YOU PROBABLY ALREADY KNOW anything you ingest can have an effect on your body, whether it’s food, liquid, or medication. For instance, you know that if you drink coffee, the caffeine can help you stay awake. And an allergy pill can relieve your stuffy sinuses.

The active ingredients in prescription and over-the-counter (OTC) drugs are tested to make sure they are safe and will have the expected effect. But if you mix those medications with other medications or substances, intentionally or even by accident, they can produce potentially dangerous effects.

**Interaction Alert**

An active ingredient is the part of a drug that acts on your body. Combining substances can change the way an active ingredient works. This can increase the effect of that ingredient on your body, make it less effective, or have other unexpected results.

For example, prescription medications used to treat attention deficit hyperactivity disorder (ADHD), such as Ritalin, are stimulants. These drugs contain ingredients that increase alertness and attention, but can also increase heart rate and blood pressure. The decongestants in many OTC allergy and cold medications are also stimulants. As a result, taking Ritalin at the same time as a decongestant can cause an additional increase in heart rate and blood pressure. Over time, this can damage the heart.

Even with OTC drugs, you can accidentally exceed the dosage of an active ingredient. For example, think about when you have a cold. You may have a headache and take a pain reliever like Tylenol. Then an hour later you have a cough, so you take cold medicine. But many OTC cold treatments contain acetaminophen, Tylenol’s active ingredient. Using these medications together can cause you to exceed the recommended dose of acetaminophen, increasing your risk for liver damage.

Even vitamins, herbal supplements, and foods can interact with medications. For example, the allergy medicine Allegra is less effective if taken with citrus fruit, including grapefruit and oranges. There is also evidence that the herbal supplement St. John’s wort can interact with drugs that treat depression, such as Zoloft and Prozac. These interactions can increase the risk of dangerous side effects, including heightened body temperature and seizures.

**DRUGS AND ALCOHOL: A TOXIC MIX**

Drinking alcohol, taking illicit drugs, or misusing prescription medications like sedatives or opioid pain relievers is never safe for teens. These substances have powerful active chemicals that can harm the developing adolescent brain, pose a high addiction risk, or even lead to death. But when mixed with other drugs, the dangers are even greater.

Mixing alcohol with other substances is particularly dangerous because alcohol magnifies the effects of many drugs. For example, prescription opioids or sedatives can slow breathing and heart rate. So can many OTC cold or cough medicines. Taking these with alcohol can cause a person’s breathing to slow so much that the person dies.

Alcohol also amplifies the impaired thinking and coordination that occurs with marijuana use. And when mixed with stimulants such as cocaine and methamphetamines, alcohol can dangerously increase a person’s heart rate, blood pressure, and body temperature.

Prescription opioids (Vicodin, Oxycontin) are extremely powerful drugs that should never be mixed, especially with sedatives or alcohol. More than 30 percent of opioid overdoses in this country involve combining opioids with sedatives such as Valium or Xanax.
Combining substances can change the way an active ingredient works on your body. This can increase the effect of that ingredient, make it less effective, or have other unexpected results.

Protecting Yourself

Thankfully, medications must include labels with usage instructions and warnings about possible interactions. Always carefully read the label with an adult before taking anything, and talk to your doctor before starting a new medication if you are still taking an old one.

Also be mindful of potential interactions with vitamins and herbal supplements, which might not be labeled with warnings about interactions. Ask the pharmacist or your doctor to make sure these products won’t interact with any medications you are taking.

Staying smart and reading labels carefully will keep you healthy and make sure your medicine is helping, not hurting you. After all, the whole point of taking medicines is to feel better, not worse!
A Dangerous Mix

Many teens regularly take medications and over-the-counter drugs. But they may not know that mixing substances can cause unexpected and potentially dangerous effects. Those risks are even greater when alcohol and illicit drugs are involved. By sharing the student article “A Dangerous Mix,” teaching the lesson, and handing out the activity sheet, you will help students be smart about medicine safety.

