Unit VII - Answer Key

Cognition

Module 31 - Studying and Encoding Memories

While You Read

31-1

1. Answers will vary but strong answers should mention that memory is the persistence of learning.
2. Studying cases of people with high and low functioning memory gives us clues to what is possible and also what is lacking when certain structures are impacted, such as with a stroke.
3. The multiple-choice portion of the AP Psychology exam is a recognition test because you simply need to choose the correct answer; the Free Response Section of the AP Psychology is more typical of a recall test because no answer choices are provided for you.
4. Ebbinghaus argued that the more he practiced/rehearsed the nonsense syllables the less time it took him to relearn them the next day.

31-2

1. Answers will vary.
2. Parallel processing is the brain's natural mode of information processing. Here, you process many aspects of a problem or situation simultaneously, and sometimes partly unconsciously. Answers will vary.
3. Atkinson and Shiffrin: Record information as sensory memory, process it into short-term memory, move it into long-term memory

Information-processing: Get information in (encode), retain it (storage), get it out (retrieval) The information-processing model is similar in that it requires encoding to move material from the sensory memory to the STM and the LTM and retrieving still occurs from LTM to STM. Storage in the information-processing model is LTM in the Atkinson and Shiffrin model.

4.

- External event: being presented with the formula and moving it to sensory memory; the components of the formula being the sensory input
- Encoding the formula by attending to the information and moving it to the STM/working memory, where you will see how it would be applied to a problem, compare it to other formulas you have learned, label it, and so on
- Storing the formula in LTM and then retrieving it for use in the STM/working memory while you use it for an exam problem, for example

5. The term *working memory* implies a cognitive function-- we have to work with information, make connections, rehearse it, and actively process it.

6. In an experiment where people typed new information they would need later and knew the information would be available online later, they invested less energy in remembering and then remembered the material less well. They did not “work” with the new information in order to move it from working memory to LTM.

31-3

1. Explicit memories for the facts and experiences we know are processed through conscious, effortful processing. Implicit memories for the skills and conditioning we have acquired are processed automatically.
2. Declarative memories are those we can consciously know and declare—these are explicit memories, such as episodic memory (my 6th birthday party) and semantic memory (George Washington was president of the United States).

   Nondeclarative memories are those that happen without our awareness and are implicit memories and could include procedural memory (how to ride a bike).

31-4

1. Answers will vary but should reflect an understanding of the information on text page 331.
2. Effortful processing can become automatic through practice and experience.

31-5

1. It is the immediate, very brief recording of sensory information in the memory system. This is often "fleeting." It comes before processing into short-term memory.
2. Echoic memory is a momentary sensory memory of auditory stimuli where sounds and words can still be recalled within 3–4 seconds even if your attention is elsewhere. Iconic memory is a momentary sensory memory of visual stimuli where you can recall a photographic or picture-image memory.

   Answers will vary.

31-6

1. In short-term memory, we can recall about seven information bits (give or take two) if nothing distracts us. Working-memory capacity varies by age and other factors. Young adults have more working-memory capacity compared with children and older adults.
2. When we do two things at once, we don't do either of them as well as when we do one thing at a time.

31-7

1. It is easier to retrieve information organized into categories (remember the hanging file folder "Mythical winter figures"). When words are organized into categories, recall is two to three times better.
2. Answers will vary.
3. The testing effect shows that challenging the brain to retrieve information is a more successful way to learn. Rereading over and over lulls you into thinking you "know" the material but the only way to ensure you KNOW it is to try to retrieve it—if you can, you DO!
4. Answers will vary.

31-8

1. Shallow processing encodes on a very basic level—using a word's letters or sounds, for instance. Deep processing encodes semantically, based on the meaning of the words or connections that can be made with the words to previous experiences, memories, and so on.
2. We need context to be better able to retrieve information—knowing the meaning of an arbitrary paragraph, for example, better enabled students to recall the text of the paragraph.

