

Pickens County School District

Elementary
Sixth Grade

Extended Learning for Reading
and Math

Bubble Tea Is Blowing Up (880L)

Step 1: Before Reading Poll (Write Your Answer)

A relatively new drink called "bubble tea" is winning followers across the world. What do you think?

Newer is better.

- Do you agree or disagree?

Step 2: Article (Read the Article)



Photo credit: jarenwicklund/iStock/Getty Images

A bubble tea shop is a sweet spot to hang out, as well as a good place to get a sweet treat.

TAIPEI, Taiwan (Achieve3000, May 7, 2019). Bubble tea is a sweet drink is trendier than avocado toast and cooler than a cucumber-kale smoothie. Originally from Taiwan, it's winning fans around the world, from Los Angeles to London and Sweden to New Zealand.

To enjoy this treat, you will likely need an extra-wide straw. Why? To slurp up a fun surprise! A bubble tea is made with tea, flavorings, creamer, and often ice. What makes it so special, though, is that it typically includes chewy goodies, which you'll find at the bottom of your cup. Most often, they are black tapioca pearls. They're sweet. Tapioca is a starchy food made from cassava, the root of a tropical plant. Some people claim the balls of gummy goodness are the "bubbles" that give the drink its name. Others insist that the "bubbles" in the name actually refer to the foam on top of the drink. This forms when the drink gets shaken to mix the ingredients.

Tapioca is also used to make desserts, and that probably explains how bubble tea was invented. In the 1980s, tapioca desserts and milk tea were both popular in Taiwan. Milk tea is a drink consisting of—you guessed it—tea and milk or creamer. Near the end of that decade, some creative snacker added ice and tapioca pearls to a milk tea. Who was this trendsetter? Where exactly did the inspiration strike? Those are questions steeped in controversy. Different people and cities have claimed the credit.

What we do know, however, is that people loved this new combination. It was like a drink and a snack in one cup! The invention took off like a soap bubble on a breezy day. In no time at all, it was a huge hit all over Taiwan. From there, its popularity spread to other places in Asia.

In the 1990s, bubble tea shops started opening in the United States. Many were in areas where there were a lot of Taiwanese immigrants, like Southern California. Now, they're on the rise elsewhere in the U.S. and in lots of other countries around the world. If there isn't a bubble tea shop near you now, look for one to pop up soon!

Thinking of trying a bubble tea? Get ready to face a lot of tough-but-tasty decisions. Part of what people like so much about these drinks is that they can customize them to their own tastes. Some shops offer over a hundred flavors and styles. Customers can choose the type of tea, for example, black, green, jasmine, or oolong, the amount of ice, and the exact level of sweetness. There's also a flurry of flavor options. Would you like a traditional favorite, like mango, honeydew, or chocolate pudding? Or are you up for something more unusual, like matcha or cookie dough? Even when you've settled these questions, there's another important consideration to chew on: toppings! You could go for black tapioca pearls, of course. But there are plenty of other options on the table, too. You might ask your bubble tea barista to throw in almond jelly, pudding, chia seeds, or red beans. (Yes, they're called "toppings" even though they typically sink to the bottom of the drink.)

You might need a break after making all those decisions. But guess what? A bubble tea shop is a great place to chill out while you enjoy your concoction. In fact, for many people, the fun, relaxing atmosphere is as much of a draw as the bubble tea itself. In Southern California, for example, bubble tea shops are especially popular with high school and college students. They go there to hang out with friends, play games, or study. For these young people, the shops are an important part of their social lives. As Chatchawat Rienkhemaniyom, the former owner of one bubble tea shop in California put it, "[Bubble tea] has become life."

Voice of America contributed to this story.

Credit: Voice of America

Dictionary

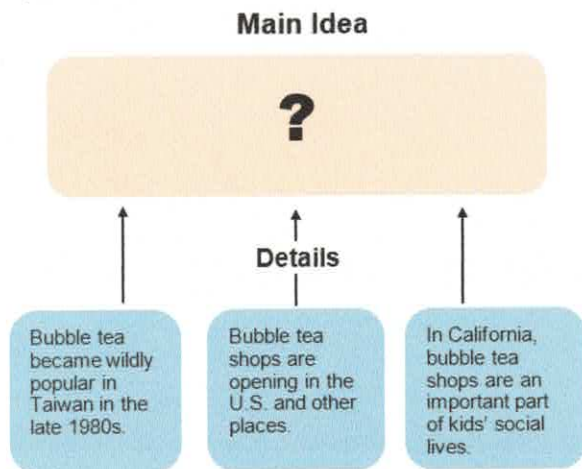
controversy (*noun*) disagreement

inspiration (*noun*) something that prompts a creative act

trendier (*adjective*) more in style or fashionable than something else

Step 3: Activity (Answer the Questions)

Question 1



Based on the Article, which best replaces the question mark in the box above?

There is a large rectangle with a question mark in it. Above the rectangle, it says "Main Idea of the Article." Under the rectangle, there are three smaller boxes with arrows pointing up to the rectangle. Each small box includes a detail from the Article. The first box on the left says "Bubble tea became wildly popular in Taiwan in the late 1980s." The box in the middle says "Bubble tea shops are opening in the U.S. and other places." The box on the right says "In California, bubble tea shops are an important part of kids' social lives."

- Ⓐ One of the things that people like about bubble tea is that they can customize the drink to their own tastes.
- Ⓑ The popularity of bubble tea has spread from Taiwan to other places around the world.
- Ⓒ The "bubbles" in bubble tea could be black tapioca pearls or the foam that is made when mixing the drink.
- Ⓓ Lovers of bubble tea can order toppings like almond jelly, pudding, chia seeds, and red beans.

Question 2

Which is the closest **synonym** for the word *controversy*, as it is used in the Article?

- Ⓐ Tradition
- Ⓑ Mystery
- Ⓒ Agreement
- Ⓓ Debate

Question 3

Look at the events below. Which of these must have happened *second*?

This question asks about when events happened. It does not ask where in the Article the events appear. Look back at the Article for clues, such as dates.

- Ⓐ A combination drink and snack made by adding ice and tapioca pearls to milk tea became a hit in Taiwan.
- Ⓑ The popularity of bubble tea spread in the United States and other countries around the world.
- Ⓒ Tapioca, a food created from the root of a tropical plant, was used to make desserts in Taiwan.
- Ⓓ Bubble tea shops opened in parts of the United States where there were a lot of Taiwanese immigrants.

Question 4

Which of these is a statement of opinion?

- Ⓐ A bubble tea flavor option such as chocolate pudding is much tastier than matcha because it is sweeter.
- Ⓑ In the 1980s, tapioca desserts and milk tea, a drink made by combining milk with tea, were both popular in Taiwan.
- Ⓒ Exactly who invented bubble tea is a matter of debate because different cities and people have claimed the credit.
- Ⓓ Bubble tea shops are popular in Southern California with high school and college students, who visit them to hang out, play games, or study.

Question 5

Suppose Rosa wants to find out about bubble tea shops in the United States. She would find **most** of her information _____.

- Ⓐ In an article called "Bubble Tea Takes America by Storm"
- Ⓑ In an encyclopedia, under the entry for "bubble tea"
- Ⓒ In a chapter about the United States in a world atlas
- Ⓓ In a food science textbook that gives the ingredients of tapioca

Question 6

The Article states:

Thinking of trying a bubble tea? Get ready to face a lot of tough-but-tasty decisions. Part of what people like so much about these drinks is that they can *customize* them to their own tastes. Some shops offer over a hundred flavors and styles. Customers can choose the type of tea, for example, black, green, jasmine, or oolong, the amount of ice, and the exact level of sweetness. There's also a flurry of flavor options.

Which would be the closest **synonym** for the word *customize*, as it is used above?

- Ⓐ Adapt
- Ⓑ Acquaint
- Ⓒ Expand
- Ⓓ Compare

Question 7

Which passage from the Article best supports the idea that bubble tea is becoming a big part of American life?

- Ⓐ Customers can choose the type of tea, for example, black, green, jasmine, or oolong, the amount of ice, and the exact level of sweetness. There's also a flurry of flavor options.
- Ⓑ A bubble tea shop is a great place to chill out while you enjoy your concoction. In fact, for many people, the fun, relaxing atmosphere is as much of a draw as the bubble tea itself. In Southern California, for example, bubble tea shops are especially popular with high school and college students. They go there to hang out with friends, play games, or study. For these young people, the shops are an important part of their social lives.
- Ⓒ In the 1990s, bubble tea shops started opening in the United States. Many were in areas where there were a lot of Taiwanese immigrants, like Southern California.

