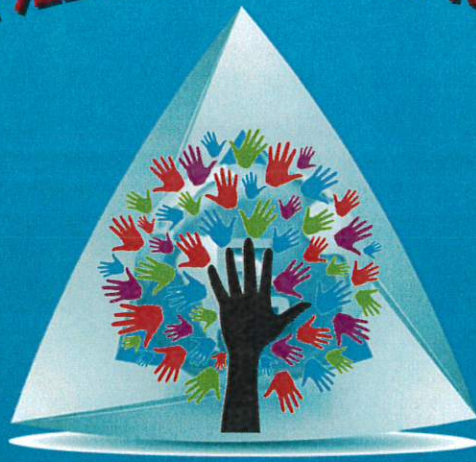


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**HEADS UP
REAL NEWS
ABOUT DRUGS
AND YOUR BODY**

STUDENT ACTIVITY REPRODUCIBLE ○ ○ ○

Name _____

Date _____

What Do You Know about Stress and Drug Abuse?

Answer the questions below to find out what you know about stress and its connection to drug abuse.

1. **Short-term physical responses to stress include:**
 - a. a faster heart rate.
 - b. sweaty palms.
 - c. a pounding head.
 - d. tense muscles.
 - e. all of the above.
2. **Long-term physical responses to stress include:**
 - a. back pain.
 - b. high blood pressure.
 - c. sleeplessness.
 - d. an inability to make decisions.
 - e. all of the above.
3. **Drugs of abuse increase levels of the hormone CRF in the brain. The function of CRF is to:**
 - a. control breathing.
 - b. control movement of arms and legs.
 - c. initiate the body's response to stress.
 - d. stimulate digestion.
4. **Stress affects which of these body systems?**
 - a. central nervous
 - b. endocrine
 - c. immune
 - d. cardiovascular
 - e. all of the above
5. **Which of the following statements is true?**
 - a. All stress is bad for you.
 - b. Using illicit drugs reduces stress.
 - c. Anyone can learn to manage stress.
 - d. Everyone deals with stress in the same way.
6. **If a friend is stressed out, a good suggestion you might offer would be to:**
 - a. eat healthy foods, exercise, and get enough sleep.
 - b. talk openly to an understanding listener who will remain calm.
 - c. focus on one problem at a time.
 - d. all of the above.
7. **The "stress hormone cycle" involves the release of hormones from:**
 - a. the brain, the pituitary gland, and the adrenal glands.
 - b. only the adrenal glands.
 - c. only the brain and the pituitary gland.
 - d. only the brain.
8. **Stress can cause brain changes similar to those caused by drug addiction.**
 - a. true
 - b. false
9. **Drug abuse is harmful, but it does relieve stress.**
 - a. true
 - b. false
10. **Stress is thought to be a cause of relapse to drug addiction.**
 - a. true
 - b. false

Drugs and the Teen Brain

Adolescence is a critical time in brain development. That means teens are at greater risk of experiencing the harmful effects of drugs and alcohol.

Taking chances isn't always bad—it's part of growing up. But not thinking through consequences can be dangerous when it comes to decisions about drugs and alcohol.

BY THE TIME YOU ARE A TEENAGER, many parts of your brain have developed so much that you may be able to perform complicated calculations and even have a sharper memory than some adults (like how you might be able to memorize your home's random 11-character Wi-Fi password—while your parents never can!).

But one critical part won't be developed until your mid-twenties—putting teens at a higher risk for the harmful effects of drugs and alcohol.

Under Construction

The key brain part that's still developing is the **prefrontal cortex** and it's the area you use in critical thinking, such as when you weigh pros and cons before making a decision.

Because the prefrontal cortex is not yet fully developed, teens automatically rely more on the **limbic system** to make decisions. This system's network of brain structures is linked to emotions and experiencing rewards rather than critical thinking.

Because their prefrontal cortex is in development, teens are more likely to make decisions based on what provides instant gratification, such as a feeling of happiness. This focus can lead them to take more risks than adults. For example, your peers might pressure you to do something you later regret, such as pulling a prank that lands you in trouble. Rather than thinking carefully about the negative outcomes, the teen brain focuses more on getting the reward of your friends' acceptance.

