



Unit Overview

The brain is seemingly a place of miracles. It enables us to think, to learn, to laugh, and to cry. It keeps our heart beating and helps us draw a breath. In the Brain Science unit, students explore a series of informational texts that expose the intricate workings of the brain, challenge their concept of what it means to be human, and help them consider how their own growing brains are impacted by their daily experiences.

In *Phineas Gage: A Gruesome but True Story About Brain Science*, students meet one of the most unforgettable brain injury patients of all time. They trace the events that lead to Phineas's injury, the extraordinary efforts of doctors and scientists to learn from his survival, and the early understanding of brain structure and function that grew from that learning. Through readings from *Inventing Ourselves: The Secret Life of the Teenage Brain*, students add additional information to their understanding of brain structure and function and apply the study of brain science to consider why adolescents behave the way they sometimes do, and how they can expect to change over time. In excerpts from Oliver Sacks's book *The Man Who Mistook His Wife for a Hat*, students meet the real-life patient who really did mistake his wife for a hat, and several other patients with fascinating symptoms. They consider what each set of symptoms reveals about the brain, applying their growing understanding of how the brain functions to these modern brain injury cases. Just as students build a better working model of their brain with each new text, the sequence of texts from less to more challenging allows the work they do in the early texts to support their reading of the subsequent texts.

The lessons provide lots of opportunities for students to collaborate and refine their understanding through a specific partner discussion technique. One of the discoveries students make in the Brain Science unit is the process by which science advances over time, a process not unlike the way in which learners and readers obtain and evolve new understandings. Using a peer instruction method suggested by science educator Eric Mazur, students will have many moments in this unit where they gradually build and refine their knowledge through focused readings and collaborative, problem-driven discussions. These discussions compel students to draw on textual evidence and to distinguish between clear facts and possible interpretations.

Brain science is not only a fascinating topic for middle school students to explore; reading about brain science is functional in helping adolescents understand the stages of their own development. In early adolescence, your students are embarking on the second most rapid age of brain development after infancy. This unit will support students to build awareness of their own unique cognitive strengths and challenges, and of the ways in which they can exert control over their own learning.

Texts

- *Phineas Gage: A Gruesome but True Story About Brain Science* by John Fleischman
- Excerpts from *Inventing Ourselves: The Secret Life of the Teenage Brain* by Sarah-Jayne Blakemore
- Excerpt from "Demystifying the Adolescent Brain" by Laurence Steinberg
- Excerpts from *The Man Who Mistook His Wife for a Hat* by Oliver Sacks
- Excerpts from the majority and dissenting opinions in *Roper v. Simmons*
- EXTRA: "Sonnet—To Science" by Edgar Allan Poe



- EXTRA: “The Brain” by Emily Dickinson
- EXTRA: “Recovery from the Passage of an Iron Bar Through the Head” by John M. Harlow, MD

Skills and Content

Topic & Theme: Brain development and brain disorders

Reading: Synthesize information from multiple texts to develop understanding of a topic

Writing: Describe facts, explain concepts, and convince the reader of an opinion

Activity Highlights: *Perception Academy* Quest, discussions to refine conceptual understanding

Text Features: Narrative and informational nonfiction about discoveries in brain science

Sensitive Content

Phineas Gage describes a real account of a terrible accident that occurred in Cavendish, Vermont, in 1848 when an iron rod was propelled clean through the head of an American railroad construction foreman. Some students may be sensitive to the graphic nature of the content and images that appear in this text.

Grammar Instruction

The Amplify Grammar Pacing Guide provides a sequence of recommended grammar topics for each grade level and identifies both whole class and self-guided lessons to cover each topic. Use this guide to plan grammar instruction for each Amplify Flex Day.

After you have provided some grammar instruction, assess whether students are applying what they’ve learned to their own writing during Amplify’s 12-minute writing activities. If they need support to integrate and apply a new skill, consider assigning one of the grammar revision assignments (found in the Materials section of each Flex Day) to complete at the end of the next 4 writing prompts.

Resources for grammar instruction:

- Flex Days: The Flex Days provide an opportunity for students to receive regular instruction on needed grammar skills.
- Amplify Grammar Unit: The Grammar unit covers key grammar topics for the middle grades, both grade-level topics and areas where students often need review. Topic Pairings:
 - Sub-units 1 and 2: Sentences
 - Sub-units 3 and 4: Pronouns
 - Sub-units 5 and 6: Verb Tenses
- *Mastering Conventions* PDFs:
 - *Mastering Conventions 1, 2, and 3* contain student exercises and teacher instruction to cover grades 3–8 grammar skills.
 - *Mastering Conventions 4* focuses on spelling, including assessment recommendations, student worksheets, teacher instruction, and word lists.



- The Quill™ program. Amplify has partnered with Quill to provide teachers and students use of Quill's extensive writing and grammar lessons and activities. Use the global navigation to access Quill.

Additional Instructional Notes

Many lessons use a technique borrowed from Eric Mazur, a physics professor at Harvard University. This technique helps students work with partners to find the source of their own misunderstandings in the text.

For your reference, below is the sequence of steps used to implement the Mazur technique in the Brain Science unit. Find out more about Eric Mazur's work online at: <http://harvardmagazine.com/2012/03/twilight-of-the-lecture>.

Instructional Steps Based on the Mazur Technique

1. Independently, students answer a factual question based on the text (featured in the lesson, "Phineas Should Have Been Dead").
2. You project students' answers so students can see the range of answers in the class. You do not give students the correct answer yet.
3. Students pair with students who have *different* answers, reconsider their answers while looking back at the text, and come to a common answer with their partners.
4. You show students the range of answers again and this time give students the correct answer.
5. You lead a discussion about where students found the correct answer in the text and which parts of the text led to incorrect answers and misunderstandings.