

## UNIT A: LESSON 9

### 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 analyze the main ideas and supporting details presented in a video clip.

analyze . study something and explain it

#### Learning Target:

I can compare and contrast written and digital presentations of ideas.



## THINKING LOG

### INSTRUCTIONS FOR TEACHERS

- x Read the guiding question aloud to students, then play the indicated section of video. Make sure that the closed captioning is on so that students can read along as they watch.
- x At the end of the section, have students answer supplementary questions.
- x Repeat this routine for each section of the other three sections until the video concludes.
- x Discuss the guiding question(s) as a group and then have students write the answer in their student chart.

### INSTRUCTIONS FOR STUDENTS:

The video is divided into four sections, or parts. Your teacher will ask you a guiding question for each section that you will think about as you watch and listen to the video. After you have watched each section or part, of the video, you will answer supplementary questions and then answer the guiding question with your teacher and the class. 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 :

How are teen brains different from the brains of adults and children and how do we know?

### WORD BANK :

adaptive	changes	like	snapshot
adults	consequences	mature	social
adventures	decisions	money	special
actions	dopamine	moving	striatum
Affiliate with	emotional	people	sugar
back	excitement	prefrontal cortex	teen
beneficial	experiences	responded	teenagers
better	front	reward	teens
biased	ideas	rewards	thrills
brains	information	risks	twenties

Watch Part 1 of the video. Pay attention to what the speaker says about teens and decision making. Then work individually or with a partner to answer the supplementary questions.

Insight Into the Teenage Brain

PART 1: 00:00 . 02:39

Hi. Thank you. I love, love, love your enthusiasm. Your energy and excitement is

‘ Š • 1 › Ž Š • • ϕ 1 – Š ” Ž œ 1 – Ž 1 • ~ Ÿ Ž 1 – ϕ 1 “ ~ ‹ ð 1 Š — • 1 – ϕ 1 “ ~ ‹ 1 ’ œ 1 • scientist at UCLA, as Jake said.

Scientists have studied the brain for centuries, but it œ 1 ~ — • ϕ 1 ‹ Ž Ž — ’ — 1 • ‘ Ž 1 œ ~ 1 • ‘ Š • 1 Ž Ÿ Ž 1 • ’ œ œ ~ Ÿ Ž • 1 ~ — Ž 1 ~ • 1 • ‘ Ž 1 – ~ œ • 1 • Š œ œ ’ — Š • changes every single day. As you sit in this room, your brain is changing in response to my voice, in response to the person next to you. And your experiences and the people you affiliate with shapes the way your brain ultimately develops. We also know that the brain matures and continues to do so past childhood and into the teenage years and well into your mid -twenties. So most of you in this room today, as middle - and high - œ œ ‘ ~ ~ • 1 œ • ž • Ž — • œ ð 1 • ~ — • 1 ϕ Ž • 1 ‘ Š Ÿ Ž 1 Š 1 • ž • ž • 1 • ‘ Š • œ 1 Š œ • ž Š • • ϕ 1 › Ž Š • • ϕ 1 ‹ Ž — Ž • ’ œ ’ Š • ï 1 • 1 Ž 1 • ‘ — ” adolescence, which is to establish your independence from a caregiver. Because your brain as an adolescent is built to help you do that, compared to children and adults, the teenage brain is really good at seeking out new experiences, enjoying thrills, and œ Ž Ž ” — • 1 ~ ž • 1 › ’ œ ” œ ï 1 • œ 1 Š • œ ~ 1 › Ž Š • • ϕ 1 • ~ ~ • 1 Š œ ž œ ð œ and emotional information. And so for that reason the teenage brain is really responsive to rewards and emotions when making decisions. And at my laboratory at UCLA, Š — • 1 ’ — 1 • Š ‹ ~ › Š • ~ › ’ Ž œ 1 Š • • 1 Š › ~ ž — • 1 • ‘ Ž 1 ~ › • • ð 1 Ž › ž 1 ’ — question: how does the teenage brain make decisions?

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2. What shapes the way your brain ultimately ~~fi~~ally develops?

Your experiences and the people you affiliate with, or spend time with, shape your brain.

3. How long does it take for your brain mature?

Your brain continues to mature until your mid -twenties.

4. Is it beneficial (good for you) or ~~de~~trimental (bad for you) to have an immature brain?

It is (beneficial/detrimental) beneficial to have an immature brain.

5. What four things is the teenage brain really good at doing?

The teenage brain is really good at:

- A. seeking, or looking for, new experiences
- B. enjoying thrills, or excitement
- C. seeking risks
- D. recognizing, or being able to sense, social and emotional information

6. Why is the prefrontal cortex the last brain region, or area, to develop?

The brain develops from back to front, and the prefrontal cortex is in front of your brain.

7. What does the prefrontal cortex do?

The prefrontal cortex helps you think about the consequences of your actions.

Watch Part 2 of the video. Pay attention to the graphs and images

organisms respond, really, with a lot of excitement in their brain when they get something they like.

So in my lab we study this reward system across development, and especially in teenagers. And we do that by asking people to come to the laboratory and perform what's called a functional magnetic resonance imaging scan, or fMRI. And the beauty of fMRI is that you can take a snapshot of the brain in motion. So while you are experiencing something you like, or while you are making a decision, we capture how your brain is responding to that / how your brain is active.