Of course, taking chances isn't always a bad thing—it helps you grow into an adult and become independent. But not thinking through consequences can be dangerous when it comes to decisions related to drugs and alcohol.

That's one reason teens are more likely than adults to binge drink. Binge drinking is when someone consumes four to five alcoholic drinks within a few hours. Teens may be less able than adults to judge when to stop drinking (remember: underdeveloped prefrontal cortex!). The scary part? Studies have shown that even a few sessions of binge drinking can cause harmful changes to a developing brain.

Addiction Risk

Teens are also at a higher risk of developing the disease of **addiction**. Scientists believe that addiction is closely linked to **dopamine**, a chemical that helps transmit signals in the brain. A person taking drugs causes a surge of dopamine in the brain.

Any rewarding activity, such as enjoying a slice of pizza, causes a dopamine release. But the surge is much higher and more intense with drugs. Over time, repeated drug use can “teach” the brain to seek the substances over other, healthier rewards. That is addiction.

Teens have a higher risk of addiction because their limbic systems are very sensitive to dopamine. As a result, they may crave drugs more strongly than adults. The earlier someone starts drug use, the higher his or her addiction risk.

Brain Changes

As you grow and learn, your body strengthens pathways between **neurons** (nerve cells) in the brain and gets rid of ones that aren't used. These connections, called **synapses**, determine how your brain processes information. The network of synapses is what supports everything from your memory to your ability to learn and feel emotions.

Exposing the teen brain to drugs can change how these pathways are organized and how the brain functions. The negative impact

of drug use can cause problems with attention, memory, and problem solving that can last all the way through adulthood.

The good news is that by thinking through your actions now, you can have a positive impact on your brain for the rest of your life. Taking on challenges to build abilities and skills—such as learning a new sports move or picking up a foreign language—helps build new connections that make your brain stronger and better able to tackle future tasks. If you are good to your brain, it will be good to you.



Because the brain's **prefrontal cortex**

(the part in charge of critical thinking) is not yet fully developed in teens, they rely more on the limbic system (which is tied to rewards and emotions) to make decisions.

GET MORE

For additional facts about science and your health, visit scholastic.com/headsup and teens.drugabuse.gov.

From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services



addiction (*noun*): a brain disorder or illness associated with compulsive (uncontrollable) behavior, such as drug use, despite negative consequences

adolescence (*noun*): the period of life when a person develops from a child into an adult

automatic (*adjective*): working mostly or completely by itself

binge (*noun*): the act of doing something in an excessive or uncontrolled manner

chemical (*noun*): a substance, such as an element or a mix of elements (compound), that is made by a chemical process

consequence (*noun*): a result or outcome

consume (*verb*): to eat, drink, or use up something

crave (*verb*): to have a strong desire for something

critical (*adjective*): important or necessary

develop (*verb*): to grow or cause something to grow larger or more advanced

development (*noun*): the act or process of growing or causing something to become larger or more advanced

dopamine (*noun*): a neurotransmitter chemical that helps transmit signals in the brain and is associated with feelings of pleasure

expose (*verb*): to make something accessible (open) to the action or influence of something else

function (*verb*): to carry out an action

gratification (*noun*): a reward or the feeling of pleasure or being rewarded

impact (*noun*): a significant or powerful effect

independent (*adjective*): not relying on or needing others for support or care

intense (*adjective*): having a very strong or extreme degree of something

key (*adjective*): extremely important

limbic system (*noun*): a set of five different brain structures that together are involved in emotions and feelings, as well as learning and memory

linked (*adjective*): connected

network (*noun*): a group of things that are connected or related to each other

neuron (*noun*): a nerve cell that carries messages between the brain and other parts of the body

outcome (*noun*): a result

prefrontal cortex (*noun*): the front part of the frontal lobe area of the brain that is involved in complex decision making and thinking