Ⓓ In the 1980s, tapioca desserts and milk tea were both popular in Taiwan. Milk tea is a drink consisting of—you guessed it—tea and milk or creamer. Near the end of that decade, some creative snacker added ice and tapioca pearls to a milk tea. Who was this trendsetter? Where exactly did the inspiration strike? Those are questions steeped in controversy. Different people and cities have claimed the credit.

Question 8

The reader can tell from the Article that _____.

- Ⓐ Bubble tea shops appeared in Southern California after they became popular in other parts of the country.
- Ⓑ The rate of bubble tea shops opening in the U.S. has slowed compared to the rate they were opening in the 1990s.
- Ⓒ Ordering a cup of bubble tea can be a confusing experience, especially for those who have never ordered it before.
- Ⓓ Bubble tea shops in Southern California encourage customers to finish their drinks quickly to make room for more customers.

Step 4: After Reading Poll (Did you change your mind?)

Now that you have read the article, indicate whether you agree or disagree with this statement.

Newer is better.

- Agree
- Disagree

Step 5: Thought Question (Write Your Response)

What is bubble tea? What conclusions can you draw about the people who visit bubble tea shops? Include facts and details from the Article in your answer.

The Early-Late Debate (880L)

Step 1: Before Reading Poll (Write Your Answer)

Some people want later start times for middle schools and high schools. These people want start times pushed back until 8 a.m. or later. What do you think?

Middle schools and high schools should start later.

- Do you agree or disagree?

Step 2: Article (Read the Article)



Photo credit: Tom Wang/Shutterstock.com

It's hard to learn when you're nodding off at your desk! Should the school day get off to a later start?

SACRAMENTO, California (Achieve3000, October 30, 2019). Ever feel like drifting back to dreamland when it's time to get up for school? If you think school shouldn't kick off at the crack o' dawn, you're not alone. Lots of researchers and doctors agree. That's why some groups are pushing for later start times. They say a little extra shut-eye makes a big difference in students' health and success at school.

Their efforts are paying off: There's good news for some teens who like to snooze. In October 2019, the governor of the U.S. state of California approved a new law. It regulates the start times of public schools in the state. Beginning in the 2022 school year, high schools will start at 8:30 a.m. or later. Middle schools will start at 8 a.m. or later.

So middle schoolers and high schoolers will have a chance to get more minutes of California dreamin' in the morning. But what about younger students? The reason the new law doesn't cover elementary schools has a lot to do with *circadian rhythms*. Sound like a hip-hop dance craze? The phrase actually refers to changes that happen in the body in 24-hour cycles. *How much* you sleep is important, but *when* you sleep matters, too.

Research shows that most adolescents need about nine hours of sleep a night. But unlike younger or older people, they typically get their best sleep between 11 p.m. and 8 a.m. So, while a 5-year-old or a 35-year-old might get a great night's rest by hitting the pillow at 7 p.m. and waking up at dawn, most teens' bodies just don't work that way. If they get up at 5 or 6 a.m., they miss out on a lot of top-quality z's.

What's more, not getting enough sleep puts students at risk of developing serious physical and mental health issues. These include eating disorders, diabetes, heart problems, anxiety, and depression. Academic performance is affected, too. It's hard to learn when you're nodding off at your desk!

But not everyone agrees that starting the school day later is a smart way to go. Opponents argue there's no way to be sure students will get more sleep. After all, the law can't make teens go to bed! Although data suggest students do get more sleep when schools start later, more research is needed. And schools that start later will finish later. That will leave students with less time for things like sports, jobs, chores, homework, and—last but not least—fun.

Maybe the biggest roadblock for school districts looking into later start times? Buses! If all schools start near the same time, a district has to pay for more buses and drivers. That's one reason so many high schools start very early. Flipping the schedules so that elementary schools start first has drawbacks, too. Younger kids need more total hours of sleep. And early elementary dismissal times could be hard on working parents. Another option would be shifting all school schedules later. But that could create a whole new set of problems, with elementary schools getting out much later in the day.

California schools will have to work through these and other issues. Educators and government officials in other places will be watching to see how the experiment goes and looking to apply the lessons learned. In fact, several school districts outside California have already adopted start times that meet the state's new standards. In Seattle Public Schools, high schools now start no earlier than 8:45 a.m. And an Ohio lawmaker recently introduced a bill to push back school start times there.

How about you? Would you rather start school bright and early or snooze till the sun is high in the sky?

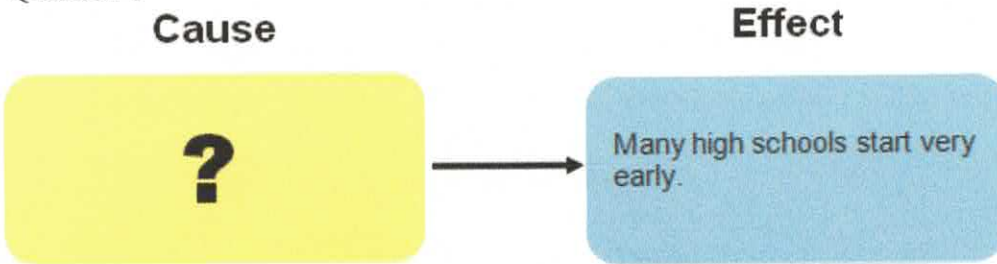
Dictionary

depression (*noun*) a serious medical condition in which a person feels very sad, hopeless, and unimportant and often is unable to live in a normal way

diabetes (*noun*) a serious disease in which the body cannot properly control the amount of sugar in your blood because it does not have enough insulin

Step 3: Activity (Answer the Questions)

Question 1



Based on the Article, which best replaces the question mark in the diagram above?

There are two boxes. The box on the left is labeled "Cause," and it has a question mark in it. There is an arrow pointing to a box on the right. The box on the right is labeled "Effect," and it says "Many high schools start very early."

- (A) Districts have to pay for more buses and drivers when all schools start near the same time.
- (B) Circadian rhythms are changes that happen in the body in 24-hour cycles.
- (C) Going to bed by 7 p.m. and waking up earlier helps teens get a better night's rest.
- (D) Research data suggest that students do not get more sleep when schools start later.

Question 2

What is this Article mainly about?

- (A) Students who don't get the sleep they need can have serious health problems, including diabetes and depression, and their academic success can be affected.
- (B) A later school start time for adolescents could cause problems such as less time for after-school sports, jobs, chores, homework, and fun.
- (C) People in other places will watch to see how starting school later goes for California, and how problems resulting from later start times are handled.
- (D) Some schools around the U.S. are moving to later start times, but there's debate over whether starting school later will make a difference in students' health and success at school.

Question 3

Which of these is a statement of opinion?

- (A) Adolescents with later school start times will take advantage of the additional time for sleeping in the morning by staying up later at night.
- (B) California middle schools must start their school days no earlier than 8 a.m. beginning in the 2022 school year.
- (C) Seattle Public Schools began having later high school start times that meet California's standards before California did.
- (D) Changes occur in the body according to the time of day during 24-hour cycles in response to circadian rhythms.

Question 4

Which two words are the closest **synonyms**?

Only some of these words are used in the Article.

- (A) issues and standards
- (B) depression and encouragement
- (C) approve and permit
- (D) physical and mental

Question 5

Which of these statements is **contrary** to the ideas presented in the Article?

- (A) Sleep deprivation can interfere with academic performance and cause serious physical and mental health problems.
- (B) The amount of time that adolescents spend sleeping is more important than what time of day they sleep.
- (C) Schools in places beyond California may consider revising their school schedules based on how the experiment works.
- (D) Additional research is needed to determine whether students do in fact get more sleep when schools have later start times.

Question 6

The Article states:

What's more, not getting enough sleep puts students at risk of developing serious physical and mental health issues. These include eating disorders, diabetes, heart problems, anxiety, and depression. Academic performance is affected, too. It's hard to learn when you're nodding off at your desk!

The author's purpose for writing this passage was to _____.

- (A) explain how important sleep is for adolescents
- (B) show that sleep is more important to adults than adolescents
- (C) identify issues common to all students during adolescence
- (D) analyze the quality of the research on adolescent sleep

Question 7

The Article states:

What's more, not getting enough sleep puts students at risk of developing serious physical and mental health issues. These include eating *disorders*, diabetes, heart problems, anxiety, and depression. Academic performance is affected, too. It's hard to learn when you're nodding off at your desk!

Which is the closest **synonym** for the word *disorders*?

- (A) illnesses
- (B) decisions
- (C) discussions
- (D) emergencies

Question 8

Which passage from the Article best supports the idea that it's too soon to tell whether or not students will benefit from a later school start time?

