



**Lesson Summary:** Students explore declarative memory and discuss the effects of practice on improving this type of memory. Students will also discuss different ways to retrieve memories, applying these ideas to how they can be used to study for a test.

Grade Level 5-12

Lesson Length  
1 class period

## Standards Alignment

### Next Generation Science Standards

- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem
- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- 5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.
- MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- **Framework for K-12 Science Education:** Science & Engineering Practices 3

### National Science Standards – Project 2061: Atlas of Science Literacy reference

- a) Scientific inquiry: Evidence and reasoning in inquiry – observations and evidence (p.17, Atlas Vol. 1)
  - *Research on student learning:* “Middle school students tend to invoke personal experiences as evidence to justify a particular hypothesis...More students can recognize these inadequacies in arguments after prompting (for example, after being told that the conclusions drawn from the data were invalid and asked to state why).” (p. 16, Atlas Vol. 1)

## Objectives—Students will

- understand that there are different types of memory.
- experience how memory can be studied.
- explore ways to improve memory retrieval.

## Assessment Options

- Engage students in a discussion about different types of memory and different types of retrieving memory.
- Discuss the anatomy, location, and function of the hippocampus and cerebral cortex.
- Design and carry out an experiment to investigate ways to retrieve words (optional).



## Teacher Guide

### Your Incredible Memory

**Terms** — important vocabulary that can strengthen the lesson -- select terms according to the needs and abilities of your students.

- semantic memory – type of memory used when talking about facts and concepts
  - episodic memory – type of memory used when one talks about events in one’s life; includes time, place and emotions
  - declarative memory – type of memory used when recalling (or declaring) facts or experiences, as opposed to skills
- Both semantic and episodic memories are declarative memories which can easily be forgotten.

- procedural memory – type of memory used in performing skills, learned behaviors, or procedures

Procedural memories are of tasks that are easy to do but difficult to explain to others. For example, it is easy to demonstrate how to ride a bike but it is not easy to describe how to do it. Procedural memories are less likely to be forgotten.

- recall – the act of retrieving memory
- recognition – the act of remembering words or situations that were previously learned or studied; also acknowledging and understanding something that is familiar

### Materials for each pair of students

- list of 10 words -- Make up 4-5 lists of 10 different words and mark each list with an identifying code (i.e., List 1-A, List 2-B).
- paper
- pencil
- lab notebook/science journal for each student (optional)

### Procedures

#### Engage

1. Ask students to describe or write down in detail one of their favorite memories including details of what they were wearing, how long ago the event was, and who they were with, etc. Some students may not remember the details.
2. Ask students whether they needed to practice in order to remember the memory they described. Discuss what they think memory is: how and why we come to have memories, how reliable a person’s memory is.

#### Explore

1. Place students into pairs.

One student will be the recorder and the other will be the reader. The recorder should have pencil and paper handy.



## Teacher Guide

### Your Incredible Memory

2. Round 1: The reader reads aloud a list of 10 words (provided by the teacher). After the reader finishes reading aloud the last word, ask the recorder to write down all the words he/she remembers.
3. Round 2: The reader reads the list of words two more times, each time in a different order, without skipping any word. After these readings, the recorder writes down all the words s/he remembers.
4. Ask the students to swap roles and give them a new list of words. Repeat rounds 1 and 2 in the new reader and recorder roles.

#### Explain

1. Discuss with students what they thought about their results. Ask them to compare and contrast their results and draw conclusions.
  - Was there a difference between the number of words remembered during round 1 versus round 2?
  - Were there specific words that they remembered vividly?
  - Did the order of the words affect their ability to be recalled?
  - Were words recalled that were not in the list?
2. Discuss the anatomy, location, and function of the cerebral cortex and the hippocampus.

Note: Discussion about the hippocampus can be tied in to the hippocampus extraction during sheep brain dissection.

#### Elaborate and Extend

- Ask students what other ways one could test memory.

They could switch the order of words, use a list of related words, see if people remember words that weren't in the list, etc.
- Talk about recall and recognition memory.

Explain that the hippocampus and cerebral cortex are storage areas for memories and are used to retrieve memories. The types of memories that are stored and/or retrieved in these areas are declarative memories and can be retrieved using recall or recognition.
- Discuss with students whether they used certain strategies to remember the words. Ask them to describe what those strategies were.
- Ask students to identify or describe strategies they can use in remembering the words. Relate this to how they can use these strategies to study for tests.