process (*verb*): to go through a series of actions to lead a certain result

release (*verb*): to allow out; to set free

risk (*noun*): the possibility of loss or injury; danger

seek (*verb*): to look for or to go in search for

sensitive (*adjective*): to be highly responsive or able to be affected by something

session (*noun*): a period of time set aside for a certain activity

substance (*noun*): a material with a specific chemical makeup

surge (*noun*): a sudden increase to a high level

synapse (*noun*): the structure between neurons (nerve cells) that allows a signal to be transmitted between the neurons

tackle (*verb*): to deal with or handle a situation

transmit (*verb*): to send from one person, place, or thing to another

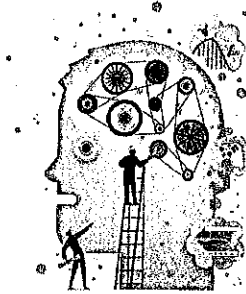
underdeveloped (*adjective*): not normally or fully developed

vulnerable (*adjective*): able to be hurt or damaged

weigh (*verb*): to think about something carefully in order to make a decision

What Do You Know About the Teen Brain and Drugs?

Answer these questions to test your knowledge.



1. The brains of teenagers are:

- a. larger than those of adults
- b. the same as adult brains
- c. not yet fully developed
- d. made up of different parts than those of adults

2. The limbic system of the brain is involved mainly with:

- a. decision making
- b. emotions
- c. problem solving
- d. balance

3. The last part of the brain to fully develop is:

- a. the emotion center
- b. the part of the brain that controls automatic behavior like breathing
- c. the reward center
- d. the part of the brain involved in critical thinking

4. Teen brains are less sensitive to the effects of drugs than those of adults.

- True
- False

5. Which of the following statements is NOT true about the brain's prefrontal cortex?

- a. It helps people to weigh the risks of actions.
- b. It develops fully during childhood.
- c. It is used when adults need to make decisions.
- d. It can be damaged by drug use.

6. Drug use can cause changes to the brain.

- True
- False

7. Dopamine is:

- a. a natural chemical in the brain linked to pleasurable feelings
- b. a chemical found in drugs that affects the brain
- c. the region of the brain involved in emotions
- d. a natural chemical in the brain that decreases risk-taking

8. The number of connections between neurons in your brain can be affected by drug use.

- True
- False

NOW TRY THIS

Answer the following questions on a separate piece of paper after reading "Drugs and the Teen Brain."

1. What is the importance of the limbic system in the teen brain? Describe two ways this system can make teens more vulnerable to drugs.
2. Explain why a person's actions during their teen years can have a permanent impact on their life. Use evidence about brain development to support your answer.

For more information, visit scholastic.com/headsup

From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services



STRESSED OUT?



Learn how the body responds to stress—and healthy ways to cope

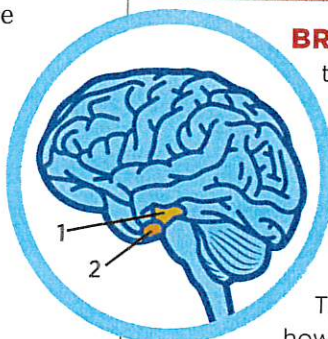


Your Body Under Pressure

Think of a time you were stressed. You may remember your heart racing, palms sweating, shoulders tensing up.

These reactions are part of the body's natural stress response. When the brain perceives a situation to be threatening, it triggers a surge of hormones that prepare the body for the challenge.

Known as "fight or flight," the stress response evolved to help us survive. But it is also triggered by events that aren't life-threatening. This can include academic and relationship pressures, or even stress from being over-connected to technology and social media. Some stress is helpful, like keeping you energized to study for a test. But constant stress can take a toll on a person's emotions and body, which can lead to serious health problems.

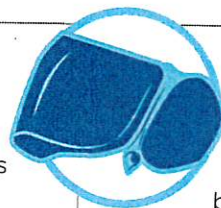


BRAIN: The body's stress response is triggered when the brain's hypothalamus (1) sends a signal to the pituitary gland, located at the base of the brain (2). This gland then signals the adrenal glands (located above the kidneys) to release stress hormones. These hormones change how organs and systems act to prepare the body to fight or take flight.