- Ⓐ Research shows that most adolescents need about nine hours of sleep a night. But unlike younger or older people, they typically get their best sleep between 11 p.m. and 8 a.m. So, while a 5-year-old or a 35-year-old might get a great night's rest by hitting the pillow at 7 p.m. and waking up at dawn, most teens' bodies just don't work that way. If they get up at 5 or 6 a.m., they miss out on a lot of top-quality z's.
- Ⓑ Opponents argue there's no way to be sure students will get more sleep. After all, the law can't make teens go to bed! Although data suggest students do get more sleep when schools start later, more research is needed. And schools that start later will finish later. That will leave students with less time for things like sports, jobs, chores, homework, and—last but not least—fun.
- Ⓒ What's more, not getting enough sleep puts students at risk of developing serious physical and mental health issues. These include eating disorders, diabetes, heart problems, anxiety, and depression. Academic performance is affected, too. It's hard to learn when you're nodding off at your desk!
- Ⓓ If you think school shouldn't kick off at the crack o' dawn, you're not alone. Lots of researchers and doctors agree. That's why some groups are pushing for later start times. They say a little extra shut-eye makes a big difference in students' health and success at school.

Step 4: After Reading Poll (Did you change your mind?)

Now that you have read the article, indicate whether you agree or disagree with this statement.

Middle schools and high schools should start later.

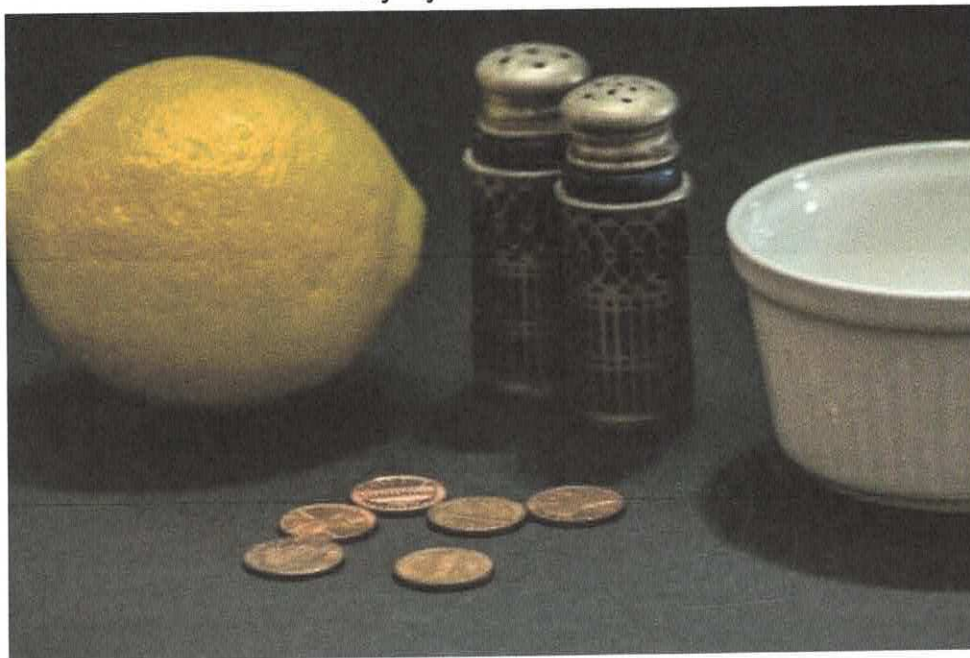
- Agree
- Disagree

Step 5: Thought Question (Write Your Response)

Do you think middle schools and high schools should start later in the day? Why or why not? Support your answer with facts and details from the Article.

The Penny Experiment

by Kyria Abrahams



Paola is 12 years old. She lives in Seville, Spain. The streets of her city are lined with beautiful orange trees. The oranges that grow here are sometimes called *Bitter Oranges*, because they are sharp to the taste. Tourists often come to Seville to see the beauty of Spain. They like to see flamenco, a colorful style of Spanish dancing, or visit a royal palace called the Alcázar.

But while all the tourists were coming to Spain, Paola and her family were off visiting New York City. They had many things to see while they were there, and seeing the Statue of Liberty was on the top of the list.

The Statue of Liberty is made of copper, but Paola noticed the statue didn't look much like copper. It was more of a bluish-green color. Once Paola noticed this, she started seeing this same color of copper all over the place. She noticed a green copper statue of the composer Beethoven in Central Park and a green copper roof on a famous old building called The Dakota.

There must be two kinds of copper, Paola thought to herself. I guess one kind of copper is green.

When Paola returned to Spain from New York, she brought home some souvenirs. One of the souvenirs wasn't something you could buy in a store, though. Paola is something of an amateur coin collector. So every time she travels, she brings home some money from that part of the world.

From this particular trip, she brought home about 30 pennies she had saved. She put them in a velvet pouch and packed it neatly in her suitcase. She had never held pennies before. In Spain, they use *euros*

Paola spread all the pennies out on her kitchen table. She noticed they all had different dates on them. Some were old, and some were brand new. One of the pennies was from 1953, which happened to be the year Paola's grandmother was born. Paola started to organize the pennies by date when she noticed something else: the pennies were all slightly different colors.

The newer pennies were copper-colored and shiny. But the older pennies were dull and had green spots on them. This was the same kind of green color she had seen on the Statue of Liberty.

Maybe there weren't two different kinds of copper, after all. Maybe the copper was just dirty. Or maybe the copper was painted green!

Paola asked her mother why the pennies were green. Her mother explained that the pennies had gone through a process called *oxidation*. This is a chemical reaction that can take place on metal. In this case, it creates a substance on metal. This substance on copper is green. It is called *verdigris*.

Paola said, "In Spanish, the word for green is *verde*."

"That's right. Now let's see if we can recreate *verdigris* on these pennies," Mom said. "We need a glass bowl, some salt, and some vinegar."

Together, they mixed a $\frac{1}{2}$ cup of vinegar and two teaspoons of salt together in the bowl. They mixed the vinegar around until the salt dissolved. Then they put 10 of the shiny new pennies into the mixture.

"What are we doing, cooking pennies?" Paola asked.

"In a way," said Mom, laughing. "I promise I won't make you eat pennies for dinner, though."

After about five minutes, Paola emptied the bowl of vinegar, salt, and pennies into a colander over the sink, and let all the liquid drain out. Then she spread two paper towels out on the counter.

"Now separate out the pennies into two groups of five," said Mom. "Wash half with water, and leave half the way they are."

Since there were 10 pennies, Paola placed five on each paper towel. She placed the washed pennies on the right side so that she wouldn't get confused later.

The next (and hardest) part was waiting for the results. They had to let the pennies dry for about an hour while the chemistry experiment worked its magic. To pass the time, Paola went for a bike ride.

She rode her bike up the street to the *Giralda*, a very old bell tower in Seville. It was completed in the year 1198. As she passed the tower, Paola remembered it used to have a copper sphere on the top. She had learned in school that the sphere fell off during an earthquake in the year 1365. She wondered whether that sphere would also be green today if it hadn't fallen off in the earthquake.

When she returned home, she ran to the kitchen to check on her pennies. She was so excited she almost forgot to close the front door.

Here's what had happened: the pennies that had been rinsed off in water looked really shiny and not at all green.

The five unwashed pennies on the left, however, had started to turn green.

Paola hadn't painted the pennies. The vinegar mixture created a chemical reaction between the copper and the air. This is also known as *redox*, or what happens whenever atoms change their *oxidation* state. A substance of copper oxide mixed with chlorine from the salt had formed on the penny, and the substance looked green.

But, if this was how you oxidize copper, how did the Statue of Liberty turn green? Had an airplane dumped a giant bowl of vinegar over her head?

"There is more than one way for a metal to oxidize," Mom explained.

Paola's mom continued to explain that vinegar is a mild acid. When combined with salt (a neutral base), it can form hydrochloric acid, which both cleans and oxidizes copper.

When you wash it off, the penny looks shiny. When you leave it on, the penny turns green.

There are also other ways of making copper turn green, however. For example, there could be products in the air that react in different ways when combined with oxygen, such as sulfur from coal. They will behave in a similar way to the vinegar. And that is why statues and buildings might have green-colored copper.

Paola decided to recreate the experiment. This time she used some of the bitter oranges from the tree in her backyard. Oranges are also mildly acidic, just like vinegar. She followed all the steps from the first experiment, only replacing vinegar with orange juice. She got the same result.

She called to her mother, who was relaxing on the porch, thumbing through a cookbook.

"Look, Mom, I made *verdigris* with oranges, too!"

"That's great," Mom said, pointing to the cookbook. "Because I'm about to make marmalade with the rest of the oranges."

"Just make sure you leave out the pennies!" said Paola.

