

Grade 8
Dr. Anderson

Summer Reading Assignment for *Brief History of Time* by Stephen Hawking

In Archie open Resources and you will see the PDF file for this book.

As you read the first 7 chapters, think about scientific theories. Stop and revisit Chapter 7 “Black Holes Ain't So Black”

Objective: Chapter 7 Black Holes Ain't So Black: Observation is the basis for a lot of the information in this book. No one has observed a black hole, but they are presumed to be there. However, people have observed at least one type of antiparticle, so the rest are assumed to be valid. The assignment will focus on the role of observation.

Pre-reading, please visit these 2 websites:

<https://www.khanacademy.org/humanities/big-history-project/big-bang/how-did-big-bang-change/v/bhp-view-of-the-universe-change>

<https://science.howstuffworks.com/dictionary/astronomy-terms/dark-matter.htm>

- **Theories are explanations for observable phenomena.**
- **Science theories are based on a body of evidence developed over time.**
- **Laws are regularities or mathematical descriptions of natural phenomena.**
- **A hypothesis is used by scientists as an idea that may contribute important new knowledge for the evaluation of a scientific theory.**
- **The term "theory" as used in science is very different from the common use outside of science.**

Complete the following five (5) items and submit them as one pdf document in Archie with your name on a cover page.

1) What does Hawking say is a valid observation, and what should observation do? Please explain this in your own words.

2) Prepare written responses to use for our in-class debate.

One side defends the idea that nothing can be proven until it is observed. The other side says that things can be proven without observation. At the end of the debate, we will vote on who the class thinks is right.

3) Prepare written responses to use for our in-class discussion: Why is observation important? If you cannot observe the thing itself, can you observe its effect on something else? This is how scientists see black holes, right? Do you trust this method of observation? Why? Why not? Do you trust it because it comes from a scientist rather than from someone else? Is the source of the observation enough to lend it credibility when otherwise you would doubt it?

4) Individual observations:

Theories are generally made on the basis of observations. Go somewhere and sit for 30 minutes. Write down what you observe, and then create a theory for it. Was it hard to do? Why or why not? Be creative about how you will share this experience.

5) Examples of theories based on math:

Go through the book and find five examples of when a theory or idea is based not on an observation but on math. Then write down what the theory is, what it is based on, why it hasn't been observed, and if you believe the theory and why.

Grading Rubric

Student Name: _____

Project Title: Summer Reading Stephen Hawking “Brief History of Time”

| CATEGORY | 4 | 3 | 2 | 1 | 0 |
|---------------------|--|--|---|---|--|
| Sources | Source information collected for all graphics, facts and quotes. All are documented in the desired format. | Source information was collected for all graphics, facts, and quotes. Most documented in the desired format. | Source information was collected for graphics, facts, and quotes, but not documented in the desired format. | Very little or no source information was collected and was not in the desired format. | No evidence of source material |
| Content | Covers the topic in-depth with details and examples. Subject knowledge is excellent. | Includes essential knowledge about the topic. Subject knowledge appears to be good. | Includes essential information about the topic but there are 1-2 factual errors. | Content is minimal OR there are several factual errors. | Almost no content or there are multiple factual errors. |
| Originality | Product shows a large amount of original thought. Ideas are creative and inventive. | The product shows some original thought. Work shows new ideas and insights. | Uses other people's ideas (giving them credit), but there is little evidence of original thinking. | Uses other people's ideas, but does not give them credit. | Mostly plagiarized/copied from some source |
| Organization | Content is well organized using the required format throughout | Uses headings or bulleted lists to organize, but the overall formatting appears flawed. | Content is logically organized for the most part. | There was some organizational structure, mostly just a list of facts. | Almost no structure, hard to find or follow the required information |

Teacher Feedback:
Response:

Student