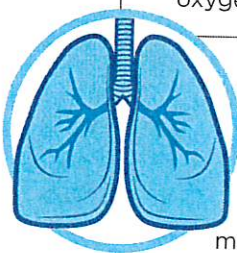
Fast Fact: Adrenaline, norepinephrine, and cortisol are the body's major stress hormones.



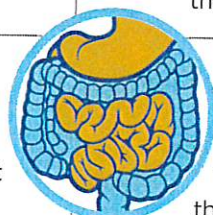
HEART: Heart rate and blood pressure increase so that blood travels through the body faster. This helps deliver oxygen to power muscles.



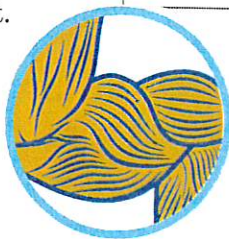
LIVER: The liver causes more glucose (blood sugar) to be released into the bloodstream. This powers cells in the body.



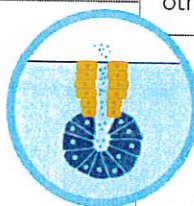
LUNGS: Breathing rate increases to deliver more oxygen throughout the body to power muscles and tissues.



STOMACH/INTESTINES: Digestion decreases. This redirects energy that would be used to break down food to power other parts of the body.

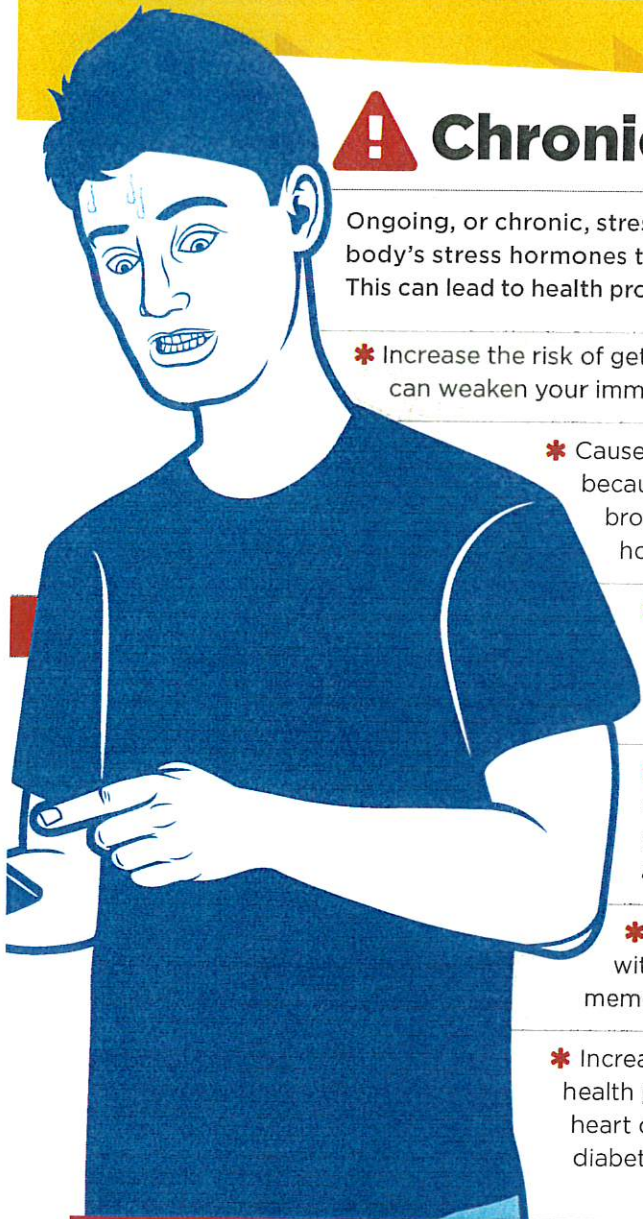


MUSCLES: Muscles tense up to prepare the body for action.