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2. Sniffle, wheeze, cough, ahchoo! You've probably been hearing those sounds a lot. Why? Allergies are increasing in the United States. Those are bad **reactions** to things around you or that you eat.
3. Don't try to hold on to a cat that becomes frightened. It doesn't really want to hurt you, but its natural **reaction** is to use its claws to get away or to protect itself.
4. James barely had time to be curious about his father's **reaction** before his father turned on his heels, slammed the door shut and went sprinting down the hallway towards James and his mother.
5. Angelou had a difficult childhood. She endured some terrible experiences. Her **reaction** to these experiences was to become mute. She did not speak for almost five years.

substance

sub · stance

Definition

noun

1. a particular kind of matter or material.

She was covered with a sticky substance.

Advanced Definition

noun

1. that of which something is made; matter.
2. a specific kind of matter.

a liquid substance

3. essence; meaning; gist.
4. density; body.

a sauce with no substance

5. that which is solid, actual, or real in character.
6. wealth.

a family of substance

Spanish cognate

sustancia: The Spanish word *sustancia* means substance.

These are some examples of how the word or forms of the word are used:

1. Artificial steroids are **substances**, including drugs, that can help an athlete become stronger.
2. Do you know how to change the properties, structure and state of matter of a **substance**? If you have made ice before, the answer is yes.
3. When coal burns, it gives off a lot of darkcolored smoke. Soot is a black **substance** that is collected on a surface that comes into contact with smoke.
4. In a person with diabetes, the body makes little or no insulin. That is a **substance** that the body needs to help convert glucose, a sugar in food, into energy.

5. In humans, diet is strongly linked to heart disease. Eating foods high in saturated fat can cause cholesterol to build to dangerous levels in the body. Cholesterol is a soft, waxy **substance** the body needs in moderate amounts to build and repair cells. When cholesterol levels are too high, blockages can form in the arteries, the blood vessels that carry blood away from the heart.
6. The reef may look like a rock but it's actually alive. Coral reefs are underwater structures that are made by corals-tiny animals that are related to jellyfish. The coral have tender bodies that are vulnerable to attack, so they secrete a hard **substance** called calcium carbonate to protect their exteriors. The calcium carbonate builds up until it makes formations that look like rocks to the human eye.
7. At some point in the juice-making process, all the water has been removed from the fruit. What's left behind is frozen. That new **substance**-the concentrate-takes up a lot less space and is easy to move from one place to another. The concentrate still has all the vitamins and minerals from the original fruit. So if you buy a carton of orange juice from concentrate, that means that water has been added back to the concentrate to make your juice.

Name: _____ Date: _____

1. What do Paola and her mom perform an experiment on?

- A. coal
- B. salt
- C. pennies
- D. the Statue of Liberty

2. What is the order of events in this story?

- A. Paola wonders why some copper is green; Paola experiments; Paola understands why some copper is green.
- B. Paola experiments; Paola understands why some copper is green; Paola wonders why some copper is green.
- C. Paola experiments; Paola wonders why some copper is green; Paola understands why some copper is green.
- D. Paola understands why some copper is green; Paola experiments; Paola wonders why some copper is green.

3. Acid causes copper to turn green.

What evidence from the story supports this statement?

- A. Paola brings home 30 pennies from her trip to the United States.
- B. Paola lives in Seville, Spain, and the streets of her city are lined with orange trees.
- C. Paola's mother is going to make marmalade with oranges from the backyard.
- D. Both vinegar and orange juice cause some of Paola's pennies to turn green

4. Why does Paola's mom suggest doing an experiment on pennies?

- A. to make Paola appreciate the music of Beethoven
- B. to explain why tourists like to see flamenco performances
- C. to show Paola how copper changes color
- D. to teach Paola the history of an old bell tower

5. What is this story mainly about?

- A. the Statue of Liberty
- B. why copper changes color
- C. why people visit Spain
- D. why people visit New York City

6. Read the following sentences: "This substance on copper is green. It is called *verdigris*. Paola said, '**In Spanish, the word for green is verde.**'"

Why does the author mention that the Spanish word for green is *verde*?

- A. to show readers a connection between the word *verdigris* and the color green
- B. to prove to readers that learning Spanish is more useful than learning English
- C. to explain where the word "copper" comes from
- D. to illustrate the difficulty of learning a new language

7. Choose the answer that best completes the sentence below.

Paola does experiments with pennies; _____, she learns why copper changes color.

- A. as a result
- B. however
- C. previously
- D. first

8. What is different about the first experiment and the second experiment that Paola does?

9. What is similar about the first experiment and the second experiment Paola does?

10. Why does Paola recreate the first experiment? Support your answer with evidence from the story.

What Is Heat?

by ReadWorks



Imagine an eleven-year-old boy named Paul. Now imagine Paul inside a wood cabin. He is shivering. It is cold outside, and inside the cabin it isn't much warmer. Paul can hear the rain beating down on the roof. Every few minutes there would be a loud boom, and thunder would shake the cabin walls. Paul is happy to be inside the cabin, safe and dry with his family. "Let's make this cabin warmer," says his father. "Paul, help me build a fire." Paul fetches the firewood and then watches as his father carefully stacks the logs in the shape of a pyramid. Paul's father puts several small sticks of kindling in the bottom of the pyramid. The kindling would catch on fire much more quickly than the big logs. Paul's father lights a match, and soon the logs crackle and burn in the fireplace, shooting off small sparks. The fire gives off some light, but it also gives off heat. Within 30 minutes the inside of the cabin is warm and toasty. Thanks to the radiation of heat from the fire, Paul isn't shivering any more.

Though all that Paul's father did was light a match to start the fire, there was a complex set of interactions that had to occur for the fire to ignite and grow. There are three components needed for a fire to successfully burn: fuel, oxygen and a heat source. The matches were the heat source and the logs were the fuel. The oxygen supply came from the air around the fireplace. That's why Paul's father had to pile up the logs as a pyramid, with space in between them. If the logs had been too close together, there wouldn't have been enough oxygen for the fire and it could have fizzled out. A wood fire can grow very quickly. That's why it's so important to be careful when lighting fires and to never leave them unsupervised. A wood fire, like the one in Paul's fireplace, can reach temperatures over 1,000 degrees Fahrenheit. The hottest part of the fire is often the red glowing embers that are left in the fireplace once the wood has burned through. These embers can be as hot as 1,200-1,500 degrees Fahrenheit. Though fire is a common heat source, heat can come from many different sources. Heat can also be transferred from one object to another in a variety of ways.

Scientists use the term "heat" to refer to the energy transferred when two objects or systems are at different temperatures. Heat naturally moves from warmer areas to cooler areas. Think of what happens if you leave a bowl of ice cream out in hot weather. At first, the ice cream is much cooler than the air around it. But if you go back in an hour, the ice cream has melted, and it is roughly the same temperature as the surrounding air. The heat from the air has moved to the ice cream. In this example, the air is the heat source, the place where the higher temperature is found. The ice cream is the heat sink, or the place to which the heat moves. Whenever there is a temperature difference in a system or a group of objects, the heat will naturally move from the heat source to the heat sink.

How does heat transfer from one object to another?

Heat transfers in three different ways: conduction, convection, and radiation. Conduction is the transfer of heat between two surfaces that are directly in contact with one another. When you burn yourself on a hot pan while making scrambled eggs, that's an example of conduction. The heat is transferring from a very hot surface (the frying pan) to a cooler surface (your hand). Heat transfers through some materials better than others. Metals are especially good thermal conductors; that's why pots and pans are made out of metal. Materials that are very slow to transfer heat are called thermal insulators. Some examples of materials that are thermal insulators include rubber and cork. Typically materials that are good thermal conductors - like gold, silver and copper - are also good conductors of electricity.

The second way that heat can transfer is through convection. Convection is the transfer of heat through the movement of large amounts of a liquid or gas. An example of this is the storm outside Paul's cabin. Thunder and lightning are caused when a large mass of hot air meets a large mass of cool air. Warm air tends to rise, and cool air tends to fall. The movement of these air masses and the transfer of energy that occurs are called convection.

The third way heat transfer can occur is through a process called radiation. Radiation is when there is no material transferring the heat. Instead, the energy is carried by electromagnetic waves. Electromagnetic waves come in a wide variety of types: they can be infrared, visible light, UV, or radio waves. The hotter that the object is, the more infrared radiation (and heat) it gives off. The fire that Paul is looking at is radiating heat into the rest of the cabin.

Another example of heat radiation is the sun. At the sun's core the temperature is at least 10 million Kelvin, and on the surface of the sun, the temperature is about 6,000 Kelvin. Kelvin is a form of measurement of heat that scientists use, instead of measuring degrees in Fahrenheit or Celsius. What does 10 million Kelvin actually feel like? It's about 30,000 times as hot as boiling water. All of that heat travels from the sun to the earth on electromagnetic waves. To reach the earth's surface, the waves must travel through 93 million miles of our solar system. When the radiation arrives from the sun to the earth, it causes the ground to heat up. An object that is especially good at radiating heat is called a blackbody. The sun is a perfect example of a blackbody.

