

Grade 3

Unit 5

Assessment Guide: Unit Assessment

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Task 1: Follow along with “The Big Bang Theory” as your teacher reads it aloud. Highlight or underline key ideas and details as you read along. Complete Student Assessment Page 5.1 after reading.

The Big Bang Theory

The universe is everything that exists—all matter, all energy, and all the space between things and even all of time! It includes things that you can see and many, many more that you can’t see. The universe is so big, that we don’t even know for sure how big it is! One question you may be asking yourself is how the whole thing got started. Where did the universe come from?

Scientists learn more about the universe every day. The new discoveries they make help form ideas—or **theories**—about the universe. A theory is an explanation about something or a reason for something.

Scientific theories are not just guesses—they are explanations based on evidence and facts, or true information, that scientists get by making observations and taking measurements. Frequently there are several different theories that seek to explain the same phenomenon. So, scientists gather new data to help select between these theories. They share the data and study it to look for patterns and answers to their questions.

Today, there is a common theory about how the universe first developed called the **Big Bang Theory**. It is a **theory** that is based on facts, well-tested, and widely accepted by many scientists. The **Big Bang Theory** seeks to explain how the universe may have come to be. And it began with—a tiny speck!

According to the **Big Bang Theory**, before the universe was the way it is today, it was believed to be very different. There were no billions of galaxies.

There was no Milky Way. There were no stars at all. No sun, no solar system, no planets, no Earth, no moons, no asteroids, no comets. There may not have even been time or space! All of the ingredients to make everything we see today were there; they were just in a very different form. It's hard to imagine, but the **Big Bang Theory** traces the universe back to a point where all of what we can now see in the universe was compressed into a teeny-tiny speck. This speck was jam-packed full of, well—everything! It was unbelievably dense and crowded.

This speck was also super-hot. Hotter than anything on Earth. Hotter than the sun!

Around fourteen billion years ago, something amazing happened to all that compressed stuff. Kaboom! A bursting forth! A moving outward! A rapid unfolding! It's been called many things by many people, but this amazing thing that happened is believed to be the “**Big Bang**”—the birth of the universe. It was hot, and it was sudden, and it was powerful. In a fraction of a second, space that had not been there before was suddenly everywhere all at once. Tiny new particles formed and began crashing into each other, creating energy and eventually joining to form larger bits of matter. The universe kept expanding and expanding—all of its matter spreading out as the universe kept getting larger! And as the universe expanded, it began cooling down a little at a time.

According to this theory, the newborn universe was nothing like it looks now, an estimated fourteen billion years later. Back then there were no stars yet—and there wouldn't be for the first one hundred million years after the Big Bang! The universe kept expanding and cooling. Substances kept crashing into each other, and brand new bits of matter were formed. Eventually new gases formed. As these gases began to cool, they collapsed because of gravity, and

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formed the first stars. The universe kept expanding and stretching, and more and more stars were born. Then galaxies formed. About nine billion years after the Big Bang, our sun and solar system were born when gases collapsed in on themselves and formed our sun. That was believed to be a little over four and a half billion years ago, but the expansion of the universe, and the creation of new stars, still goes on today.

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Reading Comprehension, Part 1

Answer the questions below about “The Big Bang Theory” with evidence from the text. Use the information below to help you during the class discussion.

1. What is the difference between a theory and a fact?

2. What was the “Big Bang”?

3. What was the effect of the Big Bang?

4. In the space below, fill in the spaces showing the sequence of events from the Big Bang until our solar system was born.

1. Big Bang

2. _____

3. _____

4. _____

5. _____

6. Our solar system

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Reading Comprehension, Part 2

After reading chapter 13, “The Big Bang,” answer the questions below to prepare you for the class discussion.

1. What did scientists using telescopes notice about the stars and galaxies?

2. Why is Edwin Hubble important to the Big Bang Theory?

3. Who are the three astrophysicists who proposed the Big Bang Theory?

4. Draw a timeline that shows the scientists and their contributions to the Big Bang Theory in order.

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Writing Assessment: Compare and Contrast Texts

Compare and contrast the two texts we read about the Big Bang Theory. List the key ideas and details from the texts. You may use your notes to complete the graphic organizer. On the second page, list the biggest similarities and differences between the two texts.

