

First Name: _____ Last Name: _____ Date: _____ Period: 8 - _____

800 points

Characteristics of the Universe - Theories About How the Universe Was Formed **DUE DATE:** _____ 100 bonus

1. What do you know about the theories of the formation of the universe? Explain the theories you've heard of. What do you really think about how the universe began? (30 points)

2. Define these terms: observe, theory, hypothesis. (Use the interactive glossary) (30 points)

a. observe:

b. theory:

c. hypothesis:

3. Explain the difference between the terms: observation, hypothesis, and theory. (30 points)

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4. Read the following information. CIRCLE the word in parenthesis () that correctly completes each sentence. (30 points)

(Astronomers, cats) are greatly interested in the formation of the universe. There are two major opposing theories for this.

The Big Bang Theory proposes that the universe was created about **(15 days, 15 billion years)** ago. Stars and galaxies formed as gravity caused some of the matter to **(coalesce, melt)**. As a result of this inflation, the universe is **(expanding, decreasing)**, creating more and more space between the galaxies. As the universe expands the **(density, color)** of matter decreases over **(time, coffee)**. This rate of expansion is accelerating. There are **(billions, hundreds)** of galaxies, each with **(thousands, billions)** of stars, populating the universe. Galaxies can have different shapes such as **(spiral, square)**, **(elliptical, triangle)**, and **(irregular, trapezoid)**.

The rival Steady State Theory differs on many key points. While it agrees that the universe is expanding, it contends that the universe did not begin from a single point and that it has no **(beginning, ear)** or **(stomach, end)**. Instead, matter is being constantly **(created, destroyed)** at the same rate as old celestial objects die out. The universe is expanding, but the amount of matter stays the same over time. The Steady State Theory has been largely discredited and is no longer accepted by most **(astronomers, cats)**.

5. Watch Early Theories About the Universe. (80 points)

Why do people no longer believe these theories?

Were they based on scientific evidence?

What evidence has been discovered that disproves these theories?

How has this led to a current scientific theory about the formation of the universe?

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6. True or False and explain why. (80 points)

The Big Bang Theory is the only explanation for the formation of the universe scientists have ever considered. _____

WHY?

The Big Bang Theory is conclusive, and now we know all we need to about the formation of the universe.

WHY?

Scientific investigations may disprove one theory but lead to another. _____

WHY?

Scientific theories that are not entirely correct are usually not discarded completely, but are modified to accommodate new observations and data. _____

WHY?

7. CREATE A CARTOON (100 points)

a. Read **Universe** to prepare to make a multiple-panel cartoon with captions that shows how the Big Bang explains the origin of the universe. Use a separate sheet of paper for your cartoon and staple to the back of this packet.

b. Watch the videos and answer the questions. Use the information to fill in captions for the cartoon explaining the Big Bang origin of the universe. (40 points)

Matter, from Subatomic Particles to Galaxies: How Was It Created?