The earth is also a blackbody - it doesn't just absorb heat from the sun's electromagnetic waves; the earth also radiates heat out into space. Some of the heat that the earth radiates is the same energy from the sun. Around 30% of the electromagnetic waves that arrive from the sun are bounced back into outer space by the earth. The rest of the electromagnetic energy is either absorbed by the earth's atmosphere or heats the surface and oceans of the earth.

source

SOURCE

Definition

noun

1. the start or cause of something.

Having too little money was the source of his problem.

2. a person or thing that gives information.

The newspaper article named a government report as its source.

Advanced Definition

noun

1. the origin or cause of something.

Poorly written instructions were the source of the confusion.

The closing down of the factory was the source of the town's woes.

2. a person or thing that provides information.

A woman who had been a maid in the household was one of my sources for the story.

You have to cite the sources you used for your report.

3. the place where a stream or river begins.

The source of the Mississippi River is Lake Itasca in Minnesota.

These are some examples of how the word or forms of the word are used:

1. The koalas on St. Bees live and sleep in the trees. Koalas eat a steady diet of eucalyptus leaves-their main **source** of food.
2. About 25 percent of tree fires are caused by a heat **source** that is close to a tree.
3. Ever wonder where the metal inside your MP3 player comes from? Chances are the **source** is an impoverished country in the heart of Africa: the Democratic Republic of the Congo.
4. More than 20,000 polar bears live in the Arctic regions. Disappearing sea ice threatens polar bears and other cold-weather animals. Polar bears use the ice as a bridge to hunt seals, their

primary **source** of food.

5. Doctors now know that diabetes occurs when the body fails to make or properly use insulin. Insulin helps the body turn starches and other foods into glucose (a form of sugar)-a **source** of energy needed for daily life.
6. Beatrice was Dante's inspiration. He thought all beauty came from her. He wanted only to admire her from afar. The idea of having a beautiful woman as a muse, or **source** of inspiration, was new to authors in the Renaissance.
7. When they live away from human habitations, pythons eat birds and small wild mammals. The python is a solitary animal. The python kills by constricting its body around its prey. Python eggs and hatchlings are a food **source** for other animals. In the wild, pythons grow to be on average 12 feet long.
8. Ancient Egyptians ate a lot of bread. In fact, because they had no potatoes or rice, bread was the most important carbohydrate **source** in an ancient Egyptian's diet.
9. The Amazon River is the longest river in South America. It flows for 4,000 miles across the continent. The location of the river's **source**, or beginning, was a mystery for centuries. A team of explorers and geography experts recently found the tiny stream where the mighty river begins.
10. Her dad hired a caretaker to take care of my grandmother and her brother. On nice days, the caretaker would send my grandmother out to the rice paddies to collect slugs. Then the caretaker would fry the slugs with peppers. Peach trees provided another **source** of food. My grandmother would climb the sticky trees to get the fruit. She stated this was the one time during the war when she actually enjoyed herself.

temperature

tem · per · a · ture

Definition

noun

1. the degree of heat or cold in an object or an environment.

The temperature is higher in the afternoon than in the evening.

2. a condition when the body is warmer than normal because of illness; fever.

John stayed in bed because he had a temperature.

Advanced Definition

noun

1. the degree of heat or cold of a body or an environment.

I don't mind the temperature during the winter, but I hate shoveling snow.

The temperature in the office was uncomfortable to work in.

2. the specific level of heat or cold in a body or environment expressed as a number of degrees and determined by measuring with a thermometer or other standard instrument.

Did the meteorologist say what the temperature was?

The temperature was 85 degrees Fahrenheit in the mid afternoon.

3. abnormally high body temperature because of infection or illness; fever.

Spanish cognate

temperatura: The Spanish word *temperatura* means temperature.

These are some examples of how the word or forms of the word are used:

1. Sweat happens from the inside out. When the body gets too hot, it uses sweat to regulate its **temperature**.
2. Wind is really just air that moves across the Earth. One reason that air moves is because of changes in **temperature**.
3. The oil and gas could soon become easier to reach. **Temperatures** in the Arctic are rising. That is causing the sea ice there to melt.

4. Meteorologists, such as TV weather specialists, try to predict what the weather will be. They study weather patterns and carefully observe **temperature**. They also consider other factors that affect weather like humidity, wind speed, and air pressure.
5. Most cicadas on the East Coast belong to Brood II. They live in an area that stretches from Connecticut in the North, down to North Carolina in the South. Brood II last appeared in 1996. In northern states such as New Jersey, this happens around early June when the **temperature** warms up to about 64 degrees.
6. Sandes, with his eye on winning all four of the races in the series, trained for the Antarctic conditions by running in a large freezer. **Temperatures** in the freezer could be set as low as minus 20 degrees Celsius (4 degrees Fahrenheit). A fan was adjusted to simulate the wind chill Sandes would experience during the race.
7. Within a minute Fiennes' hand was frozen and completely useless. He knew that he only had a matter of minutes before his core **temperature** (the temperature of his major organs) would begin to fall. Disappointed, Fiennes knew he had only one real choice. He had to turn around and go back.
8. He's a professor of exercise and sports sciences at Ithaca College in upstate New York (where winter **temperatures** routinely drop into the teens and the record low is -21 degrees Fahrenheit), and he has studied people like you. He's come to a conclusion: "Get out there," he says. "Get out of your house. Just don't slip on the ice."
9. A lightning bolt that crackles through the air can reach a **temperature** of 60,000 degrees Fahrenheit. That is about five times hotter than the sun! The intense heat from lightning causes the surrounding air to expand, resulting in the loud sound known as thunder.
10. **Temperatures** is the heat of the air. When the sun shines down on earth, it warms up the earth's surface. But that is not all that happens. The warmth of the sun also heats up the water on earth. This process is responsible for many changes in weather and weather patterns. A thermometer measures temperature.

transfer trans · fer

Definition

verb

1. to move or carry from one person or place to another.

We transferred our money to our new bank when we moved.

2. to move from one place or situation to another.

He transferred to New York University from another school last year.

3. to change from one bus or train to another.

In order to get home, I had to transfer at Central Station.

noun

1. the act of moving something from one person or place to another.

The transfer of the star player to another team disappointed fans.

Advanced Definition

transitive verb

1. to convey or move from one place or person to another.

Her company is transferring her to the Los Angeles office.

I transferred everything from my old wallet to my new one.

Please hold while I transfer your call to our other department.

The disease is transferred from one person to another through sneezing or coughing.

2. in law, to make over the control or legal title of.

She transferred the property to her brother.

3. to copy (a design, illustration, or the like) from one surface to another by pressing the surfaces together.

Press evenly against the surface or you won't transfer the design completely.

intransitive verb

1. to move from one place or situation to another.

He transferred to the downtown branch office last year.

2. to change from one bus, train, or the like to another.

When you get to Times Square, you'll need to transfer.

noun

1. the act or process of transferring.

He was looking forward to his transfer back to the States.

The transfer of power after the election went relatively smoothly.

2. the state of being transferred.
3. a ticket given without charge allowing a passenger to shift from one bus, train, or the like to another.
4. an illustration, design, or the like that can be transferred from one surface to another.
5. in law, the conveyance of property by gift or sale from one party to another.

Spanish cognate

transferir. The Spanish word *transferir* means transfer.

These are some examples of how the word or forms of the word are used:

1. Energy can never be created or destroyed, only **transferred**-moved from place to place. One way energy is moved from place to place is by moving objects.
2. Why are honeybees so important? Farmers depend on honeybees to pollinate their crops. During pollination, bees **transfer** pollen, the yellow powder inside flowers, from one flower to another.
3. For us on earth, the sun is the major source of energy. This is what allows plants to grow and also influences our ocean's currents. The sun loses energy by emitting light, lending a small fraction of it to earth. This **transfer** allows for us to have light, which travels on a variety of wavelengths.
4. Arch bridges have substructures called abutments at each end, creating curved arches. These bridges work by **transferring** the weight of the bridge and whatever is loaded onto it, into these abutments. They are not the most economical bridges to build, and are usually made from concrete, wrought iron, cast iron and masonry.
5. Energy is **transferred** again in an ecosystem's energy flow from primary consumers to "secondary consumers". Carnivores, or meat eaters, act as secondary consumers. Lions,

tigers, and polar bears are carnivorous. They eat the meat of the herbivores after a hunt. When tigers eat their prey's meat, they go on to digest it and use the energy from it for their own survival.