3. Information deemed "relevant to me" is processed more deeply and remains more accessible.

4. Answers will vary

After You Read

Module 31 Review

Terms		*Definitions*
A **1.**	short-term memory	**A.** activated memory that holds a few items briefly before the information is stored or forgotten
F **2.**	working memory	
G **3.**	explicit memory	**B.** a momentary sensory memory of visual stimuli; a photographic or picture-image memory lasting no more than a few tenths of a second
H **4.**	effortful processing	
B **5.**	iconic memory	**C.** the relatively permanent and limitless storehouse of the memory system
E **6.**	echoic memory	
C **7.**	long-term memory	**D.** the immediate, very brief recording of sensory information in the memory system
I **8.**	implicit memory	
D **9.**	sensory memory	**E.** a momentary sensory memory of auditory stimuli; if attention is elsewhere, sounds and words can still be recalled within 3 or 4 seconds
J **10.**	automatic processing	
		F. a newer understanding of short-term

memory that focuses on conscious, active processing of incoming auditory and visual-spatial information, and of information retrieved from long-term memory

G. memory of facts and experiences that one can consciously know and "declare"

H. encoding that requires attention and conscious effort

I. retention independent of conscious recollection

J. unconscious encoding of incidental information such as time, space and frequency

11. 1776 1815 1914 1945 2001

Placing them into years instead of one long string creates smaller chunks of numbers that are easier to remember.

12. Answers will vary

13. Spacing effect: She should study smaller portions of the material each day. Spacing out her studying instead of cramming gives more time for encoding and produces better long-term recall.

Testing effect: She should repeatedly test herself. Practicing retrieving material rather than just rereading it results in higher recall.

Deep processing: She should study the material based on the meaning of the words—or semantically.

14. Echoic memory. Katrina is still hearing the echoes of the teacher's words. Auditory echoes tend to linger for 3 or 4 seconds.

Module 32 - Storing and Retrieving Memories

While You Read

32-1

1. While short-term memory holds approximately 7 items, long-term memory is essentially limitless.
2. We do not store information as libraries store their books, in precise locations. Instead, many parts of the brain interact as we encode, store, and retrieve information that forms our memories.

32-2

1.
   a. Episodic
   b. Semantic
   c. Semantic
2. The hippocampus is the brain's "save" button for explicit memories. Brain scans of people recalling words show that new explicit memories of names, images, and events are laid down via the hippocampus. However, memories are not permanently stored there— the hippocampus temporarily "holds" the memories for the brain to register and process a remembered episode, which then is stored elsewhere.
3. During sleep, the hippocampus processes memories for later retrieval. The greater the hippocampus activity during sleep, the better the next day's memory will be of a given training.

32-3

1. The cerebellum plays a role by forming and storing the implicit memories created by classical conditioning. With a damaged cerebellum, people cannot develop certain conditioned responses, such as associating a tone with an impending puff of air.

2. The basal ganglia (deep brain structures involved in motor movement) facilitate formation of our procedural memories for skills. They receive input from the cortex but do not send the information back to the cortex for conscious awareness of procedural learning.

4. Infantile amnesia is the experience of not consciously remembering the first three years of our lives, although as adults we do remember the reactions and skills we learned during our infancy. Two influences contribute to this: first, we index much of our explicit memory using words that nonspeaking children have not learned. Second, the hippocampus is one of the last brain structures to mature and it is key in remembering explicit memories.

32-4

1. Stress hormones provoke the amygdala to initiate a memory trace in the frontal lobes and basal ganglia and to boost activity in the brain's memory-forming areas.

2. Personal answers will vary but should reflect the understanding that they are clear, vivid, snapshots of a very significant event. In this context, flashbulb refers to the old bulbs on top of cameras that would "flash" and freeze a moment on film. Flashbulb memories are explicit—they are episodic memories (declarative).

3. Because they are rehearsed and relived, they tend to be more accurate than other memories. They are, however, not perfect memories of an event; even if the inconsistencies remain consistent.

32-5

1. They observed changes in the synapse during learning in the California sea slug, *Aplysia.* They were able to see changes in the amount of the neurotransmitter serotonin released into certain synapses when the slug was learning to withdraw its gills prior to an electric shock. Those synapses then became more efficient at transmitting signals.
2. The increased efficiency of potential neural firing (as shown above in #1) provides a neural basis for learning and remembering associations. Evidence for LTP: Drugs that block LTP interfere with learning, mice lacking LTP couldn't learn, rats with enhanced LTP learned with half the mistakes, and rats injected with a chemical that blocked LTP lost recent learning.

