

## UNIT A: LESSON 1

### LEARNING TARGETS

#### INSTRUCTIONS FOR TEACHERS:

- Refer students to the standards and objectives.
- Review the standards and objectives with students one at a time.
- At the end of the lesson, ask students what they did in class to meet the standards.

#### INSTRUCTIONS FOR STUDENTS:

Listen as your teacher reviews the standards and objectives. Your teacher will call on an individual or pair to explain what they mean.

#### Learning Target:

I can **determine** the **main** ideas and **supporting details** in the **article** “Teens and Decision Making.”

#### Learning Target:

I can **determine** the meaning of unknown **technical** words.

*determine* – decide  
*main* – central or most important  
*supporting details* – helping ideas  
*article* – a short text in a newspaper or magazine  
*technical* – having to do with specific subjects

## ACQUIRING AND USING VOCABULARY

### INSTRUCTIONS FOR TEACHERS:

- Review student instructions.
- Familiarize students with their glossary. It is located in Appendix A (Glossary; labeled “Appendix: Glossary” in the student version). Tell students to use the glossary throughout the lesson.
- Pre-teach the vocabulary selected for extended instruction, provided as word cards in Appendix B (Teacher Resources). This vocabulary is abstract and critical to understanding the text.

### INSTRUCTIONS FOR STUDENTS:

Your teacher will pre-teach several key words. Use your glossary for the rest of the lesson to find meanings for words you don't know. Words that are **bolded** in the text and word banks can be found in the glossary. The glossary is located in the Appendix at the end of the lesson.

## THINKING LOG

### INSTRUCTIONS FOR TEACHERS:

- Read the guiding question and text aloud to students, modeling appropriate pace and intonation.
- During the read-aloud, define words and phrases in context that students are unlikely to know, drawing definitions from the glossary when you can. Translations, examples, gestures, and visuals also help.
- Ask students to read the text on their own and work with a partner to answer supplementary questions.
- Ask students to use their glossary to help them with word meanings.
- Call on pairs to answer the supplementary questions.
- Discuss the guiding question(s) as a group and then have students write the answer in their student chart.

### INSTRUCTIONS FOR STUDENTS:

Your teacher will ask you a guiding question that you will think about as your teacher reads the text aloud to you. As your teacher reads the text aloud, listen and follow along in your text. After the text has been read aloud, work with a partner to reread the text and answer the supplementary questions. Use your glossary to help you. Your teacher will review the answers with the class. You will then discuss the guiding question(s) with your teacher and the class. Finally, you will complete a written response to the guiding question(s).

**GUIDING QUESTION:** *Are teen brains the same as adult brains? Why or why not? Why is this information important?*

### PART A: TEENS AND DECISION MAKING: WHAT BRAIN SCIENCE REVEALS

Do you ever act before thinking? Have you ever wondered why? Do you worry this might create problems? If you answered "yes" to any of these questions, read on.

Picture this: Your finger is poised on the send button, your eyes scanning an angry e-mail you've dashed off to a friend who has upset you. Some things you've written are a little harsh. In your brain a little red light goes off, but, what the heck, you're steamed and your friend deserves it.

You push the button.

Whether you're aware or not, rushed **decisions** like this—acting before thinking it through—happen more often in **teens** than in **adults**. Recent discoveries in brain science may help explain why this is so.

First, a bit about how a brain makes decisions. Decisions don't "just happen" **automatically** in conscious mind. They stem from a **series of events** in the brain, which happen almost **instantaneously**. This involves a **relay system** in which different **structures**—made up of specialized cells called **neurons**—talk with each other by way of **electrochemical impulses** and **chemical** messengers, called **neurotransmitters**.

Information flowing through this **decision-making** circuit is analyzed in the different **structures**. Then the **network**, as a whole, puts out a **response**. This output provides the basis for our **behaviors** and actions.

While this is basically the same for **teens** and **adults**, the devil is in the details. Since the brain is not fully **developed** until the early 20s, the way in which a **teen's decision-making** circuit **integrates** information may put him or her at a higher **risk** of making **decisions** the **teen** could later **regret**.