6. Scientists use a simple rule to understand how energy is **transferred** from one level of the food pyramid to the next. They call it the "10 percent rule." According to the rule, only 10 percent of the energy on one level moves to the next level on the ecological pyramid.
7. To create Snuppy, South Korean scientists first took several cells from the ear of the 3-year-old Afghan. Scientists then removed the DNA (deoxyribonucleic acid) from those cells. DNA holds the genetic information that determines an animal's inherited characteristics, such as eye and hair color. The scientists then **transferred** the Afghan's DNA to eggs taken from another dog.
8. When Wilcox decided to sell his land, he wanted to make sure that whoever bought the property would preserve the site. To do that, he sold the ranch to a local preservation group. The group then **transferred** the land to the state of Utah.

Name: _____ Date: _____

1. What do Paul and his father build in the cabin?

- A. a radio
- B. a clock
- C. an engine
- D. a fire

2. What does this text explain?

- A. This text explains what a wood cabin is and how to build one.
- B. This text explains what heat is and how it moves from one object to another.
- C. This text explains what UV radiation is and why it can be harmful to people.
- D. This text explains what oxygen is and how the human body uses it to survive.

3. Heat moves from warmer areas to cooler areas.

What evidence from the text supports this statement?

- A. Heat moves from the hot fire Paul and his father build to the cold air of the cabin.
- B. A wood fire can reach temperatures of more than 1,000 degrees Fahrenheit.
- C. After Paul fetches firewood, his father carefully stacks it in the shape of a pyramid.
- D. Ten million Kelvin is a temperature about 30,000 times as hot as boiling water.

4. What is an example of a heat source?

- A. rubber
- B. oxygen
- C. thunder
- D. the sun

5. What is this text mainly about?

- A. a wood cabin
- B. convection
- C. heat
- D. the relationship between a boy and his father

6. Read this sentence from the text.

Heat can also be **transferred** from one object to another in a variety of ways.

What does the word "**transferred**" mean?

- A. broken
- B. trapped
- C. moved
- D. planned

7. Choose the answer that best completes the sentence below.

Heat is transferred in three different ways, _____ conduction, convection, and radiation.

- A. instead
- B. namely
- C. in conclusion
- D. meanwhile

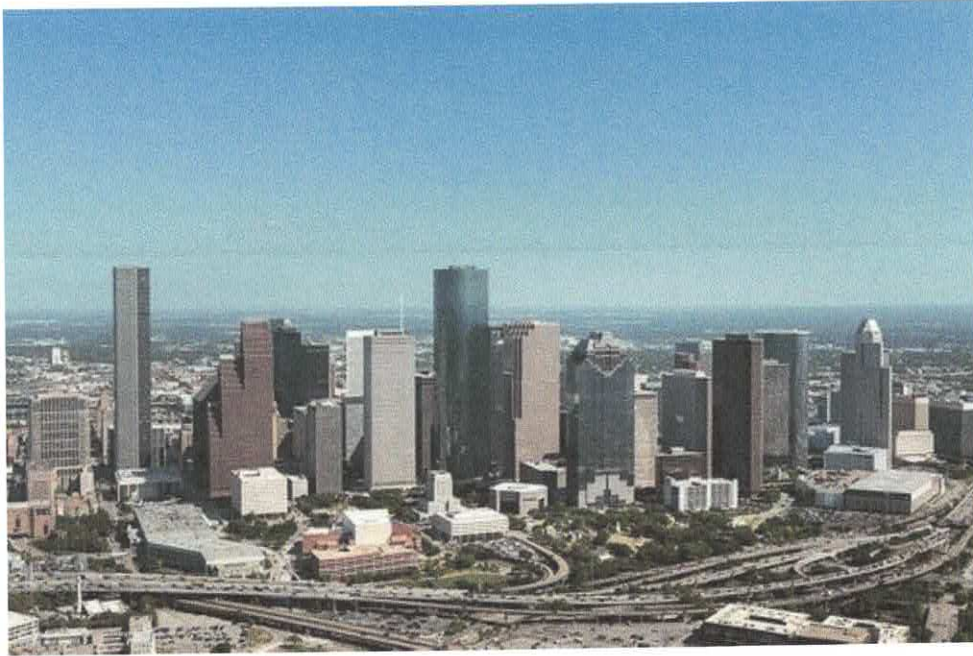
8. What is radiation?

9. What are two examples of radiation mentioned in the text?

10. Using information from the text, explain how a fire makes someone warmer.

Predicting the Future

by ReadWorks



Houston, Texas

Garry Golden sits in a small cafe in Brooklyn, New York. In front of him, sheets of paper with diagrams litter the table. He rapidly sketches trains, cars and highways as he explains his ideas. Garry Golden has one passion: transportation. The science of how to move people from place to place fascinates him. He spends his days studying the relationships between cars, subways, and trains. But he's most excited about imagining the way these relationships will change in the next 20 years.

Golden is a futurist. Futurists are scientists who analyze the way the world is today and use that information to make predictions about what the world will be like in the future. In this way, they are the opposite of historians, who try to better understand the present through studying the past. Futurists hope that by making scientific predictions about the future, we can make better decisions today.

Some futurists study the environment. Some study human society. Golden focuses on the study of transportation. He earned his graduate degree in Future Studies from the University of Houston. Living in Houston for those two years changed the way he viewed transportation in the United States.

Many public transportation advocates dislike Houston. They argue the city is too sprawling (it can take more than three hours to drive from one side of the city to the other during rush hour) and that there aren't enough buses and subways. However, Houston was a source of inspiration for Golden.

"Houston is a really interesting place, and their transportation is a fascinating story-it's worth watching. When you think about it, what is the U.S. like? It's more like Houston. So you need to understand how Houston approaches things to understand the country as a whole. New York City is the exception." said Golden in an interview with *The New York Times*.

Golden points out that people in New York City own fewer cars and walk much more than anywhere else in the United States. "It's a unique environment," says Golden. "Very different from the rest of the country."

However, Golden believes American cities will become more similar to New York City in several ways over the next 20 years. He sees a trend toward fewer cars in the future. He explains, "Cities have a cost of car ownership that is a challenge. All these vehicles cost the city: in services, in having to repair roads and all of the other things." Cars also take up a lot of space. Houston, for example, has 30 parking spaces for every resident. That's 64.8 million parking spaces in only one city.

Golden points out that having so many parking spaces is inefficient. Much of the time the parking spaces sit empty. At high-use times—for example, Saturday afternoon when everyone is running errands—every parking space at a shopping center is full. But at 3 a.m. on a Monday, no one is at the shopping center. What is the solution? "I think cities are going to start to legislate cars in very new ways," says Golden. He explains that cities will make new laws to limit the number of cars people can have within city limits. Instead, people will use taxis, subways and buses. New technology, like smartphones, can make these forms of public transportation even better.

Buses have the same problem of inefficiency as parking spaces, explains Golden. Sometimes they are full, and sometimes they are empty. But imagine if everyone had a smartphone and used them to signal when they wanted to ride the bus. Buses could change their route, depending on who wanted to ride.

How soon would these changes come? Golden admits that it will take several years. Cities can be slow to change. Also, new systems of transportation can be expensive. "But it's coming," he says. "The trend of the empowered city will be here soon."

The other trend that excites Golden is electric cars. "We need to reduce the amount of fuel we consume," says Golden. "Everyone agrees on this. The question is how to do it." Golden especially believes in the future of electric cars that have sensors to understand the world around them. "If we have cars that can communicate with one another, they can adjust speeds to eliminate traffic jams," he says. Rush hour in Houston would suddenly be much less painful.

One challenge related to the production of electric cars is that it is hard to cheaply produce batteries that are strong enough for these cars. This is partially because cars are so heavy. But Golden argues you could also make cars out of strong plastic composites. The cars would then be much lighter and much cheaper to make. "This could revolutionize the highways," he says. When could electric smart cars become the norm? Golden argues as soon as 2030.

As a futurist, Golden shares his predictions with other scholars at conferences across the country. He also provides advice to companies that want to know what the future will be like so that they can make better strategies. Golden remains optimistic about the future. "There are so many exciting developments," he says. "In thirty years we will live a very different world."

inefficient in · ef · fi · cient

Advanced Definition

adjective

1. using excessive time or means to produce or achieve results; wasteful; uneconomical.
2. not producing or incapable of producing an intended effect; ineffective.

Spanish cognate

ineficiente: The Spanish word *ineficiente* means inefficient.

These are some examples of how the word or forms of the word are used:

1. To combat the issues of much smoke filling homes and **inefficient** heating, Franklin created a new system, called the Franklin stove. Essentially, it was an improved fireplace, meant to offer more heat and less smoke than the fireplaces that came before it.
2. Public transportation in the city consists primarily of an **inefficient** bus system, which does not run on a consistent and timely schedule, often getting stuck in the same traffic as cars, and an incomplete subway system, which is inaccessible to many commuters.

trend

trend

Definition

noun

1. a general course, direction, or tendency.