   ECT or a concussion can block this process and will result in recent memories being erased.

32-6

1. recall—retrieving information that is not currently in conscious awareness. Examples will vary. recognition—identifying items previously learned. Examples will vary. relearning—learning something more quickly when learning a second time. Examples will vary.
2. Answers will vary but should reflect understanding that previous associations can unconsciously recall other associations.
3. Putting yourself back in the context where you experienced something can prime your memory retrieval. Sometimes returning to the spot where we created a task can help spur recollection of that task. We've all gone upstairs to get something only to get up there and

not remember what we went up for—going back down to retrace our steps (or reestablish context) is often a trigger to remind us of our mission.

4. State-dependent memory refers to the emotional or physiological state one is in when making a memory, not where one is located (context) when making the memory.
5. Mood-congruent memory influences the retrieval and recall of other memories made when in that same mood. If you had a bad night, your mood may make it easier to recall other times when you had a bad time. Personal answers will vary but should reflect understanding of the effect of mood on memory retrieval.
6. The serial position phenomenon refers to the likelihood of recall based on which position in a series a particular event, word, number, etc. falls. Researchers have found, and Figure 32.7 shows, that items recalled best tend to fall at the beginning (primacy effect) of a list, or at the end (recency effect) of a list.

   New example answers will vary.

After You Read

Module 32 Review

1. **b.** hippocampus.
2. **d.** cerebellum.
3. **e.** basal ganglia.
4. **c.** your first kiss
5. **e.** long-term potentiation
6. **b.** priming

7. **b.** recall the countries at the end of the list only.
8. Danielle will most likely recall other sad and depressing times in her life as memories tend to be mood-congruent.
9. John likely has an undamaged cerebellum as evidenced by his retention of implicit skill memory for driving.

   John likely has a damaged hippocampus as evidenced by his inability to recall the explicit semantic and episodic information of the bank robbery and loot location.

   John does recall where he lives, which would be information stored in other places of the brain as the hippocampus does not seem to store memories permanently.
10. An essay test is a measure of recall, and studies have shown that recall is less successful in retrieving memories than recognition. You might advise Jorge that a multiple-choice test, as a recognition test, is actually a better bet for retrieving material for an exam.

Module 33 - Forgetting, Memory Construction, and Improving Memory

While You Read

33-1

1. If we remembered everything, we would be overcome with a "junk heap of memories." Forgetting helps us discard the clutter of useless or out-of-date information.

2. With anterograde amnesia, a person cannot form new memories; they can only remember the past.

With retrograde amnesia, a person cannot remember their own past. Personal examples will vary.

3. Nonverbal tasks are generally implicit memories that are not affected by damage to the hippocampus because they are processed by the cerebellum.

4.

- **a.** Much of what we sense we never actually notice and if we do not encode the stimuli, it is not there to be remembered. Age can affect encoding as well.
- **b.** The course of forgetting is rapid initially, then levels off with time. There is a gradual fading of the physical memory trace.
- **c.** Sometimes important events defy attempts to access them in memory—tip of the tongue phenomenon, where one can just remember the tiniest part of the memory until being provided with context cues, occurs to many of us.
- **d.** When prior learning disrupts recall of new information—your memorized old phone number makes it harder to memorize your new one after a move.

e. When new learning disrupts recall of old information—eventually that new phone number becomes the one easily recalled, and it is the old phone number you can no longer retrieve.

f. Repression is a psychoanalytic term describing an unconscious forgetting of painful or unacceptable memories to protect our self-concept and to minimize anxiety.

4. Memory for novel information fades quickly (over the first few days) then levels out with time.

5. Proactive interference is when a person is unable to recall new information; retroactive interference is when a person is unable to recall old information.

6. Most people (60-90%) believe that painful or anxiety-laden memories can be banished from consciousness. Most researchers think that repression, rarely, if ever occurs.

33-2

1. Loftus found that when witnessing an event, then receiving or not receiving misleading information about the event prior to a memory test, those exposed to misinformation misremembered. This finding calls into question the use of eyewitnesses in a court proceeding. Lawyers can use this effect by subtly changing the words they use to question witnesses to generate "memories" that support their case.