Critical-Thinking Questions

1. What is an active ingredient? Where can they be found? Give an example of an active ingredient.

(An active ingredient, also known as an active chemical, is a substance that has an effect on the brain or body such as causing alertness or slowing breathing. Active chemicals can be found in drugs and alcohol, over-the-counter and prescriptions medications, and even natural substances like food, vitamins, and herbal supplements. Examples may include caffeine, decongestants, stimulants in ADHD medications, etc.)

2. Explain why it is important to check the ingredients in any over-the-counter medications before taking them.

(Answers may include that many over-the-counter medications contain the same active ingredients. Mixing these medications together may cause you to ingest too large of a dose of a chemical, which may be harmful to your body. Mixing medications can also amplify their effects, which may cause dangerous bodily reactions.)

3. Why might someone who mixes alcohol with an illicit drug end up in the emergency room? Use evidence to support your answer.

(Alcohol often magnifies the effects of a drug on the body. Depending on the drug, this can cause dangerous complications that may impair a person’s breathing, such as with sedatives or opioids, or dangerously increase a person’s heart rate, such as with stimulants like cocaine and methamphetamine.)

Writing Prompts

Grades 6–8 Why is it important to tell your doctor about any vitamins or herbal supplements you are taking?

Grades 9–10 Describe at least two ways that the effect of a medication may change if it is mixed with another substance. Give examples of each.

Grades 11–12 Explain why mixing drugs such as opioids can increase risk of death.

Paired Reading

“Non-Addictive Drugs: Are They Always Safe?” (teens.drugabuse.gov/blog/post/non-addictive-drugs-are-they-always-safe) This paired text describes why even over-the-counter medications should be used with caution.

Writing Prompt

Explain why it is important to follow the directions on an over-the-counter medication. Describe at least two possible risks if you misuse the drug. Have students use text evidence from “Non-Addictive Drugs: Are They Always Safe?” and “A Dangerous Mix” to support their answers.

Activity Sheet Answers

1. The active ingredient in the medication is chlorpheniramine maleate.

2. Assuming an age of 12 and up: You can take a maximum of 12 pills per 24 hours, which is equal to 24 milligrams of chlorpheniramine maleate.

3. Answers may include: a person should not drive a vehicle or operate heavy machinery when taking this medication. That’s because the medication can cause the person to be drowsy.

4. Alcohol, sedatives, and tranquilizers.

5. Sedatives, tranquilizers are substances that slow breathing and heart rate and cause drowsiness. These are similar to the medication’s side effects. When the substances are combined, the effects could be amplified or could result in other side effects. This is also true for alcohol, which can amplify the effects of medications.

Subject Areas

• Science Literacy
• English Language Arts
• Health/Life Skills

Standards

CCSS
RST.6-8.1 / RST.9-10.1
• Cite specific textual evidence to support analysis of science and technical texts
W.6-8.1 / W.9-10.1
• Write arguments to support claims, using valid reasoning and relevant and sufficient evidence

NGSS Practices
• Obtaining, evaluating, and communicating information/engaging in argument from evidence

NSES
• Personal health

NCSS
• 8. Science, technology, and society

Additional Lesson Resources

• Tiered Vocabulary Tools: Visit scholastic.com/headsup/adangerousmix for a vocabulary list to support this article.
• headsup.scholastic.com/teachers and teens.drugabuse.gov

NIH National Institute on Drug Abuse
Read the Label!

Directions: Read the label from an allergy and cold medication below and then answer the questions that follow.

**Drug Facts**

<table>
<thead>
<tr>
<th>Active Ingredient (in each tablet)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorpheniramine maleate 2 mg</td>
<td>Antihistamine</td>
</tr>
</tbody>
</table>

**Uses**
- temporarily relieves symptoms due to hay fever or other upper respiratory allergies:
  - sneezing
  - runny nose
  - itchy, watery eyes
  - itchy throat

**Warnings**
- Ask a doctor before use if you have
  - glaucoma
  - a breathing problem such as emphysema or chronic bronchitis
  - trouble urinating due to an enlarged prostate gland
- Ask a doctor or pharmacist before use if you are taking tranquilizers or sedatives
- When using this product
  - you may get drowsy
  - avoid alcoholic drinks
  - alcohol, sedatives, and tranquilizers may increase drowsiness
  - be careful when driving a motor vehicle or operating machinery
  - excitability may occur, especially in children
- If pregnant or breast-feeding, ask a health professional before use.
- Keep out of reach of children. In case of overdose, get medical help or contact a Poison Control Center right away.