**PART A: WORD BANK**

actions	<b>developed</b>	<b>neurotransmitters</b>	teens
angry	<b>electrochemical impulses</b>	output	thinking
<b>automatically</b>	imagine	problems	twenties
<b>behaviors</b>	<b>instantaneously</b>	<b>regret</b>	
brain	mean	<b>response</b>	
chemical messengers	<b>network</b>	<b>series of events</b>	
<b>decision</b>	<b>neurons</b>	similar	

**PART A: SUPPLEMENTARY QUESTIONS:**

1. *Look at the title. What can we learn from brain science?*

The science of the brain can help teens understand how they make a decision (the act or result of making up one's mind).

2. *What is the author asking you in the very first paragraph?*

The author is asking me if I sometimes do things without thinking. The author is asking me if this might make problems for me.

3. *What does the author ask you to imagine, and how do you react?*

The author asks me to imagine, or picture, that I am angry at a friend because the friend has sent me an email that makes me angry. I react by writing a mean (not nice) email to my friend.

4. *What do you think "In your brain a little red light goes off" means?*

"In your brain a little red light goes off" means your brain is trying to warn you that you are about to do something bad (good/bad).

5. What does "You push the button" mean that you do?

"You push the button" means that you send the mean email to your friend. You send the email even though your brain is warning you *not* to do it.

6. Does acting before thinking happen more often to teens or to adults?

Making quick decisions happens more often to teens (teens/adults).

7. What is another way of saying "decisions made by our brains don't just happen?"

Another way of saying "decisions made by our brains don't just happen" is "decisions don't happen automatically."

8. Does just one thing happen in the brain when you make a decision?

No, there are a series of events that happen when you make a decision.

9. Does making a decision take a long time?

(Yes/No) No, your brain does not (does/does not) take a long time to make a decision. The brain works almost instantaneously (at the same time).

10. Different structures in the brain communicate, or talk with each other. How do they do this?

Different structures in the brain communicate using specialized cells called neurons. The neurons use electrochemical impulses and chemical messengers to communicate.

11. What are the electrochemical impulses and chemical messengers called?

Electrochemical impulses and chemical messengers are called neurotransmitters.

12. What are the structures as a whole called?

The structures as a whole are called a network.

13. What does the network produce, or put out?

The network produces a response.

14. What is a synonym for (another word meaning the same as) response?

A synonym for response is output.

15. The output of the network in our brains is responsible for, or in charge of something. What is it responsible for?

The network in our brains is responsible for our behaviors and actions (how we act and what we do and say).

16. *Are the brain networks of teens and adults basically similar (the same) or different?*

The brain networks of teens and adults are basically similar (similar/different).

17. *But there is a difference between the teen and adult brain. What is the difference between the brains of teens and adults?*

The brain does not develop fully until a person is in their early twenties. The teen brain is not fully developed. The adult brain is fully developed.

18. *What can happen to teens if their brains are not yet fully developed?*

If the teen brain is not yet fully developed, the teen may make bad (good/bad) decisions that he or she may regret (feel sorry for) later.

#### PART B: THE TEEN BRAIN: UNDER CONSTRUCTION

Not long ago, scientists thought the human brain was fully **mature** long before the **teen** years. While **research** shows that one's brain reaches its **maximum** size between ages 12 and 14 (depending on whether you are a girl or a boy) it also shows that brain development is far from complete. **Regions** of the brain continue to **mature** all the way through a person's early 20s.

A **key** brain region that matures late is the **prefrontal cortex**, located directly behind your forehead. The prefrontal cortex is very important as a **control** center for thinking ahead and sizing up **risks** and **rewards**. (This area is, in fact, the little red light that was trying to warn you about sending that e-mail.) Meanwhile, another part of the brain that **matures** earlier is the **limbic system**, which plays a central **role** in **emotional** responses.

Since the **limbic system matures** earlier, it is more likely to gain an upper hand in **decision making**. This relationship between the **emotional** center (limbic system) and **control** center (prefrontal cortex) helps to explain a **teen's** inclination to **rush** decisions. In other words, when **teens** make choices in **emotionally** charged situations, those choices are often more weighted in feelings (the mature limbic system) over **logic** (the not-yet-mature prefrontal cortex).

This is also why **teens** are more likely to make "bad" choices, such as using drugs, alcohol, and tobacco—all of which pose a **risk** of serious health **consequences**. "Most kids don't really 'plan' to use drugs," says Professor Laurence Steinberg of Temple

University, "at least not the first time. They are more likely to experiment on the spur of the moment, particularly when influenced by others (peer pressure)."