One bad trend is that many young people do not vote.

Advanced Definition

noun

1. a general course, direction, or tendency.

The trend toward obesity continues.

Studies show that standards of living are on a downward trend.

A trend toward living together before marriage began some decades ago.

2. the latest style; mode.

Short skirts are the trend this year.

intransitive verb

1. to have a general tendency or inclination.
2. to move or turn in a particular direction.

The curve on the graph trends rapidly upward.

These are some examples of how the word or forms of the word are used:

1. Like Danielle, you probably know who's really popular and has high status at your school. They're the **trendsetters**, and just about everyone else follows their lead.
2. Every year, the average temperature of the Earth's surface gets a little bit warmer. This gradual **trend** is called global warming. Warmer weather may sound nice, but global warming is something to be very concerned about.
3. When Merkel was sworn in as chancellor on Nov. 22, 2005, she promised to reduce unemployment. "Our aim is to stop this downward **trend** and reverse it," Merkel told reporters. "We want to give people hope of having jobs." The country's unemployment has since lowered to 5.6 percent.

4. Should kids be allowed to opt out of gym classes? Absolutely not! PE is a great way to get and

stay healthy. It gives you a chance to burn off calories. In some cases, it might be the only exercise kids get each day. The problem of obesity has infected our society. PE is a great way to fight that troubling **trend**.

5. Other states saw how popular the farmers' markets were, and decided that they wanted to have their own markets. Soon there were farmers' markets across the country. Barry Benepe had started a **trend**.
6. Woodstock is one of a growing number of U.S. schools teaching Mandarin. The schools want to prepare students for a future in which they are likely to work with people from China. Business in China is booming, and that **trend** is expected to continue.

Name: _____ Date: _____

1. What is Gary Golden's one passion?

- A. Houston, Texas
- B. the environment
- C. human society
- D. transportation

2. One problem with electric cars is that they require very strong batteries. Part of the reason the batteries have to be so strong is that cars are so heavy. What solution does Golden propose for this problem?

- A. build cars out of strong plastic composites so that they are lighter
- B. find an easier and faster way to produce strong batteries for cars
- C. build cars out of lighter weight metals so they don't need as many batteries
- D. create a way for cars to communicate with each other and adjust their speeds

3. Cars require a lot of space in cities. What evidence from the passage best supports this conclusion?

- A. Cities have to build parking spaces and repair roads for cars.
- B. Cities may limit the number of cars people can have within the city.
- C. In Houston, there are 30 parking spaces for every resident.
- D. Parking lots at shopping centers are not full all of the time.

4. Based on Garry Golden's predictions, how can transportation systems of the future best be described?

- A. expensive and complicated
- B. high-tech and efficient
- C. high-tech yet impractical
- D. inexpensive yet outdated

5. What is this passage mostly about?

- A. how one futurist thinks transportation will change in the coming years
- B. reasons why cars cost the city money and are an inefficient use of resources
- C. how to improve electric cars so that they are more widely used and available
- D. a comparison of public transportation systems across the United States

6. Read the following sentences: "Houston, for example, has 30 parking spaces for every resident. That's 64.8 million parking spaces in only one city. Golden points out that having so many parking spaces is **inefficient**. Much of the time the parking spaces sit empty. At high-use times—for example, Saturday afternoon when everyone is running errands—every parking space at a shopping center is full. But at 3 a.m. on a Monday, no one is at the shopping center."

As used in this sentence, what does the word "**inefficient**" most nearly mean?

- A. productive without wasting time and materials
- B. successful and effective
- C. imaginative and creative
- D. wasteful of space and materials

7. Choose the answer that best completes the sentence below.

Historians study the past in order to better understand the present. _____, futurists analyze the present in order to make scientific predictions about the future.

- A. In particular
- B. Such as
- C. In contrast
- D. Ultimately

8. What does Garry Golden spend most of his days studying?

9. Buses are currently inefficient. According to Golden, how could this type of transportation be improved?

10. Explain how communications technology (such as smartphones and sensors) could help improve transportation in the future. Support your answer using information from the passage.

How Do Airplanes Fly?

by Dr. Hany Farid

When an airplane is in flight, there is a downward force (gravity) and an upward force (lift) acting on the airplane. As an airplane moves through the air, the shape of the wings causes there to be less air pressure pushing down on the wings than pushing up on the wings. This difference in pressure yields the upward lift. If the downward gravitational force is less than the upward lift, then the airplane stays in the air. Read on for a more detailed explanation.

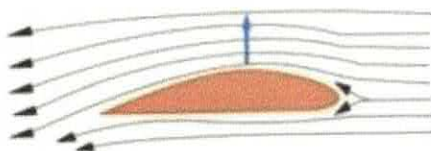
Fact 1. As an airplane's propellers spin, they give the airplane a forward force (thrust). As the airplane moves forward there is a backward force (drag) caused by the resistance of the air.



Fact 2. An airplane is attracted downward due to gravity. This force increases with the mass (weight) of the object.



Fact 3. As an airplane moves forward, the shape of its wing creates lower pressure above the wing than below, yielding a net upward force known as lift.



As an airplane speeds along the runway, the airplane's wings disrupt the flow of the air. This disruption causes the air above the wings to move faster than below the wings. As a result, the air pressure above the wing is less than below the wing. As the airplane speeds up, this pressure difference increases until the lift is stronger than the gravitational force, and the airplane takes off. In order to remain in flight, the thrust must be greater than the drag, and lift must be greater than the force of gravity.

There is still some debate as to the exact cause of the difference in the air's speed around the wings. The basic concept described here, however, seems to explain why an airplane can fly.

disrupt dis · rupt

Advanced Definition

transitive verb

1. to throw into disorder or turmoil.

An explosion disrupted the peaceful demonstration.

2. to interrupt or break off, usually temporarily.

Hecklers disrupted the governor's speech.

These are some examples of how the word or forms of the word are used:

1. Those substances can **disrupt** the body's hormone balance.
2. Kidney stones cause pain when they **disrupt** urine flow (which can cause infection).
3. The entire class listened to their teacher in silence, afraid to **disrupt** the atmosphere of the ancient temple.
4. Recent studies show that chemicals called phthalates, which may **disrupt** hormones, can seep into bottled water from the plastic container.
5. That's why we must always be careful to take care of the environment-the earth's temperature is carefully maintained by specific mechanisms. We sure wouldn't want to **disrupt** them!

force

force

Definition

noun

1. power, energy, or physical strength.

The force of the wind knocked down the trees.

2. a group of people with a common goal or activity.

She is a member of the police force.

verb

1. to make or cause to do something by using strength or power.

Ivan forced her to tell the truth.

Advanced Definition

noun

1. active power, energy, or physical strength.

The force of the hurricane knocked down the trees.

2. the use of such power, energy, or strength.

The enemy took the castle by force.

3. someone or something with the capacity to influence or cause change.

The force of logic eventually convinced the committee.

A group of parents was the main force behind the change in the town's speed limit.

She believed that, as a politician, she could be a force for good.

4. in law, illegal violence, as against a person.

Accidental death was ruled out, as use of force on the victim was apparent.

5. a group of people joined by a common goal or activity.

the labor force

the police force

6. in physics, an influence on the shape, motion, or other characteristics of a body or system.
7. (often pl.) military troops; army.

The enemy has overpowered our forces in the area.

8. effective intensity, as of the mind.

transitive verb

1. to use strength or coercion in order to compel.

The interrogators forced him to tell the truth.

2. to cause to do something despite resistance or hesitation.

The accident forced her to rely on her family for help.

Being turned down for promotion forced him to make a difficult decision.

3. to bring about (something) despite there being reluctance or unwillingness.

The scandal forced the congressman's resignation from office.

Complaints from customers forced the removal of the product from the market.

4. to obtain through force.

His captors forced a confession from him.

5. to tax or strain.

Don't force the situation.

These are some examples of how the word or forms of the word are used:

1. Darwin realized that the birds had grown beaks specialized for their environment because nature had **forced** them (to) over many generations.
2. In an actual launch, astronauts feel about three times the **force** of gravity. Gravity is the force that pulls things toward Earth.
3. Electromagnetic **force** is the interaction responsible for almost everything in daily life. Magnets are objects that produce an area of magnetic force called a magnetic field.
4. Mom grabbed the end of one, and I held the handle on the other; and we yanked. The buckets slid free, and I fell over from the **force** of the pull.
5. Kinetic energy is a term related to physics that describes the energy an object possesses due to motion. Measuring an object's kinetic energy means measuring the amount of **force** an object needs to accelerate.
6. There is a vitality, a life**force**, an energy, a quickening that is translated through you into action, and because there is only one of you in all of time, this expression is unique.