**Directions**
- adults and children 12 years and over: take 2 tablets every 4 to 6 hours; not more than 12 tablets in 24 hours
- children 6 years to under 12 years: take 1 tablet every 4 to 6 hours; not more than 6 tablets in 24 hours
- children under 6 years: ask a doctor

**Other information**
- store at 20-25° C (68-77° F) ■ protect from excessive moisture

**Inactive ingredients**
- D&C yellow no. 10, lactose, magnesium stearate, microcrystalline cellulose, pregelatinized starch

Answer these questions on a separate sheet of paper as necessary.

1. What is the active ingredient in the medication?

2. What is the maximum dose in milligrams of the ingredient someone your age can take in 24 hours?

3. What are some activities that should be avoided while taking this medicine? Explain why.

4. Which substances should not be taken with the medication?

5. Research the effect of substances listed on the label that should not be used with this medication. Apply what you have learned in the student article to explain why these substances should not be combined. Include evidence from the label, the article, and any additional research to support your answer.
Dear Teacher,

The vocabulary list on the following pages is drawn from the “A Dangerous Mix” student article and the “Read the Label!” activity sheet.

It can be previewed with students prior to reading or reinforced with students afterward. Encourage students to incorporate these words into their discussions and writing about the student article and activity sheet.

The list integrates vocabulary words that would be used across several content areas, such as adolescent, ingest, and usage, as well as domain-specific words, such as decongestant, dose, and vitamin.

Some suggestions for students to help their understanding include:

- organizing concept maps that include word parts, synonyms, antonyms, and examples;
- composing memory aids that explain the words or use them in a meaningful context;
- employing the words to create newspaper articles, stories, or poems.

Sources: Unless otherwise noted, definitions are sourced or adapted from Merriam-Webster’s Collegiate Dictionary and Scholastic Children’s Dictionary.

Supplement for “A Dangerous Mix”

- Student Article: scholastic.com/headsup/adangerousmix

Continue to vocabulary sheet on next page
acetaminophen (noun): a substance used in medications to relieve pain and reduce fever

active (adjective): producing or involving action or movement

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

adolescent (adjective): related to the time when a young person is becoming an adult

alertness (noun): the state of being aware and ready to act

allergy (noun): a condition in which a person’s body is very sensitive to certain substances, resulting in rashes, breathing difficulties, and other problems

alprazolam (noun): a type of sedative drug used to increase calmness

amplify (verb): to increase the strength or amount of

antihistamine (noun): a substance used to reduce allergy reactions in the body as well as some cold symptoms

attention-deficit/hyperactivity disorder (ADHD) (noun): also called attention deficit disorder: a disorder that makes it difficult to pay attention and control impulsive behaviors. It may also involve restlessness and near-constant activity.

blood pressure (noun): the force caused by the blood pressing against the blood vessels that carry blood through the body (such as especially arteries); high blood pressure is connected to a higher risk for heart disease

bronchitis (noun): a condition that occurs when the tubes that carry air to the lungs become inflamed (red and swollen), causing coughing

caffeine (noun): a substance found in coffee, tea, and chocolate that tastes bitter and is a stimulant

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

chlorpheniramine maleate (noun): an antihistamine

citrus (noun): a type of tree or shrub that has pulpy fruit covered in a thick rind

cocaine (noun): an addictive illegal drug that produces a temporary increase in alertness and feelings of pleasure

coordination (noun): the functioning of different muscles together to perform complex movements

