



Participant Discussion Guide for *Cosmos: A SpaceTime Odyssey*

Episode 5: "Hiding in the Light"

The creators of *Cosmos: A SpaceTime Odyssey* state that their aim is to promote scientific literacy. Episode five, "Hiding in the Light," explains several properties of light, the speed of light having been addressed in episode four. "Hiding in the Light" reveals how those who discovered some of light's most interesting properties, even many centuries ago, did so by applying the principles of the scientific method. In this discussion guide we focus primarily on certain properties of light, the people who discovered them, and the principles of observational science that enabled them to discover scientific facts that ushered us into the modern age.

1. **Children of the 21st century are sometimes guilty of thinking that ancient people were ignorant savages. Yet from the Bible we know that, while man's savagery was evident as early as 6,000 years ago when Cain committed the first murder, the generations soon after Adam and Eve already understood how to work with metal and make musical instruments. After the global Flood and the dispersion of people from the Tower of Babel, many ancient people discovered or rediscovered scientific and technological principles.**

- A. What fifth century BC philosopher does the program present as an example of an ancient discoverer of how light works? What country did he live in? What was going on in his land at the time? What sort of philosophy did he promote?**
- B. What did the philosopher invent?**
- C. Which of the philosopher's essays does Tyson describe as an early example of the scientific method? What principles does he say the essay recommends? How does that compare to the scientific method?**

2. What 11th century Arabian scientific genius learned a lot about how light moves? How did he test his idea about how light moved?

3. Galileo's telescope gathered in more light from the night sky than a person's eyes can. How? And why is that important? How do modern telescopes do the same thing, but even better?

4. What do Isaac Newton and the rainbow have in common?

5. What “new” kind of light did William Herschel discover? How did he do it?

6. What 18th–19th century Bavarian who made many advances in optical science started out life as an apprentice not even allowed to read? How do the principles of light that he discovered enable us to know what stars are made of? How does that work?

7. Why does a prism split ordinary light into a rainbow?

8. What is wavelength? What is frequency? Compare the wavelength and frequency of the various colors in the visible spectrum.

9. How do sound waves differ from light waves? How can you tell the difference between a high frequency and low frequency sound? On a pipe organ, which pipes make what kind of sound?

10. Name the various kinds of light (electromagnetic radiation).