Name: _____ Date: _____

1. What is the downward force that acts on an airplane in flight?

- A. lift
- B. drag
- C. thrust
- D. gravity

2. As an airplane moves forward, the shape of its wings causes a difference in pressure below and above the wings. What is the effect of this difference in pressure?

- A. a downward force is created
- B. the airplane speeds up
- C. an upward force is created
- D. the airplane slows down

3. Read these sentences from the text.

"As an airplane's propellers spin, they give the airplane a forward force (thrust). [...] As an airplane moves forward, the shape of its wing creates lower pressure above the wing than below, yielding a net upward force known as lift."

Based on this evidence, what conclusion can be drawn about thrust and lift?

- A. Airplanes do not need lift to fly, as long as they have thrust.
- B. Airplanes need lift in order to create thrust.
- C. Airplanes can create lift without any thrust.
- D. Airplanes need thrust in order to create lift.

4. Which of the following would probably help an airplane to take off and remain in flight?

- A. having a large body and small wings
- B. moving at a slow speed while on the ground
- C. being made from a lightweight material
- D. carrying heavy luggage inside the plane

5. What is the main idea of this text?

- A. Airplanes fly as a result of the forward force of thrust being greater than the backward force of drag.
- B. The upward force called lift is caused by a difference in air pressure above and below an airplane's wings.
- C. Four different forces called thrust, drag, lift, and gravity, all prevent airplanes from being able to fly.
- D. Airplanes fly as a result of the upward force of lift being greater than the downward force of gravity.

6. Why might the author have chosen to include three diagrams in this text?

- A. to illustrate the forces being discussed
- B. to introduce new information into the text
- C. to give examples of how different planes fly
- D. to provide an alternate explanation of how planes fly

7. Choose the answer that best completes the sentence below.

As an airplane speeds along the runway, the airplane's wings disrupt the flow of the air. _____, the air above the wings moves faster than below the wings.

- A. However
- B. As a result
- C. For instance
- D. Previously

8. What gives an airplane a forward force?

9. An airplane takes off when the upward force beneath its wings is greater than the downward force of gravity. Starting from when the airplane is standing still, describe the sequence of events that has to happen for the upward force to become greater than the downward force of gravity.

10. An airplane would not be able to fly if it did not have a propeller. Why not? Support your answer with evidence from the text.



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Pickens County School District



Common Core Mathematics Practice for Kindergarten

Name: _____
CCSS.Math.Content.K.OA.A.5 - Worksheet #7303

Standard: CCSS.Math.Content.K.OA.A.5

Description: Fluently add and subtract within 5.

Add and subtract two numbers within 5:

1. $1 - 1 =$	6. $3 - 1 =$
2. $4 - 4 =$	7. $4 + 1 =$
3. $5 - 2 =$	8. $4 - 1 =$
4. $3 + 2 =$	9. $4 - 3 =$
5. $2 + 2 =$	10. $2 - 1 =$

Printable #: 7303-CCSS.Math.Content.K.OA.A.5

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.NS.B.3 - Worksheet #17210

Name: _____

Standard: CCSS.Math.Content.6.NS.B.3

Description: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Add three x.xxx decimal numbers:

1. $7.176 + 6.844 + 0.839 =$	6. $7.215 + 1.184 + 2.068 =$
2. $8.769 + 4.014 + 1.379 =$	7. $6.708 + 3.575 + 4.793 =$
3. $4.773 + 3.082 + 9.479 =$	8. $8.628 + 7.794 + 7.227 =$
4. $4.056 + 3.110 + 9.437 =$	9. $6.297 + 6.174 + 0.456 =$
5. $9.736 + 2.413 + 7.348 =$	10. $4.164 + 0.007 + 3.870 =$

Printable #: 17210-CCSS.Math.Content.6.NS.B.3

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.NS.B.3 - Worksheet #9809

Name: _____

Standard: CCSS.Math.Content.6.NS.B.3

Description: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Multiply a three-digit by a three-digit decimal number:

1. 590 <u>x 0.654</u>	6. 760 <u>x 0.816</u>
2. 490 <u>x 0.849</u>	7. 223 <u>x 0.673</u>
3. 417 <u>x 0.518</u>	8. 653 <u>x 0.018</u>
4. 421 <u>x 0.161</u>	9. 760 <u>x 0.454</u>
5. 108 <u>x 0.994</u>	10. 330 <u>x 0.416</u>

Printable #: 9809-CCSS.Math.Content.6.NS.B.3

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.NS.B.2 - Worksheet #8211

Name: _____

Standard: CCSS.Math.Content.6.NS.B.2

Description: Fluently divide multi-digit numbers using the standard algorithm.

Divide a six-digit by a two-digit number:

1. $427824 \div 24 =$	6. $582093 \div 27 =$
2. $872154 \div 93 =$	7. $196678 \div 58 =$
3. $226035 \div 45 =$	8. $133875 \div 75 =$
4. $512265 \div 39 =$	9. $495360 \div 45 =$
5. $266328 \div 18 =$	10. $526473 \div 37 =$

Printable #: 8211-CCSS.Math.Content.6.NS.B.2

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.RP.A.2 - Worksheet #33109

Name: _____

Standard: CCSS.Math.Content.6.RP.A.2

Description: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is $3/4$ cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."

Solve The Proportion for X (Easy):

1. $\frac{x}{12} = \frac{19}{5}$	6. $\frac{17}{13} = \frac{20}{x}$
2. $\frac{9}{x} = \frac{11}{10}$	7. $\frac{20}{x} = \frac{12}{13}$
3. $\frac{18}{x} = \frac{9}{11}$	8. $\frac{15}{x} = \frac{20}{12}$
4. $\frac{10}{18} = \frac{x}{19}$	9. $\frac{8}{12} = \frac{19}{x}$
5. $\frac{x}{5} = \frac{19}{20}$	10. $\frac{6}{x} = \frac{20}{1}$

Printable #: 33109-CCSS.Math.Content.6.RP.A.2

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.NS.B.3 - Worksheet #9809

Name: _____

Standard: CCSS.Math.Content.6.NS.B.3

Description: Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Multiply a three-digit by a three-digit decimal number:

1. 590

x 0.654

6. 760

x 0.816

2. 490

x 0.849

7. 223

x 0.673

3. 417

x 0.518

8. 653

x 0.018

4. 421

x 0.161

9. 760

x 0.454

5. 108

x 0.994

10. 330

x 0.416

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.EE.B.7 - Worksheet #17409

Name: _____

Standard: CCSS.Math.Content.6.EE.B.7

Description: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Linear Equations in One Variable with Subtraction - Decimal Numbers:

1. Solve and check: $m + 72.6 = 152.0$	6. Solve and check: $q + 89.5 = 119.4$
2. Solve and check: $t + 76.7 = 84.1$	7. Solve and check: $e + 17.3 = 106.5$
3. Solve and check: $u + 21.8 = 113.5$	8. Solve and check: $f + 20.8 = 69.0$
4. Solve and check: $o + 27.2 = 32.5$	9. Solve and check: $g + 99.7 = 146.5$
5. Solve and check: $n + 55.2 = 144.0$	10. Solve and check: $r + 8.7 = 35.0$

Printable #: 17409-CCSS.Math.Content.6.EE.B.7

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Common Core Mathematics Practice for Grade 6

CCSS.Math.Content.6.SP.B.5.c - Worksheet #12110

Name: _____**Standard: CCSS.Math.Content.6.SP.B.5.c**

Description: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Calculate stats on 15 numbers: order them, then calculate range, mean, median and mode.:

1. Series: 84, 75, 77, 81, 95, 80, 74, 72, 94, 66, 70, 88, 93, 92, 85	6. Series: 35, 46, 60, 19, 68, 35, 77, 46, 75, 55, 56, 17, 96, 62, 63
2. Series: 30, 72, 53, 97, 87, 50, 63, 38, 89, 51, 76, 10, 40, 86, 75	7. Series: 56, 61, 90, 75, 62, 74, 91, 93, 68, 95, 95, 51, 91, 81, 59
3. Series: 89, 87, 92, 87, 94, 97, 91, 92, 99, 94, 88, 96, 91, 97, 97	8. Series: 98, 72, 16, 63, 95, 85, 98, 68, 37, 50, 71, 33, 9, 31, 86
4. Series: 80, 73, 86, 75, 92, 71, 88, 87, 90, 79, 89, 65, 73, 79, 63	9. Series: 55, 70, 69, 76, 26, 54, 64, 56, 47, 56, 57, 31, 24, 72, 37
5. Series: 80, 77, 81, 60, 68, 50, 84, 65, 80, 92, 53, 51, 82, 95, 85	10. Series: 44, 44, 75, 40, 30, 74, 99, 60, 26, 72, 86, 29, 96, 73, 43

Printable #: 12110-CCSS.Math.Content.6.SP.B.5.c

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