2. Answers will vary.

3. Source amnesia is attributing to the wrong source an event we have experienced, heard about, read about, or imagined. We may think an idea is our own because we have forgotten that we actually heard someone else talk about it a month ago. Source amnesia is at the heart of many false memories.

4. The author suggests that the key to déjà vu seems to be familiarity with a stimulus without a clear idea of where we encountered it before—like source amnesia.
5. Both the misinformation effect and source amnesia happen outside our awareness, so it is nearly impossible to sift suggested ideas out of the larger pool of real memories. False memories can be very persistent, and we more readily remember the gist and not the specifics.

33-3

1. Children can produce false, often vivid, stories regarding one or more events they have never experienced when questioned repeatedly with suggestive interview techniques. Neither psychologists nor the children themselves could separate real memories from false ones.
2. When questioned about their experiences in neutral words they understood and when interviewers used less suggestive, more effective techniques, children have been shown to be reliable eyewitnesses. Children were especially accurate when they had not talked with involved adults prior to the interview and when their disclosure was made in a first interview with a neutral person who asked nonleading questions.
3. There is a controversy surrounding the validity of recalled memories of abuse. Research on source amnesia and the misinformation effect has shown how flawed memory can be. When combined with suggestions from a respected therapist ("your symptoms are similar to those who have been abused"), hypnosis, and visualization, the patient can create an image of an abuse situation that grows more vivid.
4. They have convened study panels and issued public statements in order to protect abused children and wrongly accused adults, and have agreed on the following: sexual abuse

happens; injustice happens; forgetting happens; recovered memories are commonplace; memories of things happening before age 3 are unreliable; memories "recovered" under hypnosis or the influence of drugs are especially unreliable; and memories can be emotionally upsetting (whether real or false).

33-4

1. Answers will vary.

After You Read

Module 33 Review

1. **b.** anterograde amnesia.

2. **d.** retrograde amnesia.

3. **d.** Amelia's knowledge of the French she learned 20 years ago is about the same now as it was 10 years ago.

4. **d.** proactive interference.

5. **b.** déjà vu.

6. **d.** people's recall may easily be affected by misleading information.

7. **b.** source amnesia.

8. **e.** repression.

9. **d.** Initially, Caitlin's recall of the French was blocked through proactive interference, and eventually, recall of the Spanish vocabulary is blocked through retroactive interference.

10. **a.** children's recollections can be easily skewed by suggestive interviewing techniques.

Module 34 - Thinking, Concepts, and Creativity

While You Read

34-1

1. Concepts are mental groupings of similar objects, events, ideas, and people. They simplify our thinking (it is easier to think of a "dog" than a "Cocker Spaniel").

   Personal examples will vary.
2. A prototype provides us with a quick and easy method for sorting items into categories (such as when we are comparing feathered creatures to a prototypical bird, such as a sparrow).
3. When an object doesn't fit our prototype (think "penguin"), category boundaries blur and we have difficulty recognizing the object. Perception is impacted and we may miss important information because we don't know how to categorize the information.

34-2

1. Fill in the blanks with convergent or divergent-- Working to solve a long-division problem requires __convergent__ thinking; coming up with a list of uses for a paperclip requires __divergent__ thinking.
2. Answers will vary but students should have examples that support their self-identification. Expertise, imaginative thinking skills, a venturesome personality, intrinsic motivation, and a creative environment should all be included in the student response.
3. Studies suggest that a certain level of aptitude—a score above 120 on a standard intelligence test—supports creativity. Those who score high in quantitative aptitude as 13-year-olds are more likely to obtain graduate science and math degrees and create published or patented work. Intelligence matters but there is more to creativity than just that.

4.

- Expertise is a well-developed base of knowledge.
- Imaginative thinking skills involve seeing things in novel ways and recognizing patterns.
- A venturesome personality seeks new experiences and tolerates risk.
- Intrinsic motivation involves being driven by interest and challenge.
- A creative environment is needed to support and refine creative ideas.

5. Develop expertise, allow time for incubation, set aside time for the mind to roam freely away from distractions, and experience other cultures and ways of thinking.