**PART B: WORD BANK**

alcohol	<b>emotions</b>	plan ahead	<b>risks</b>
<b>decisions</b>	<b>limbic system</b>	<b>prefrontal cortex</b>	tobacco
developed	<b>mature</b>	<b>research</b>	twenty
drugs	peer pressure	<b>rewards</b>	

**PART B: SUPPLEMENTARY QUESTIONS:**

1. Look at the title. Why would the teen brain be considered "under construction"?

The teen brain is considered under construction because it is still developing; it is not yet mature.

2. Between the ages of 12 and 14, the brain reaches its maximum size. What does "maximum size" mean?

Maximum size means the brain is at its largest (smallest/largest) size.

3. How long does it take for regions, or parts, of the brain to become fully developed?

It takes regions of the brain about twenty years to become fully developed.

4. How do we know that it takes this long for the brain to become fully developed?

We know this because scientists research, or study, the brain.

5. What is the name of the region of the brain that matures later than other regions?

The region of the brain that matures later is called the prefrontal cortex.

6. How does the author compare the prefrontal cortex with the little red light we read about before?

The prefrontal cortex helps us think ahead so we are able to recognize risks and rewards. It is just like the little red light that warned us about sending a mean e-mail.

7. What region of the brain matures earlier than other regions?

The region of the brain that matures earlier is the limbic system.

8. What is the limbic system involved with?

The limbic system is involved with our emotions.

9. When teens are making decision, which do they use more: the prefrontal cortex or the limbic system?

Teens use the limbic system (prefrontal cortex/limbic system) more for making decisions.

10. *When teens are in emotional situations, which do they use more: the prefrontal cortex or the limbic system?*

Teens use the limbic system (prefrontal cortex/limbic system) more in emotional situations.

11. *Does this mean that the teens' choices are more emotional or less emotional?*

Teens' choices are more (more/less) emotional.

12. *If the teens' prefrontal cortex were more mature, would their choices be more logical or less logical (would their choices make more sense or less sense)?*

Their choices would be more (more/less) logical if the prefrontal cortex was more mature.

13. *Does the author consider choices made by feelings (emotions) more or less healthy than choices made by logic? How do you know?*

The author considers emotional choices less (more/less) healthy than choices made by logic. We know this because in the last paragraph he writes, "this is also why teens are more likely to make "bad" (good/bad) choices, such as drugs, alcohol, and tobacco, all of which pose a risk of serious health consequences."

14. *Does Professor Steinberg think teens plan to use drugs?*

No, he doesn't (Yes, he does./No, he doesn't).

15. *Professor Steinberg think teens probably experiment "on the spur of the moment." What does "on the spur of the moment" mean?*

"On the spur of the moment" means that teens probably don't plan ahead to use drugs. They use drugs, alcohol, and tobacco when it is front of them.

16. *The professor also believes teens experiment when they are influenced by others. What is "being influenced by other people in your own age group" called?*

Being influenced by others in your own age group is called peer pressure.



**RESPONSE TO GUIDING QUESTION(S):**

*Are teen brains the same as adult brains? Why or why not? Why is this information important?*

*Suggested Response: Teen brains are different from adult brains. Teen brains are still developing. The limbic system is more mature than the prefrontal cortex. This means that teens are more likely to respond to risks and rewards emotionally rather than logically. Teens may make the wrong choices about drugs, alcohol, and tobacco because their brains are not yet mature.*

## NEUROLOGIST NOTEBOOK

### INSTRUCTIONS FOR TEACHERS:

- Review student instructions.

### INSTRUCTIONS FOR STUDENTS:

Work with a partner. Use your neurologist notebook to write down key, or important, information from the text. You will write down main ideas and some details, or specific information, about each main idea. You can use information from your Thinking Log. Some information is already filled in for you.

### WORD BANK:

**adult, adults, electrochemical impulses, emotional, feelings, limbic system, logic, neurons, prefrontal cortex, rewards, risks, teen, teens, think**

### **Introduction:**

Teen brains are different from adult brains. We can use science to understand why. Science can help us understand why teens make decisions differently than adults.

### **Brief background:**

Special brain cells called neurons use electrochemical impulses to talk to each other. This communication is happening in different parts of the brain.

### **Main idea:**

One part of the brain that matures late is the prefrontal cortex.

### **Supporting details:**

The prefrontal cortex helps you think ahead and figure out risks and rewards. It is the brain's logic center.

