

1. Read passage.
2. Annotate with CUR: Circle main idea, Underline details and unknown words, Respond in margin (T2T,T2S,T2W)
3. Answer multiple choice questions.
4. Turn in for quiz grade on Friday.

GRADE 7 ENGLISH LANGUAGE ARTS / READING—RELEASED FORM



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The Hottest Soup in New York

by Stephen Ornes

This winter has been a season of breaking records. Last month, athletes at the winter Olympic games in Vancouver broke sports records. A few weeks before that, record-breaking amounts of snow fell on the eastern and southern United States. And on February 15, scientists announced in Washington, D.C., that they had broken another record—for the highest temperature ever reached in a laboratory.

That new record is 4 trillion degrees Celsius (that's 7.2 trillion degrees Fahrenheit). By doing experiments at that temperature, scientists hope to study what happened just after the universe was born. Four trillion degrees Celsius is 250,000 times hotter than the hottest part of the sun, and probably close to the temperature of the universe right after the Big Bang, the birth of the universe.

③

The hot stuff is called a quark-gluon plasma, and scientists found it at the Brookhaven National Laboratory on Long Island, N.Y. Using a giant instrument called the Relativistic Heavy Ion Collider, or RHIC, the scientists zoomed two gold atoms through a ring that is 2.4 miles around and smashed the atoms together—and then watched to see what came out. There was so much energy in the crash that the atoms, in a way, melted.

As temperatures climb, most solids melt into liquids, and then the liquids become gas. (Some solids may go straight to gas if the conditions are right.) Ice becomes liquid water at 0° Celsius (32° Fahrenheit). At 100°C (212°F), liquid water boils into water vapor. Compared to other substances, water's melting and boiling points are mild: Tungsten, a material used in light bulbs, doesn't melt until 3,410°C (6,800°F).

That temperature is freezing compared to 4 trillion degrees C. At that temperature, atoms can break apart—and parts inside an atom can break apart—and then the tiny particles inside those parts can break apart. Think of an atom as a set of nesting dolls. When the largest, outer doll breaks apart, there's another, smaller doll inside. And when that doll breaks apart . . . surprise! There's another doll inside.

Similarly, at the center of every atom is the nucleus. Inside the nucleus are particles called protons and neutrons. And inside protons and neutrons are even smaller particles called quarks. Quarks are held together thanks to another kind of particle called gluons. (Gluons help to "glue" the particle together.)

The hot stuff produced at Brookhaven is a quark-gluon plasma, and it spills out like a soup made of quarks and gluons. The quark-gluon plasma is a new type of matter that's unlike solid, liquid, or gas—but it kind of behaves like a liquid.

⑧

"We are extremely anxious to find out how this works," Barbara Jacak told *Science News*. "Why is it a liquid?"

Jacak works at Stony Brook University in New York and is one of the scientists working on the project at Brookhaven. She helped take the plasma's temperature. That was a difficult task because it's hard to measure things that small. The plasma only existed for about one-trillionth of a trillionth of a second, and it was tiny, about one-trillionth of a centimeter across.

It was a very small piece of space that was super hot for a very short amount of time. In other words, you can't just put a thermometer in it, Jacak says.

⑪

To take the temperature, the researchers watched it glow. A hot iron rod changes color from red to yellow to white as it heats up. In a similar way, the colors of light coming from the plasma changed. Based on what colors of light the soup emitted, the team figured out that the substance had reached the 4-trillion-degree record.

By studying these kinds of super-hot temperatures, scientists hope to learn more about how the universe formed. The quark-gluon plasma may look a lot like the hot and heavy goo that existed in the universe right after the Big Bang.

Experiments such as those at Brookhaven may help us understand what happened at the very beginning of the universe. But there's a lot of work to be done, says scientist Chris Quigg of the Fermi National Accelerator Laboratory in Batavia, Ill. "These are very early days," he told *Science News*. "Like many good observations, this opens up many questions."

- 40 In paragraph 3, what does the word *zoomed* suggest happened to the atoms?
- A They were blasted to pieces.
 - B They were magnified to appear larger.
 - C They were moved rapidly.
 - D They were viewed closely in focus.
- 41 According to the selection, what is the purpose of gluons?
- A They bind the quark particles together.
 - B They separate the protons from the neutrons.
 - C They form the boundary of the nucleus.
 - D They help the quark particles to duplicate.
- 42 In paragraph 8, how is the word *anxious* used?
- A to convey fear
 - B to convey excitement
 - C to convey fury
 - D to convey boredom

- 43 Which summarizes the information about quark-gluon plasma in paragraph 11?
- A Its temperature is the lowest on record.
 - B Its temperature is indicated by color.
 - C It glows when heat is applied to it.
 - D It emits different colors of light.
- 44 What challenges hindered the researchers in measuring the temperature of the plasma?
- A The plasma was too large to measure and too slow to demonstrate movement.
 - B The plasma was moving very fast and was too small to catch.
 - C The plasma was extremely small and only existed for a fraction of a second.
 - D The plasma was very thin and covered a small area of the thermometer.
- 45 In the last paragraph, why did the author include the quote from Chris Quigg?
- A to support the claim that there is still much work to be done to understand the beginning of the universe
 - B to hook the reader into wanting to read more about the Brookhaven laboratory
 - C to help sell more issues of *Science News* magazine
 - D to outline future experiments that need to take place

- 46 In the last sentence of the selection, what does the phrase "this opens up many questions" mean?
- A Many scientific questions are answered by careful research.
 - B Many scientists prefer asking questions to answering them.
 - C Many scientific discoveries create more things to explore.
 - D Many scientific projects require research into plasma temperatures.
- 47 Which statement from the selection supports the author's claim that this breakthrough could help scientists better understand the origin of our universe?
- A "That new record is 4 trillion degrees Celsius (that's 7.2 trillion degrees Fahrenheit)."
 - B "The hot stuff produced at Brookhaven is a quark-gluon plasma, and it spills out like a soup made of quarks and gluons."
 - C "The quark-gluon plasma is a new type of matter that's unlike solid, liquid, or gas—but it kind of behaves like a liquid."
 - D "The quark-gluon plasma may look a lot like the hot and heavy goo that existed in the universe right after the Big Bang."
- 48 Based on the selection, what is the author's attitude toward the new scientific record?
- A He thinks it is fascinating, but not overly useful in real-life application.
 - B He thinks it is largely a waste of time in the study of physical science.
 - C He thinks it is an interesting observation that could be useful in classrooms.
 - D He thinks it is an important discovery that will help further scientific research.