D&C yellow no. 10 (noun): a substance used to color foods and drugs

dehcongestant (noun): a substance found in medications that relieves congestion (clogged sinuses)

depression (noun): a medical condition in which a person experiences symptoms such as extreme sadness, difficulty concentrating, and a lack of energy

developing (adjective): growing or becoming more advanced

diazepam (noun): a type of sedative drug used to increase calmness

disorder (noun): a physical or mental illness

dose (noun): the quantity of an active ingredient that should be taken at one time

emphysema (noun): a condition that damages the lungs and causes shortness of breath and may cause heart problems
evidence (noun): something that gives proof or a reason to believe something

exceed (verb): to go over a set limit

expected (adjective): thought to be likely or certain to occur

glaucoma (noun): a disease that affects the eye and can cause vision loss over time

heart rate (noun): the number of times the heart beats in one minute

heightened (adjective): greater in amount or degree

herbal supplement (noun): a substance made from herb plants or parts of the plant that is meant to be used as an addition to a person’s diet and often claiming to have possible health benefits

hydrocodone (noun): an opioid drug used to treat severe pain

illicit (adjective): against the law

impaired (adjective): weakened or damaged in function or ability

ingest (verb): to take into the body, normally through the mouth

ingredient (noun): something that is part of a combination or mixture

intentionally (adverb): on purpose or with awareness of what one is doing

interact (verb): to act upon one another

interaction (noun): the action or effect of two or more things on each other

lactose (noun): a type of sugar found in milk products

liver (noun): a large organ in the body that cleanses the blood

magnesium stearate (noun): a fine white powder added to drug capsules to prevent ingredients from sticking to one another, ensuring better absorption by the body

magnify (verb): to increase or intensify

marijuana (noun): dried leaves and flowers of the plant, which can be used as a drug

medication (noun): a chemical or substance that is used to treat a disease or medical condition

methamphetamine (noun): a substance found in some prescription medications that is a stimulant and is sometimes misused illegally

microcrystalline cellulose (noun): a substance produced from wood pulp that is added to some drug and vitamin tablets

mindful (adjective): aware

misuse (verb): to use something in a way that is unintended or harmful, such as misuse of a prescription drug

opioid (noun): one of a group of drugs that produce relaxation, pleasure, and pain relief. Opioids can be addictive and potentially deadly due to overdoses.

overdose (noun, verb): a lethal or toxic amount of a drug; to take a lethal or toxic amount of a drug

over-the-counter (OTC) drug (noun): a medication that can be purchased without a doctor’s prescription

oxycodone (noun): an opioid drug used to treat severe pain

Continued on next page
OxyContin® (noun): a brand-name version of the drug oxycodone, which is an opioid drug used to treat severe pain

particularly (adverb): to an unusual degree

pharmacist (noun): a trained health-care professional legally allowed to dispense prescription drugs, monitor drug interactions, and advise patients on the proper use of medications

pose (verb): to present

potentially (adverb): possibly, but not yet actual

pregelatinized starch (noun): a substance usually produced from corn or potatoes that is added to many drug or vitamin tablets to help them dissolve easily

prescription drug (noun): a medication that must be ordered by a doctor before it can be dispensed

prostate gland (noun): a small organ located at the base of the bladder in males

recommended (adjective): to be suggested

relieve (verb): to ease or reduce discomfort

Ritalin® (noun): a brand-name version of a stimulant drug used to treat ADHD

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

sedative (noun): a chemical such as a drug that makes a person feel calm or reduces anxiety or nervousness

seizure (noun): a sudden attack caused by abnormal activity in the brain that causes convulsions or loss of consciousness

sinus (noun): an open space in the skull that connects with the nose openings

stimulant (noun): a drug that causes a temporary increase in activity in parts of the brain and/or body and makes a person more active or energetic

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

tranquilizer (noun): a powerful drug used to calm nerves and reduce severe anxiety

treat (verb): to care for or deal with medically

Tylenol® (noun): a brand-name version of an over-the-counter pain reliever that contains acetaminophen as its active ingredient

usage (noun): the amount or way of using something

Valium® (noun): a brand-name version of the drug diazepam, which is a type of sedative used to increase calmness

Vicodin® (noun): a brand name for a combination of the drug hydrocodone, which is an opioid drug used to treat severe pain, and non-opioid pain reliever acetaminophen

vitamin (noun): a natural substance that is needed in small amounts in the body but does not provide energy; vitamins are found in some food and are sometimes produced inside the body

Xanax® (noun): a brand-name version of the drug alprazolam, which is a type of sedative used to increase calmness