And so to study the reward system, what we did is, not simply show people pictures of reward, which is what mostly happens in brain imaging studies, but instead what we did is we actually gave someone a reward. And what's something that people find rewarding? Sugar! So what we did is we asked people to come to the lab, we asked a group of teenagers and a group of adults. And while they were in the MRI, we hooked them up to a straw and we fed them squirts of sugar water every so often. And first we asked them whether they liked it. Maybe they weren't going to like the sugar as much as we thought. But they actually did.

This is a rating scale asking them, how much do you like the sugar? And the average response is shown in red for the teenage group, and the adults is shown in white. And you can see that everybody liked it, but it's a teenage group who showed this exaggerated sensitivity. They really liked it. So we started to wonder whether there was something neurobiological that represented this difference.

So instead of focusing on the prefrontal cortex, which is what a lot of brain scientists who study adolescents do, we looked at

the sugar, it was only in the teen age group where we saw that people who showed greater activation in the brain in response to the sugar also told us they liked it more.

So that means that in real-time at the very moment your brain gets something that it likes, it will make you think that it's better. And you can think or imagine that in future circumstances your brain will encode that information and remember that you liked it. It will bias your decisions toward getting more rewards, and that's what happens during adolescence.

#### SUPPLEMENTARY QUESTIONS :

8. What key component, or part, of the brain is the striatum?

The striatum is a key component of the rewards system.

9. What does the striatum do when you receive, or get something rewarding?

The striatum releases dopamine.

10. What happens when kids, mice, rats, or monkeys get something they really like?

All of these animals respond, or react with excitement in their brains when they get something they really like.

11. What is special about the functional magnetic resonance imaging scan (fMRI)?

The fMRI can take a snapshot, or picture of the brain while it is moving. That means researchers can take a snapshot of your brain while you are doing something you like.

12. What was the reward the researchers gave people to study the brain?  
The researchers gave people a reward.

13. What was the reward the researchers gave people to study the brain?

The researchers gave people sugar.

14. When the researchers asked people if they like sugar, who liked sugar the most? (Hint: look at the graph).

Teenagers liked sugar the most.

15. Whose brains were the most excited by sugar? (Hint: look at the brain images).

Teenagers' brains were the most excited by the sugar.





## Insight Into the Teenage Brain

PART 4: 07:44 . 09:42

So this is telling us that there's something really special about the teenage brain. There's a sharp increase in sensitivity to rewards and novel information from childhood to adolescence. But then this is a sharp decrease from adolescence to adulthood. And that probably has something to do with the fact that the prefrontal cortex is starting to come online as people transition into adulthood, and regulating the emotional response to the rewarding information.

So what does this all mean for behavior and for your everyday life? Well there are a few things. From my perspective this is really exciting time to study the teenage brain. Although scientists have made significant progress in understanding what makes a teenage brain unique, we still have a lot to learn.

rewards and to emotions, might lead teenagers to make poor choices sometimes. But it also presents an excellent opportunity to seek out new adventures, to meet new people, and to confront interesting challenges in ways that people don't typically do later in life. And I predict that as we continue to conduct more of this research we will learn how to take advantage of the sensitivity of the brain during adolescence to generate new ideas and to promote creative thinking. There's a lot that we can and will learn from the adolescent brain, and from adolescents in general in the coming decade. And perhaps we'll learn that taking risks and seeking out rewards are really adaptive behaviors in many contexts that actually lead to really good decisions, and that help individuals navigate the often challenging and intimidating transition from childhood to adulthood.



## NEUROLOGIST NOTEBOOK

### INSTRUCTIONS FOR TEACHERS:

x Review student instructions.

### INSTRUCTIONS FOR STUDENTS:

Work with a partner. Use your neurologist notebook to write down key, or important information from the video. 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, adventures , challenges, children, decisions , experiences, information, money, people, positive , rewards , sugar, teens

### Main Idea :

Teenage brains are different than the brains of children and adults.

### Support 1:

Teenage brains have a stronger response to rewards than adult brains. In the study, teens brains responded to sugar more strongly than adults. In the study, teens brains responded to money more strongly than adults or children. This may lead teens to poor choices sometimes.

### Support 2:

Teens are more open to new information and experiences. This presents an excellent opportunity for them to seek out new adventures, to meet new people, and to confront interesting challenges in ways that people don't typically do later in life.

### Conclusion:

The differences in teen brains may lead them to make poor decisions but also are positive because they help teens have new experiences that help them become adults.



<p>What do you think the perspective, or point of view, is?</p>	<p>This is a <u>dangerous</u> time for teens. Teenagers get into <u>trouble</u>.</p>	<p>Sometimes teens make bad <u>decisions</u> but it is also a time when teens learn and try <u>new</u> things.</p>
<p>What is your perspective? And why?</p>	<p>This is a(n) _____ time for teens  I think this because _____  _____  _____  _____</p>	

## Appendix A: Glossary

Word	Definition	Example
adaptive	something that can adjust or get used to something new	And perhaps we'll learn that taking risks and seeking out rewards are really adaptive behaviors in many contexts that actually lead to really good decisions, and that help individuals navigate the often challenging and intimidating transition from childhood to adulthood.
adolescent	teenager	There's a lot that we can learn from the adolescent brain.
adults	a grown-up person	Because your brain as an adolescent is built to help you do that, compared to children and adults, the teenage brain is really good at seeking out new experiences, enjoying thrills, and seeking out risks.
adventure	an new or exciting journey or activity	I encourage you to enjoy all the new people you meet and all the adventures you take.
affiliate with	become closely connected	And your experiences and the people you affiliate with shapes the way your brain ultimately develops.
average	the mathematical mean (obtained, or gotten, by adding several numbers or things together and dividing by the total quantity)	This is a real human brain image averaged