### **Main idea:**

The limbic system matures early, so teens are more likely to use it to make decisions.

### **Supporting details:**

The limbic system plays a central role in emotional responses. It is the brain's feelings center.

### **Conclusion:**

Teens are more likely to make decisions based on feelings instead of logic.

## FUNCTIONAL ANALYSIS

### INSTRUCTIONS FOR TEACHERS:

- Review student instructions for functional analysis with the whole class.
- Complete the functional analysis with the whole class.
- Have students work with a partner to rewrite the sentence in their own words.

### INSTRUCTIONS FOR STUDENTS:

Work with your class to analyze an important sentence(s) from the text.

- Every sentence has someone or something that *does* something. First you determine this *who* or *what*.
- Every sentence has something that they *do* or *did*. Figure that part out next. Now you have the most important parts of the sentence in place.
- Then you will figure out what they did the action *to* or *for*.
- Finally, you will write the descriptive details.
- Write your answers in the spaces below.
- When you are done, write the sentence again in your own words.

You may want to use definitions from the glossed text in the sections above.

### ***Functional Analysis:***

*Since the brain is not fully developed until the early 20s, the way in which a teen's decision-making circuit integrates information may put him or her at a higher risk of making decisions the teen could later regret.*

WHO OR WHAT (Actor): the way

DESCRIPTOR (Detail): *in which a teen's decision-making circuit integrates information*

WHAT HAPPENED (Action): may put

WHO (Recipient): him or her

DESCRIPTOR (Detail): *at a higher risk*

DESCRIPTOR (Detail): *of making decisions the teen could later regret*

WHY: *since the brain is not fully developed until the early 20s*

What the sentence says:	My own words:
The way in which a teen's decision-making circuit integrates	The way a teen's _____ makes _____
may put	can put
him or her	the teen
at a higher risk	at _____ risk

of making decisions the teen could later regret	of _____ _____
Since the brain is not fully developed until the early 20s	since the brain is not _____ until _____
<p><b>Write the sentence in your own words and then explain it to your partner.</b></p> <p>_____</p> <p>_____</p> <p>_____</p>	

## EXIT TICKET

### INSTRUCTIONS FOR TEACHERS:

- Review student instructions with the whole class.

### INSTRUCTIONS FOR STUDENTS:

This graphic organizer will help you keep track of information about the brain for all of the readings. Each day you will write down new information from each reading.

- First, write information about how the whole brain matures, or develops as you get older.
- Next, provide, or write, information you are learning about each of the brain's parts: the prefrontal cortex, the neurons, and the limbic system.
- Then write what you learned about teen decision making (*so what?*).

### WORD BANK:

brain, emotions, logic, neurotransmitters, twenties

Information about how the brain develops	Prefrontal cortex	Neurons	Limbic system	So what?
Your brain does not fully develop until your <u>twenties</u> .	Processes decisions using <u>logic</u> . Matures <u>late</u> . (late/early)	Specialized cells in your <u>brain</u> . "Talk" to each other with <u>neurotransmitters</u> .	Processes decisions using <u>emotions</u> . Matures <u>early</u> . (late/early)	[Write what you learned about teen decision-making:]

## Appendix A: Glossary

Word	Definition	Example
adult ( <i>adults</i> )	a grown-up person	While this is basically the same for teens and <b>adults</b> , the devil is in the details.
<i>automatic</i> ( <i>automatically</i> )	something that happens by itself	Decisions don't "just happen" <b>automatically</b> .
behavior	how we act	This output from the brain provides the basis for our <b>behaviors</b> and actions.
<i>chemical</i>	a substance in the body that reacts to other substances	Neurons talk with each other by way of <b>chemical</b> messengers called neurotransmitters.
<i>consequence</i>	something that happens because of something else	Drugs, alcohol, and tobacco have a risk of serious health <b>consequences</b> .
<i>control</i>	to influence or direct people's actions.	The prefrontal cortex is very important as a <b>control</b> center for thinking ahead and sizing up <b>risks</b> and <b>rewards</b> .
<i>construction</i>	being built	The teen brain is under <b>construction</b> .
decision (decision-making)	choice or determination	The way in which a teen's <b>decision-making</b> circuit integrates information may put him or her at a higher risk of making <b>decisions</b> the teen could later regret.
developed	mature; grown	The brain is not fully <b>developed</b> until the early 20s.
electrochemical impulse*	a signal, or message, in the body that is both electric and chemical	Neurons talk with each other by way of <b>electrochemical impulses</b> and chemical messengers.