SWEAT GLANDS: Stress-triggered sweat is chemically different from sweat that cools the body. Stress sweat interacts with bacteria on the skin to cause body odor. Researchers aren't exactly sure why we sweat when stressed.

► **More Info:** For additional facts about health, visit scholastic.com/headsup and teens.drugabuse.gov.

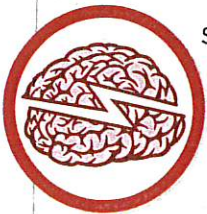


! Chronic Stress

Ongoing, or chronic, stress does not allow the body's stress hormones to return to normal levels. This can lead to health problems. Chronic stress can:

- * Increase the risk of getting sick because stress can weaken your immune system
- * Cause sleep problems because of the energy surge brought on by stress hormones
- * Lead to injuries or migraine headaches from constant muscle tension
- * Increase the risk of certain mental health problems, such as anxiety and depression
- * Lead to problems with learning and memory
- * Increase the risk for chronic health problems such as heart disease, obesity, and diabetes

Stress and Misusing Drugs: Not a Good Mix



Some people may think that drugs can help them deal with stress. But drugs can actually make it harder to cope by causing the body's stress response to be hyperactive. Here are some examples:

- * Some drugs, such as stimulants, have similar effects to stress. These effects include increased heart rate, blood pressure, and feelings of anxiety. This can cause a stronger reaction to stressful events.
- * Some drugs such as alcohol may be calming at first, but frequent use can raise stress hormone levels. This increases irritability and anxiety. Short-term withdrawal, such as a hangover, can have the same effect.
- * Both stress and drug use can make a person more impulsive and impair decision making. They can also change how the brain perceives pleasure. These effects increase the risk for drug use and for developing an addiction.

Tips to Help You Cope



MOVE YOUR BODY:

Regular aerobic exercise activates the body's stress response. But this is actually "good stress" and helps the body cope with psychological stress.



MEDITATE:

Meditation and deep breathing exercises can decrease blood pressure and improve symptoms of anxiety and depression.



TAKE A TIME-OUT:

Stepping away from distractions, such as social media and texting, may be stressful at first, but with practice can help you relax.



DO ONE THING AT A TIME:

If you feel overwhelmed with multitasking, try to tackle one challenge at a time.



GET SUPPORT:

If you are stressed, ask for help from your family, friends, or a professional, such as a doctor or school counselor.



DID YOU KNOW? If you experience stress during a test, you may feel your mind "go blank." This happens because norepinephrine—a stress hormone—may temporarily disrupt brain circuits that are used to recall memories.

Tip: If you experience your mind going blank, pause for a moment, take a deep breath, and try to relax to help the hormone surge ease off. *You've got this.*

VOCABULARY LIST FROM "STRESSED OUT?"

