

STUDY GUIDE

The Big Bang Theory and the Origin of the Universe

Video Facts

Subject: Physics

Age: 13 and up

Duration: 14 minutes

English speech

Production: Kunskapsmedia AB, 2017

Chapters in the video

- Introduction (00:00–01:01)
- Early theories about the universe (01:02–02:54)
- Basis of the Big Bang theory (02:55–06:14)
- The theory and the origin of the universe (06:15–10:54)
- Support for the Big Bang theory (10:55–12:45)
- Summary (12:46–END)



Video Content

The majority of the world's astronomers and scientists today support the theory we call the Big Bang. What does this theory mean? How did it develop? Who was Edwin Hubble and what are spectral lines?

In this video, we investigate the basis of the Big Bang theory. Was there really a bang? What elements and particles were formed immediately after the Big Bang? That's what we're going to look into. We will also find out how nebulae, stars, planets, and solar systems came about. And finally, we learn what support there is for this theory. What indicators are there that the Big Bang theory might be right?

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The Big Bang Theory and the Origin of the Universe



Before the Video

What do we know?

Hand out blank paper to all the students. In the center of the paper, have them draw two circles, one inside the other, with diameters of about 10 and 16 cm. Mark the inner circle "me," the outer circle "pair," and the rest of the page "group." Have the students consider for themselves what they know about the concepts below and have them write their answers in the inner circle. Then have the students compare their circle with that of a friend, and if the friend wrote something else, they should copy that in the "pair" circle. Finally, have the whole group or class compare, and write outside the rings what they didn't have inside them.

(The purpose of this exercise is for the students to have some understanding before they see the video, as well as to give them the insight that working together is beneficial, because most of the students will probably gain more information from comparing with others.)

Concepts in the video:

- The Big Bang
- Nebula
- Galaxy
- Spectral lines
- The Milky Way
- Matter
- Astronomer
- Subatomic particles

Discussion Questions for the Video

Before starting a discussion about the video with the group, it is important that the teacher/leader considers how to handle the discussion and the answers.

Feel free to divide the class into smaller groups and have the participants write down their own answers first. The discussion questions are divided up according to the chapters in the video.

Introduction

- What do you think of when you hear the term *Big Bang*?

Early theories about the universe (01:02–02:54)

- How long did people believe that the universe only consisted of the Milky Way?
- Who was Knut Lundmark?
- What did he discover that changed our perceptions?

Basis of the Big Bang theory (02:55–06:14)

- What did Edwin Hubble discover in 1929 that led to a scientific revolution?
- How did he prove his discovery?
- How fast are the galaxies moving away from us, according to Hubble's calculations?

The theory and the origin of the universe (06:15–10:54)

- When do scientists think the Big Bang occurred?
- Why is the expression "Big Bang" misleading?
- What do we consider to be subatomic particles?
- What are the smallest atoms, which were also formed first?
- What is the most common element in the universe?
- How are new elements formed?
- What is a nebula?
- What is it called when two hydrogen atoms merge to form helium?

Support for the Big Bang theory (10:55–12:45)

- Can we be sure that the theory of the Big Bang is true?
- What discoveries indicate that the theory is correct?

Summary (12:46–14:11)

- What did you think of the video?
- Did you learn anything new from watching it? If so, what?



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After the Video

Concepts

Go through the words under *What we know*, which you wrote before seeing the video, and see if you now understand the meanings of more of the terms, or if you need to investigate further.

About galaxies

Divide the class into smaller groups. Each group chooses one of our nearest galaxies (*for example: The Milky Way, Andromeda, The Whirlpool Galaxy, Messier 64, Bode's Galaxy or the Sunflower Galaxy*) and make an advertising folder for a vacation there.

Imagine that you own a travel agency selling trips to your galaxy. Learn information about your galaxy and explain why it would be the perfect destination. Include information about its size, appearance, structure, distance from Earth and other interesting data that could make people want to go there. Be sure not to use copyrighted images.

Astronomers

Divide the students into groups and have them learn more about some of the astronomers whose discoveries have affected how we look at creation today.

Then have them report on their astronomer to the other participants.

- Knut Lundmark
- Edmund Halley
- Stephen Hawking
- Edwin Hubble
- Isaac Newton
- Galileo Galilei
- Nicolaus Copernicus

Further studies

Astronomy and astrology are two different things. Learn more about the concepts and the difference between them.



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