Word	Definition	Example
emotion (emotional, emotionally )	a strong feeling	The limbic system plays a central role in <b>emotional</b> responses.
instantaneously	at the same time	Decisions come from a series of events in the brain that happen almost <b>instantaneously</b> .
integrate	bring several things together and blend, or mix them into a whole	The way a teen's decision-making circuit <b>integrates</b> information may put him or her at a higher risk of making bad decisions.
key	important	A <b>key</b> brain region that matures late is the prefrontal cortex.
limbic system*	the part of the brain that processes, or deals with, emotions	A part of the brain that matures earlier is the <b>limbic system</b> , which plays a central role in emotional responses.
logic	thinking or reasoning	In other words, when teens make choices in emotionally charged situations, those choices are often more weighted in feelings (the mature limbic system) over <b>logic</b> (the not-yet-mature prefrontal cortex).
<i>mature</i>	develop or grow older	Regions of the brain continue to <b>mature</b> all the way through a person's early 20s.
maximum	largest possible	The brain reaches its <b>maximum</b> size between ages 12 and 14.
<i>network</i>	system, or group of parts, that is connected	All of the parts of the brain <b>network</b> , as a whole, put out a response.

Word	Definition	Example
neuron*	specialized cell in the brain	Specialized brain cells called <b>neurons</b> talk with each other by way of neurotransmitters.
neurotransmitter*	chemical messenger that helps carry signals in the brain	Neurons talk with each other by way of <b>neurotransmitters</b> .
prefrontal cortex*	a region of the brain that is important for logic and thinking ahead	The <b>prefrontal cortex</b> , which is directly behind your forehead, matures later.
<i>region</i>	an area of the body	<b>Regions</b> of the brain continue to mature all the way through a person's early 20s.
regret	feel sad or sorry about something you have done	Teens may be at a higher risk of making decisions they later <b>regret</b> .
relay system	a group of related parts that work one after another to complete, or finish, a task	Decision making involves a <b>relay system</b> in which different brain structures talk with each other.
<i>research</i>	studying and collecting information about something	<b>Research</b> shows that the brain reaches its maximum size between ages 12 and 14, but it is not yet mature.
<i>response</i>	a reaction to something	The brain puts out a <b>response</b> .
reward	a thing you receive because you did something good	The prefrontal cortex is very important for sizing up risks and <b>rewards</b> .
risk	something that may be unsafe	This is also why teens are more likely to make "bad" choices, such as using drugs, alcohol, and tobacco—all of which pose a <b>risk</b> of serious health consequences.



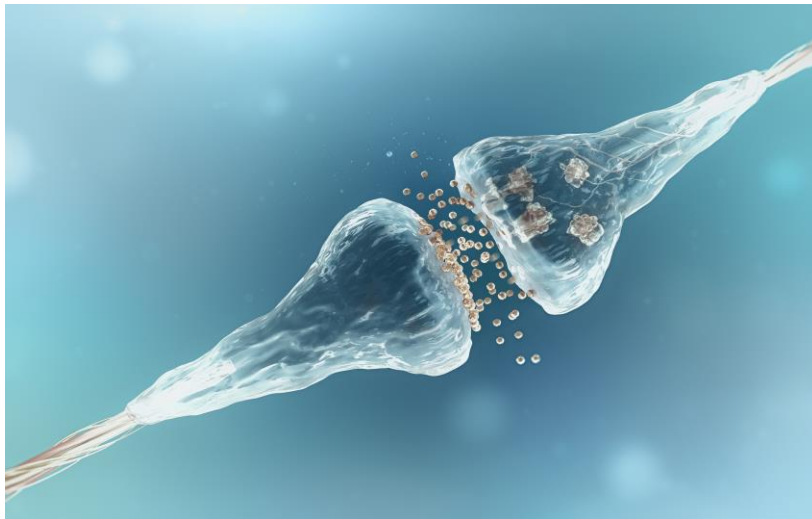
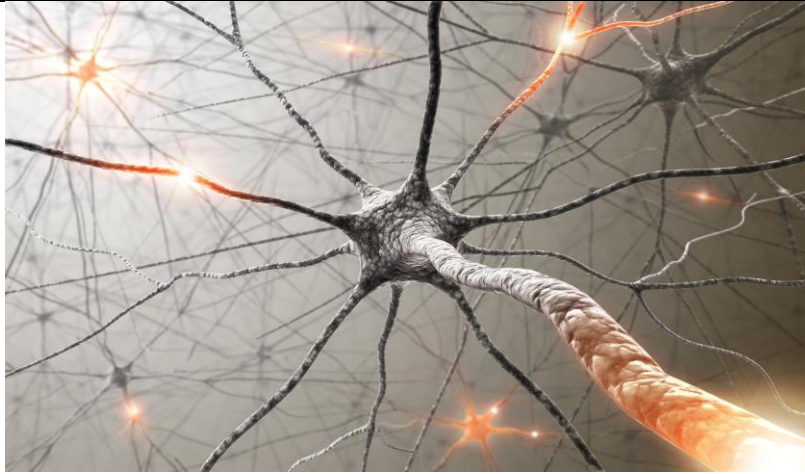
<b>Word</b>	<b>Definition</b>	<b>Example</b>
<i>role</i>	function; the part that something plays in a larger system or action	The limbic system plays a central <b>role</b> in emotional responses.
rush	hurry	<b>Rushed</b> decisions like this—acting before thinking it through—happen more often in teens than in adults.
series of events	a group of related things taking place one after another	Decisions come from a <b>series of events</b> in the brain that happen almost instantaneously.
<i>structure</i>	the way parts of something are joined together	The brain studies and decides about information in its different <b>structures</b> .
teen ( <i>teens</i> )	13--19 year olds	While this is basically the same for <b>teens</b> and adults, the devil is in the details.