- **academic** (*adjective*): relating to school or learning
- **activate** (*verb*): to make active or more active
- **addiction** (*noun*): a brain disorder or illness associated with compulsive (uncontrollable) behavior, such as drug use, despite negative consequences
- **adrenal gland** (*noun*): one of a pair of glands located near the kidneys that produces hormones, including adrenaline (epinephrine) and norepinephrine
- **adrenaline** (*noun*): a chemical hormone released in the body when a person feels afraid or threatened; also called epinephrine, it has many effects on the body including causing the heart to beat faster
- **aerobic** (*adjective*): involving oxygen
- **aerobic exercise** (*noun*): physical activity such as running that causes an increase in heart and breathing rates to increase the amount of oxygen that is delivered to muscles
- **anxiety** (*noun*): a feeling of fear or worry
- **bacterium** (*sing.*)/**bacteria** (*pl.*) (*noun*): a type of microscopic single-celled organism that sometimes causes disease in other living things
- **base** (*noun*): the lower part of an object that acts as a support
- **blood pressure** (*noun*): the force caused by the blood pressing against the blood vessels that carry blood through the body (arteries); high blood pressure is connected to a higher risk for heart disease
- **cell** (*noun*): the smallest unit that makes up a living organism. Some organisms are made of only one cell, but others, like humans, are made of trillions of cells.
- **chemical** (*noun*): a substance such as an element or a mix of elements (compound) that can occur naturally or be made by a chemical process
- **chronic** (*adjective*): occurring over a long period of time or repeatedly
- **circuit** (*noun*): a path between points over which signals can move
- **constant** (*adjective*): continually occurring without stopping
- **cope** (*verb*): to handle a problem successfully
- **cortisol** (*noun*): a chemical hormone produced and released in the body when a person experiences stress; it has many effects in the body including causing cells to produce glucose
- **depression** (*noun*): a condition in which a person feels sad and hopeless and may have difficulty concentrating and thinking
- **develop** (*verb*): to grow or cause something to become larger or more advanced
- **diabetes** (*noun*): a serious disease in which the body cannot properly control the amount of glucose in the blood
- **digestion** (*noun*): the process by which the body breaks down food into simpler chemicals that can be used by cells
- **disrupt** (*verb*): to stop the normal working of something
- **evolve** (*verb*): to change over time. Living creatures evolve through a process called natural selection, which helps each generation of a species to pass on genetic traits that are best suited to their environment
- **frequent** (*adjective*): happening often
- **gland** (*noun*): one of several organs in the body that make and release substances, such as hormones, into the body
- **glucose** (*noun*): a type of sugar found in nature, including in living organisms
- **heart disease** (*noun*): a condition in which the heart works abnormally
- **hormone** (*noun*): a chemical produced by cells and released into the bloodstream that has specific effects on the body
- **hyperactive** (*adjective*): extremely active or too active

[Continued on next page.]

VOCABULARY LIST FROM "STRESSED OUT?"

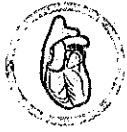
- **hypothalamus** (*noun*): the part of the brain important for controlling hormone release and regulating automatic processes such as sleep and hunger
- **impair** (*verb*): to damage or weaken something
- **impulsive** (*adjective*): doing something or tending to do something suddenly without careful planning or thought
- **meditation** (*noun*): the act or process of sitting quietly to relax the mind
- **migraine** (*noun*): a type of very bad, chronic headache
- **multitask** (*verb*): to do many things at one time
- **norepinephrine** (*noun*): a chemical hormone produced and released when the body is under stress; it has many effects on the body including increasing heart rate
- **obesity** (*noun*): a condition of being extremely overweight
- **organ** (*noun*): a structure in a plant or animal that performs a specific function, such as the brain or heart
- **perceive** (*verb*): to notice or become aware of something
- **pituitary gland** (*noun*): a gland that sits under the hypothalamus which produces and releases several hormones
- **pressure** (*noun*): the force produced when something pushes against something else
- **process** (*noun*): a series of actions taken in order to produce a certain result
- **psychological** (*adjective*): related to the mind and behavior
- **redirect** (*verb*): to change the path or direction of something
- **release** (*verb*): to allow out; to set free
- **similar** (*adjective*): almost the same as something else
- **stimulant** (*noun*): a chemical such as a drug that makes a person more active or energetic
- **strategy** (*noun*): a plan or method for reaching a certain goal
- **stress** (*noun*): a state of worry, anxiety, or tension caused by situations and problems in life
- **stress hormones** (*noun*): several chemicals produced and released in the body when a person feels threatened or afraid
- **surge** (*noun*): a sudden increase to a high level
- **technology** (*noun*): machines or equipment that are created or invented to solve problems or to do things more efficiently
- **temporarily** (*adjective*): for a limited time
- **tension** (*noun*): the physical condition of an object being stretched so that it becomes stiff; the emotional condition of being nervous or worried
- **threatening** (*adjective*): showing intention to cause harm
- **tissue** (*noun*): groups of cells that form the parts and organs in a plant or animal
- **toll** (*noun*): a cost
- **trigger** (*verb*): to cause something else to happen
- **withdrawal** (*noun*): the body's response when the presence of a drug to which it has adapted (gotten used to) is suddenly removed. Withdrawal symptoms can include pain, nausea, shaking, and anxiety

STRESS TEST

PART 1

MATCH THE RESPONSE

When you feel under stress, your body's stress response system kicks into gear to tackle the situation. Match each body organ below with the way in which it responds to stress.