Read-Aloud: "The Big Bang Theory"

Reading: "The Big Bang"

List the biggest similarities between the two texts:

List the biggest differences between the two texts:

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Revision Checklist

Ask yourself these questions as you reread and revise your writing:

1.	Do I have a good topic sentence?	
2.	Do I have a good concluding sentence?	
3.	Are there any parts that do not make sense?	
4.	Do my sentences flow well in this order?	
5.	Do I have a good variety of sentence structures?	
6.	Could I combine any of my sentences?	
7.	Do I have a good variety of descriptive words?	
8.	Is my writing interesting?	
9.	Is this my best work?	

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Answer Key

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Reading Comprehension, Part 1

Answer the questions below about "The Big Bang Theory" with evidence from the text. Use the information below to help you during the class discussion.

1. What is the difference between a theory and a fact?

A theory is an explanation about something based on evidence or observations. Facts make up the evidence that helps support the theory.

2. What was the "Big Bang"?

It was a very hot explosion that was sudden and powerful. Immediately the universe started to expand.

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3. What was the effect of the Big Bang?

Everything expanded outward and began cooling down. Tiny particles crashed into each other and created bigger particles. Gases were formed. Gases cooled and created stars. Galaxies were formed. Planets were formed.

4. In the space below, fill in the spaces showing the sequence of events from the Big Bang until our solar system was born.

1. Big Bang
2. Bursting outward and cooling
3. Gases formed
4. Stars formed
5. Galaxies formed
6. Our solar system

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Reading Comprehension, Part 2

After reading chapter 13, "The Big Bang," answer the questions below to prepare you for the class discussion.

1. What did scientists using telescopes notice about the stars and galaxies?

They appeared to be moving outward.

2. Why is Edwin Hubble important to the Big Bang Theory?

He discovered "Hubble's Law," which showed that the farther away a galaxy is, the faster it is moving outward. This led scientists to explanations of how the solar system began.

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3. Who are the three astrophysicists who proposed the Big Bang Theory?

Georges Lemaitre, Alexander Friedmann, and Edwin Hubble

4. Draw a timeline that shows the scientists and their contributions to the Big Bang Theory in order.

The timeline should include the following events:

- 1916: Einstein—Theory of Relativity
- 1922: Friedmann—Expanding Universe equation
- 1927: Lemaitre—Red Shift Expanding Universe
- 1929: Hubble—New data to support Lemaitre

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Writing Assessment: Compare and Contrast Texts

Compare and contrast the two texts we read about the Big Bang Theory. List the key ideas and details from the texts. You may use your notes to complete the graphic organizer. On the second page, list the biggest similarities and differences between the two texts.

Read-Aloud: "The Big Bang Theory"	Reading: "The Big Bang"
Answers may vary, but they should include: theory 14 billion years ago tiny speck of everything big explosion outward hot and powerful expanding and cooling particles smashing together creating energy gases forming gravity gases collapsed and formed stars more matter cooled and formed planets around stars	Answers may vary, but they should include: Hubble's Law—noticed distant galaxies moving outward faster than closer ones astrophysicists Einstein—Theory of Relativity Friedmann Lemaitre Hubble tiny ball of matter squeezed together so hot nothing would stay together expanded very quickly matter started to cool gravity pulled matter together into spheres spheres became the first stars and galaxies our sun and solar system formed 4 billion years ago

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List the biggest similarities between the two texts:

Answers may vary, but they might include the following:

1. Tiny speck or ball with all matter
2. Exploded outward
3. Very hot and powerful
4. Matter cooled and gravity pulled it together
5. Stars, galaxies and planets formed

List the biggest differences between the two texts:

Answers may vary, but they might include the following:

1. Astrophysicists notice the galaxies were moving away using telescopes.
2. Hubble's Law said that the farther away, the faster something is moving outward.
3. Astrophysicists used Einstein's Theory of Relativity to propose the Big Bang Theory.
4. Lemaitre, Friedmann, and Hubble came up with the Big Bang Theory, building on each other's work.
5. Gravity pulled matter together into spheres; they became the first stars.
6. Our sun and solar system formed around 4 billion years ago.

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