*\*Vocabulary from the Expeditionary Learning lessons.*

*Italicized words are from the Academic Word List.*

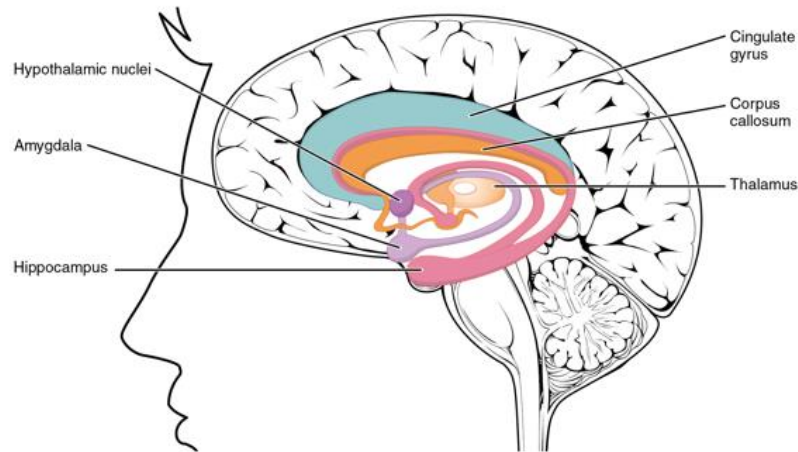
## Appendix B: Teacher Resources

### electrochemical impulse



- Look at the pictures. These are pictures of what is happening inside your brain. The pictures show how messages move between neurons. Neurons are specialized cells in your brain; they are what your brain is made of. Your body uses electrochemical impulses to share messages between neurons.
- An electrochemical impulse is a signal, or message, that is both electric and chemical.
  - In the first picture, you can see the electric signals moving between cells. The electric signals are represented, or shown, by orange flashes.
  - In the second picture, you can see how the cells use chemicals to generate, or make, the electric signals.
- Partner talk: Think about throwing a ball. What messages do your brain and your arm need to share with each other?

## limbic system



[https://commons.wikimedia.org/wiki/File:1511\\_The\\_Limbic\\_Lobe.jpg](https://commons.wikimedia.org/wiki/File:1511_The_Limbic_Lobe.jpg)



- Look at the pictures. These pictures depict, or show, your limbic system.
- The limbic system is the part of the brain that processes, or deals with, emotions. It is the part of the brain where you have feelings. The limbic system is made up of different parts.
  - The first picture is a diagram, or drawing, that shows the six parts of the limbic system.
  - The second picture is a more realistic 3D image of the limbic system. It shows where the limbic system is located. It shows how it is positioned, or placed, in your head.
- Partner talk: What can you learn from each type of picture about the limbic system?