After You Read

Module 34 Review

1. In the chart below, create either a concept, a prototype or both

Concept	**Prototype**
	Apple
Furniture	
	4-door sedan
flower	

2. Devon is part of a consumer survey group and is being asked to think of as many ways as he can to improve gas mileage in a new line of vehicles. Devon's responses require ___divergent_____ thinking.

3. In Geometry class, Chantal is asked for the answer to a problem on the board. Her response requires __convergent___ thinking.

4. Sternberg's five components of creativity are expertise, imaginative thinking skills, a venturesome personality, intrinsic motivation, and a creative environment.

Module 35 - Solving Problems and Making Decisions

While You Read

35-1

1. Algorithms are step-by-step procedures that guarantee a solution to a problem. If trying to open a locker without a combination, starting at 0-0-0 and moving to 0-0-1, 0-0-2, and so on all the way through the possible numbers, will prove a successful strategy, albeit lengthy. Heuristics, on the other hand, are short cuts or simple strategies that allow us to solve problems more efficiently and quickly, usually faster, although more errors may result. For instance, to open the locker without a combination, one could take a baseball bat or crowbar to the locker. This strategy might open the locker faster than trying every combination but may also result in damage to the locker (an error) that makes it unusable in the future.
2. Insight is a sudden realization of a problem's solution—it is not a strategy per se, but the solution just comes "out of nowhere."
3. Working with chimpanzees he demonstarted that humans are not the only animals who make use of this problem solving strategy.
4. Answers will vary but students should demonstrate an understanding of confirmation bias as a problematic tendency to search for information that only supports our preconceptions and to ignore any contradictory evidence. Mental set should be defined as a tendency to approach a problem with the mind-set of what has worked for us previously and the example should demonstrate why this can be a problem.
5. Answers will vary

35-2

1. Intuition is huge. Today's cognitive science offers many examples of unconscious influences on judgments—taking time to let unconscious processes work often results in answers. Intuition enables us to react quickly.
2. The representativeness heuristic judges the likelihood of things in terms of how well they seem to represent or match our prototypes.

   Examples will vary.
3. The availability heuristic estimates the likelihood of events based on their availability in memory—if instances come readily to mind, we presume such events are common.

   Examples will vary

35-3

1. We fear what evolution taught us to fear; we fear what we cannot control; we fear what is immediate; we fear things based on the availability heuristic-how readily something is in our memory

35-4

1. Answers will vary but should include an understanding that overconfidence is the tendency to be more confident than correct—to overestimate the accuracy of our beliefs and judgments.
2. Belief perseverance is clinging to an opinion even when the basis on which it was formed has been discredited. Confirmation bias is when you search only for information to affirm your opinion.

   Answers will vary.

3. Answers will vary but should include an understanding that the way we present an issue can impact the decisions and judgments on that issue.

35-5

1. Intuition is huge. Today's cognitive science offers many examples of unconscious influences on judgments—taking time to let unconscious processes work often results in answers. Intuition enables us to react quickly.

Intuition is implicit knowledge—what we've learned that can't be fully explained—blitz chess players can look at a board and intuitively know the right move. Intuition is analysis frozen into habit.

After You Read

Module 35 Review

Terms			*Definitions*
H	**1.**	algorithm	**A.** a tendency to search for information that supports our preconceptions and to ignore or distort contradictory evidence
E	**2.**	heuristic	
D	**3.**	insight	
A	**4.**	confirmation bias	**B.** a tendency to approach a problem in one particular way because the approach has been successful in the past.
B	**5.**	mental set	
F	**6.**	representative heuristic	**C.** the way an issue is posed; how an issue is phrased can significantly affect decisions and judgments
J	**7.**	availability heuristic	
I	**8.**	overconfidence	
G	**9.**	belief perseverance	

___C__ **10.** framing

D. a sudden realization of a problem's solution

E. a simple thinking strategy that often allows us to make judgments and solve problems efficiently but may sometimes lead to the wrong conclusion

F. judging the likelihood of things in terms of how well they seem to represent, or match, particular prototypes

G. clinging to one's initial conceptions after the basis on which they were formed has been discredited

H. a methodical, logical rule or procedure that guarantees solving a particular problem

I. the tendency to be more confident than correct, to overestimate the accuracy of our beliefs and judgments

J. estimating the likelihood of events based on their availability in memory

11. a. the representativeness heuristic

12. e. the availability heuristic.

