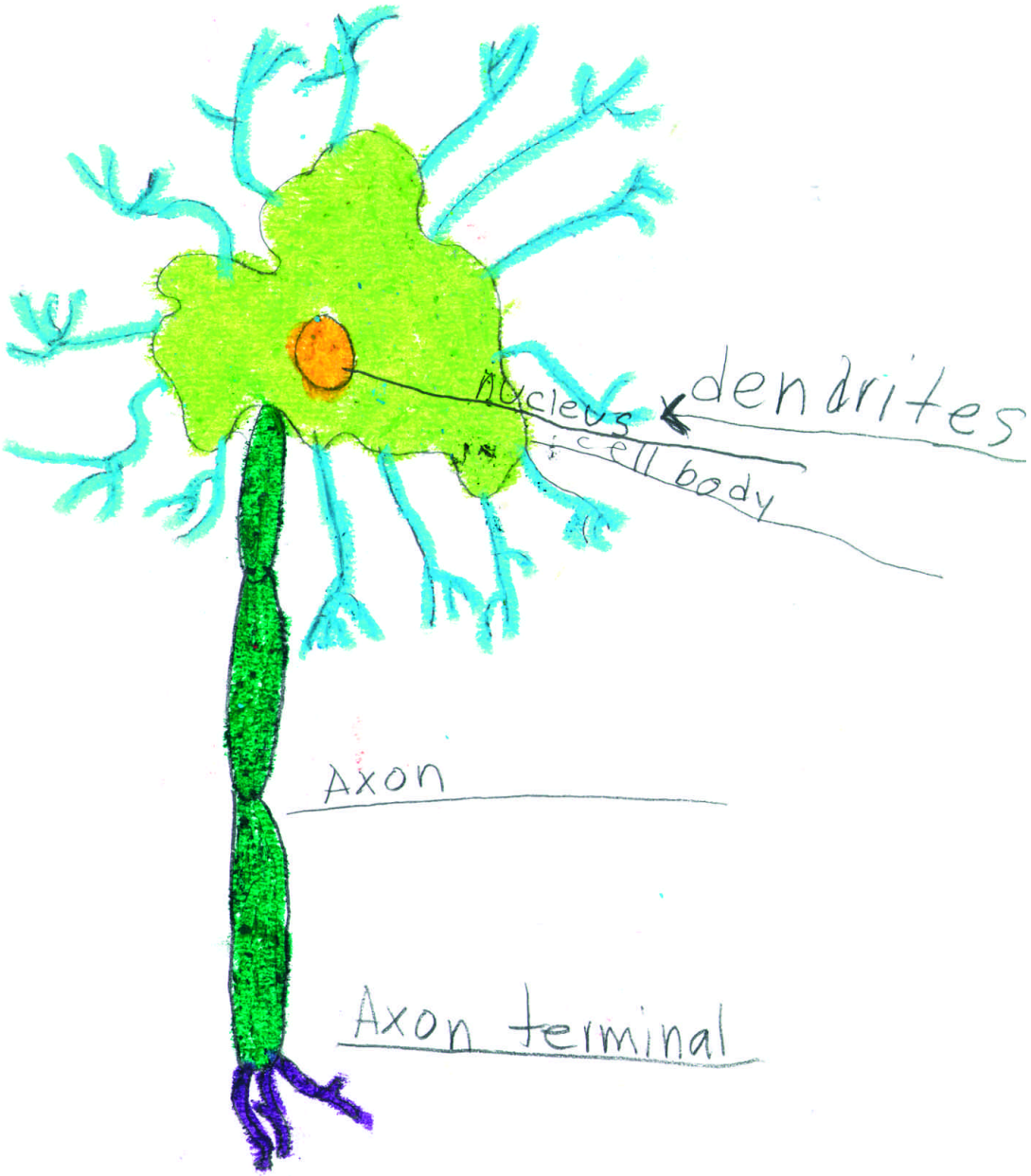
11B Models
Models are often used to think about processes that happen too slowly, too quickly, ...

12C Manipulation & Observation
Make sketches to aid in explaining procedures or ideas.

Reaction Time Poster



Nerve Cell Drawing:
Example of Student Work



Brain Explorers
Nerve Cell Drawing—Teacher Rubric

The following neuron structures should be included:

Cell body with dendrites

- Nucleus
- Axon
- Axon terminal
- Muscle cell (optional)

The following labels should correspond to the neuron drawing:

- Neuron or nerve cell
- Cell body
- Dendrites
- Nucleus
- Axon
- Axon terminal
- Muscle cell (optional)