1. Heart

a. Tense to protect against injury.



2. Brain

b. Releases glucose into the bloodstream to power cells.



3. Liver

c. Rate increases to push blood through the body faster.



4. Muscles

d. Activity decreases so energy can be used in other parts of the body.



5. Stomach/Intestines

e. Signals the release of the hormones adrenaline and cortisol.

PART 2

THINK ABOUT IT

Use information from this work sheet, as well as the article "Stressed Out?" to respond to the questions below. Record your answers on a separate sheet of paper.

1. Identify a situation in which you experienced stress.

2. Write about how your body responded to the stressful event, and explain why your body reacted the way it did.

3. What strategies will you use to reduce this type of stress in the future?

Be sure to use evidence from the texts to support your answer. Write in complete sentences.

PART 3

COPING WITH STRESS

Stress-release strategies can help you cope with day-to-day stress so that it doesn't turn into chronic stress. Pick one of the exercises below and try it for at least 10 minutes every day for a week. Report back to your class how it helped you or not.



1. **Deep Breathing Focus:** Find a quiet space. Breathe deeply through your nose for a count of four. Hold your breath for a count of two. Then, let the breath out through your mouth for a count of four. Try to continue for 10 minutes or more.



2. **Physical Activity:** Lace up and go for a walk or a run. Try to get your heart pumping, but not so much that you can't talk. In fact, you might ask a friend or family member to join you to help make it more fun!



3. **Step Away From Your Phone:** This exercise is best for those "attached" to their phones. Put your phone away and do not check it for two hours or four hours or a whole day. Let your parents know, and ask them not to call you unless it's absolutely necessary, and then pick up only for them. At first you may feel more stressed and worried about what you are missing. But see if it gets better as each day goes by. Track your progress.

**HEADS UP
REAL NEWS
ABOUT DRUGS
AND YOUR BODY**

STUDENT ACTIVITY REPRODUCIBLE ○ ○ ○

Name _____

Date _____

Teens and Decision Making: A Quiz

Use what you've learned from reading the article to answer the questions below.

Fill in the Blank

1. Acting before thinking something through happens more often in _____ than in adults.
2. Decisions stem from a series of events in the _____, which happen almost instantaneously.
3. Specialized cells called _____ talk with each other by way of electrochemical impulses and chemical messengers called _____.
4. Since the limbic system matures earlier than the _____, it is more likely to gain an upper hand in decision making. This imbalance helps to explain a teen's inclination to rush decisions.
5. Inside the brain, information travels through a network of neurons, which have thread-like fibers called _____ and branch-like structures called _____.
6. A _____ is the small space between an axon and a dendrite where information is exchanged.

True or False

7. The brain reaches its maximum size between ages 5 and 7.
(A) True (B) False
8. Brain development continues through a person's early twenties.
(A) True (B) False
9. Myelination boosts the brain's efficiency because it increases the speed of a signal traveling down an axon by up to 100 times.
(A) True (B) False
10. Synaptic pruning increases the number of synapses.
(A) True (B) False
11. Teens have the potential, through their choices and the behaviors they engage in, to shape their own brain development.
(A) True (B) False

Multiple Choice

12. The prefrontal cortex, a key brain region located directly behind your forehead, is an important control center for:
(A) thinking ahead and sizing up risks and rewards.
(B) coordinating motor responses and keeping your balance.
(C) mounting an emotional response to stimuli.
(D) responding to loud noises.
13. The limbic system, a part of the brain that matures earlier than the prefrontal cortex, plays a central role in:
(A) sports.
(B) speaking foreign languages.
(C) emotional responses.
(D) thinking ahead.