1. How and when did the Big Bang begin?

The Big Bang: The Formation of Galaxies and Elements

2. How did galaxies form after the Big Bang?

The Universe is Accelerating

3. How do scientists determine the universe is expanding?

The Big Bang and the Origin of the Universe

4. What questions do scientists still have about the universe?

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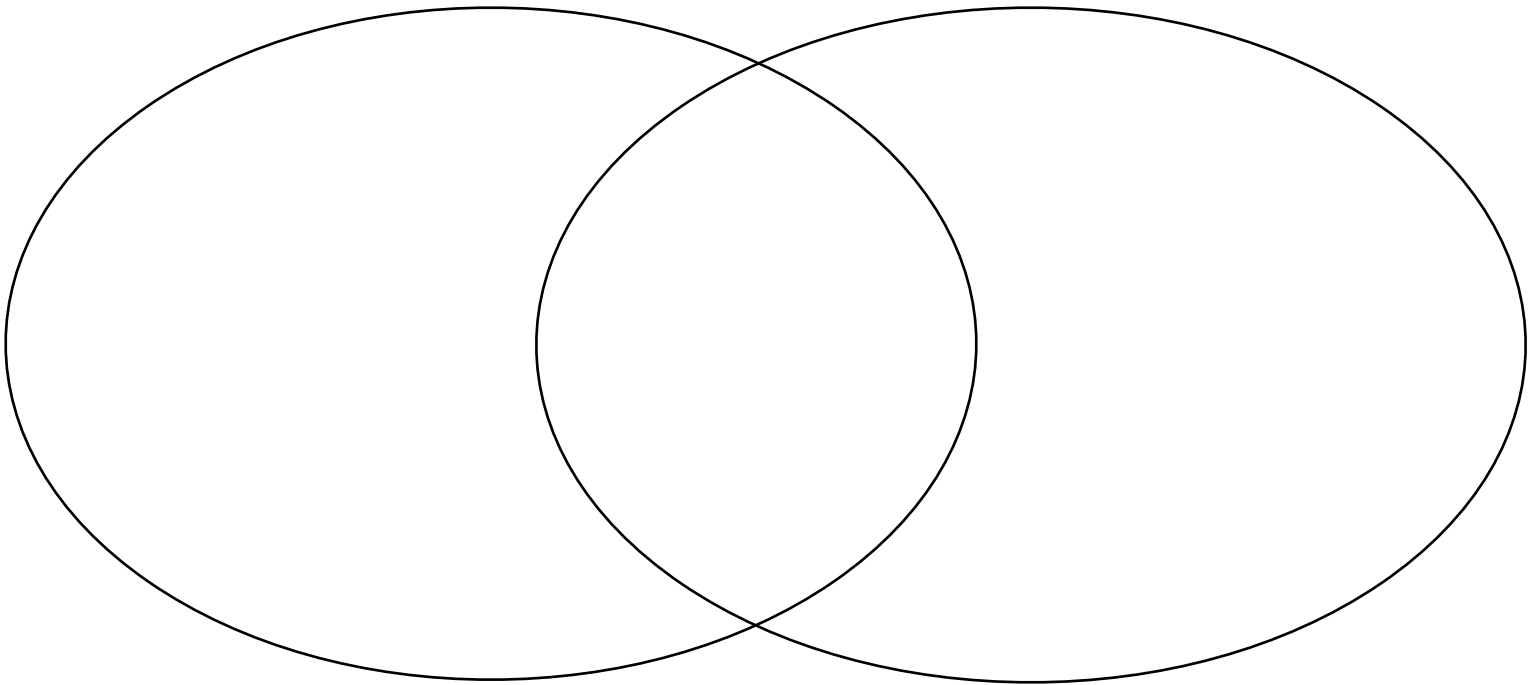
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8. The Big Bang Theory is the most widely accepted explanation but other theories have challenged it. The Steady State Theory is an example. Watch [Steady State Theory](#) (00:00 to 03:40). Fill in the Venn diagram. (60 points)

Big Bang Theory

both

Steady State Theory



9. Answer the following essential questions in neatly written, complete sentences. (100 points)

a. How does the Big Bang Theory explain the origin of the universe?

b. How does the Steady State Theory differ from the Big Bang Theory?

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10. Lab Activity - Expanding Universe (100 points)

Materials (for each group):

Large balloon

Adhesive dots of different colors (one dot of each color)

Measuring tape, or string and a ruler

The universe is expanding. It is space itself that is expanding; i.e., the universe is getting larger.

You will create and analyze a model of the expanding universe. While space is three dimensional, it will be represented by a two dimensional surface. The surface of the balloon will represent three dimensional space. You will use adhesive dots to represent clusters of galaxies, each dot representing one galactic cluster of many galaxies.

Blow a little air into the balloon and, while pinching it closed so that air cannot escape, affix the dots to the balloon's surface. Next, add a little more air to the balloon and, while one student again holds the end so that air cannot escape, another student should measure the distance between at least three pairs of dots. Record your data.

	pink to green dot	red to orange dot	green to orange dot
First measurement			
Second measurement			

Finally, inflate the balloon fully and tie it closed. Measure the distances between the dots again and record this information in the data table. When you have finished gathering your data, answer the following questions:

1. What happens to the distances between galactic clusters as the universe expands?

2. How does the balloon model support both the Big Bang Theory and the Steady State Theory?

3. Which theory does the expanding balloon model best represent? Explain.

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11. Watch: (20 points)

12 Billion Years Ago: The Big Bang Theory

The Big Bang, the Creation of Matter, and an Expanding Universe.

What role does gravity have in star and galaxy formation?

12. Create a five-question true/false quiz based on your studies of how the universe was formed. Provide an answer key with explanations. (100 points)

Extra Credit (after all your other work has been completed):

Go to puzzlemaker.com and create a puzzle and a key based on your study of theories about how the universe was formed. Choose from: word search, criss-cross, double puzzles, fallen phrases, math squares, mazes, letter tiles, cryptograms, number blocks or hidden message. (20 terms @ 5 points each = 100 points)