SCHOLASTIC TEACHER'S GUIDE

THE AWESOMELY EVOLVED HUMAN BRAIN

Dear Teacher:

This year's *Heads Up* series focuses on the human brain and gives students an abundance of valuable information through expertly crafted infographics. We start off with an article about the amazing abilities of the human brain in the context of the evolution of the brain's reward system. Unhealthy behaviors, like using drugs and eating large quantities of unhealthy food, can overload the reward system, throwing us out of balance and possibly into jeopardy.

In the accompanying work sheet, we put students' brains to the test and demonstrate for them, in real time, the brain's remarkable ability to make predictions and solve ambiguities, and help students to better understand how drugs might compromise these capabilities.

I encourage you to share these important materials with your students to help them understand how to protect one of their most valuable assets—their brains!

Sincerely,

Nora D. Volkow, M.D.
Director, National Institute on Drug Abuse

In This Installment:

- **Student article:** Students will understand that the brain's reward system has evolved to help ensure the survival of the species. Drugs can overload the reward system and decrease the brain's protective abilities.
- **Student work sheet:** Students will solve brainteasers and answer critical-thinking questions about how drugs interfere with specific abilities in real-world situations.

The lesson below and the reproducible work sheet on the reverse side reinforce student comprehension of key facts and concepts in the accompanying article, "The Awesomely Evolved Human Brain."

Standards Alignment
These *Heads Up* materials are Common Core–ready and are also aligned with Next Generation Science Standards (NGSS). Visit **scholastic.com/headsup/standards** for a complete standards chart.

Before-Reading Questions:

- How do you think your brain might be involved in making decisions about what to eat?
- What do you know about how your brain processes information and comes to conclusions?
- What do you know about how you can keep your brain's natural chemicals in balance?
- What do you know about how drugs work inside the brain?

After-Reading Questions (factual responses in *italics*):

- What is *homeostasis* and why is it important? (Homeostasis *describes a person's internal environment when that environment is stable and balanced. When in balance, the brain is capable of amazing feats of intelligence, giving people the best chance of succeeding in school and life. Drugs or foods that result in unbalanced dopamine levels can cause physical changes to the brain that detract from achieving success.*)
- How can you keep your brain in balance? *(Keep dopamine levels in balance by eating moderate portions of healthy foods and consuming processed treats on occasion. Avoid drugs.)*
- How might drugs interfere with how the brain works? *(Drugs can turn the natural chemical process that produces healthy dopamine levels to reward behaviors into one that releases abnormally high dopamine levels, resulting in compulsive behavior. The unnaturally large dopamine spikes cause your brain to adapt to this new, larger amount of dopamine so that you need large amounts of dopamine just to feel normal.)*
- What is the connection between eating unhealthy foods and using drugs? *(Both involve overloading the brain with dopamine and upset the balance of the brain's reward system.)*
- Considering the evolutionary timeline of the human brain, what is unique about the last 500 years? *(The last 500 years are marked by an overload of influences on the brain, the most in the entire evolutionary history of the brain.)*

Student Work Sheet:
Have each student complete the work sheet individually. Evaluate students on their ability to construct evidence-based answers using information from the text and their own inferences.

Work-Sheet Answer Key:
Brainteasers: "Double Take"—*dish, goblet, or table; two profiles.* "Spell Check"—*"Don't even think of eating this! It's cheese with fuzzy mold for my science project!"* **Think It Through:** *1) Drugs can alter your perceptions and slow your reflexes so that you are unable to adapt to changes as you are driving. 2) Drugs can interfere with the processes required to retain information. They can decrease the brain's ability to fill in missing information by seeing patterns, which interferes with problem solving on a test. 3) The brain has systems in place for avoiding injury, like the ability to predict potential danger in the environment. Drugs interfere with those capabilities.*

Resources:

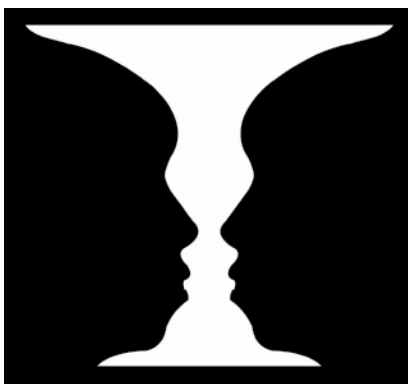
- For more information on drugs, go to **teens.drugabuse.gov** or **scholastic.com/headsup**.
- For immediate help with a crisis, call **1-800-273-TALK**.
- To locate a treatment center, call **1-800-662-HELP** or visit **findtreatment.samhsa.gov**.

Get Involved!
National Drug Facts Week
Jan. 27–Feb. 2, 2014
drugfactsweek.drugabuse.gov

Brain Power!

The brain excels at making predictions and clarifying confusion, thanks to a network of billions of cells called *neurons*. This vast network enables your brain to respond to the unexpected or the unclear. This includes solving puzzles, such as those below, as well as ducking when a ball flies at your head or eating when you feel hungry. Your amazing brain does all of this automatically—without your even having to think about it! Check out the brainteasers below to see the power of the brain in action.

Double Take



Your brain can see things that aren't there. Does that mean you're seeing things? No! Your flexible brain is so good at making sense of patterns that it can see two images in one image.

The image at left is both a _____ and _____.

Spell Check

Your brain also solves mysteries in language. Imagine you find the cryptic note to the right on a food container. Good thing your brain needs only the first and last letter of a word to be in the right place!

Translation: _____

_____

"Dnot evn thnik of etaing tihs! It's ceehse wtih fzuzy mlod for my scincee prjocet!"

Think It Through:

Drugs break into the neural network and physically modify brain communication. They can make it hard to process information and make sound decisions. They also slow reflexes, which can lead to accidents and injuries. Considering these facts, answer the questions below on separate paper.

1. How might drugs affect a person's ability to drive?

2. How might drugs affect a person's ability to take a test?

3. How might drugs affect a person's ability to avoid injury?