13. b. mental set

14. e. framing.

15. Confirmation bias involves only looking for information that supports our beliefs; belief perseverance involves ignoring evidence that proves our beliefs are wrong.

Module 36 - Thinking and Language

While You Read

36-1

1. Answers will include reference to spoken words, written words, signed words, even body language that conveys information, knowledge, or meaning.

2. A phoneme is a distinctive sound unit. A morpheme is the smallest unit that carries meaning (can be a word or a part of a word).

3. Answers will vary.

4. i-n-c-o-m-p-r-e-he-n-s-i-b-le

morphemes: in - comprehens - ible

5.

a. This has correct syntax (the words are in the correct grammatical order—nouns, adjectives, verbs where they belong).

The sentence has faulty semantics—the words' meanings: What is a sluggish calendar? How can butchers be immediate?

b. This question has faulty syntax—the nouns, verbs, and other parts of speech are jumbled.

6. Answers will vary

36-2

1. Noam Chomsky believes that all languages share a universal grammar, such as nouns, verbs, and adjectives as grammatical building blocks. As humans, we are born with a built-in predisposition to learn grammar rules, which helps explain why young children pick up language so readily and use grammar so well.

36-3

1. By 4 months, most babies can recognize differences in speech sounds and can also read lips, and they prefer to look at a face that matches a sound because they recognize the sounds that come from the facial expressions—they are beginning to understand what is said to and about them (receptive language).
2. babbling stage: around 4 months, spontaneously uttered sounds (da da ba ba na)
   one-word stage: age 1 to 2, speaks commonly heard words in the home (doggy, ball)
   two-word stage: starting at age 2, telegraphic speech (me down!, want juice!)
   early elementary school: by age 5, complex sentences, double meanings ("sand which" for example)
3. There is a "window" of time when language mechanics can be learned, and that window closes gradually in early childhood. By about age 7, those who have not been exposed to either a spoken or signed language gradually lose their ability to master any language.
4. Answers will vary but should reflect an understanding of the critical period, and the various phonemes that can be produced at birth.
5. Like with children who can hear, deaf children must be exposed to spoken or signed language in order to develop language of their own. They must be exposed during the critical period, cochlea implants are most effective when given before age 2, to have the best results.

36-4

1. Aphasia is a language impairment, usually caused by left-hemisphere damage either to Broca's area (speaking) or Wernicke's area (understanding).

2. Broca's area controls language expression. Wernicke's area controls language reception—understanding what is being said.

   Examples will vary.

3. The big functions—speaking, perceiving, thinking, remembering—are all handled in smaller sections of the brain although it seems indivisible. The brain is computing each sound, word form, meaning, and so on using different neural networks.

36-5

1. Whorf thought that language shaped a person's ideas—that we couldn't have thoughts we didn't have words for. That might be too extreme—we CAN think of things we cannot name.
2. The Japanese language has more words for interpersonal emotions such as sympathy, while English has more self-focused emotion words, such as anger. Bilingual individuals report having a different sense of self depending on which language they are using.
3. Artists, poets, composers, mathematicians, athletes and scientists all think in images.

   Thinking in images can provide mental rehearsal, which can aid performance - obviously in the end, reality must be where you show your academic or athletic strength, for example.

4. "Thinking affects our language, which then affects our thought."

After You Read

Module 36 Review

1. **c.** Benjamin Whorf.
2. **b.** It has 2 morphemes and 9 phonemes.

3. **b.** he wasn't exposed to any other languages but Spanish and lost his innate ability to hear and produce sounds and tones outside his native language.

4. **a.** telegraphic speech.

5. **d.** Wernicke's aphasia.

✓ Check Yourself

Sample answers:

Short-Term Memory Maria may have an inability to remember more than 7+/–2 names of key generals in a battle or be unable to hold the dates of wars in her memory for longer than 20 seconds.

Retroactive Interference Inez may find that each new history chapter she learns makes it harder to recall the information from earlier in the course. She will likely do poorly on cumulative tests or final course tests, or may require an inordinate amount of review time, as she will not remember the material from the beginning of the year.