



## **Participant Discussion Guide for *Cosmos: A SpaceTime Odyssey***

### **Episode 3: "When Knowledge Conquered Fear"**

The creators of *Cosmos: A SpaceTime Odyssey* state that their aim is to promote scientific literacy. Because we know that many who watch the program may find the blurring of observational, experimental science with historical, origins science confusing, in this discussion guide for episode three, we emphasize the distinction between what we know about comets and worldview-based speculation about when and how they came to be.

#### **1. What is a comet?**

2. **What makes a comet glow? Why does a comet have a tail? Does it glow and have a tail all the time?**

3. **Why did many ancient and medieval people fear comets? What did they think they meant? What does the Bible teach about such beliefs?**

4. **Why does the *Cosmos* program say that comets are in “bondage” to the sun’s gravity? Is this accurate?**

5. How long do comets last?
6. What is the Oort cloud? Has any astronomer ever seen it? Why do some astronomers believe there is an Oort cloud?
7. In *Cosmos: A SpaceTime Odyssey*, host Neil deGrasse Tyson says Isaac Newton’s “laws of gravity and motion reveal how the sun held distant worlds captive. His laws swept away the need for a master Clockmaker to explain the precision and beauty of the solar system. Gravity is the clockmaker.” What does this mean? Is he correct?

8. *Cosmos* host Neil deGrasse Tyson indicates that believing a Creator—like a master “Clockmaker”—created the solar system is a belief that limits scientific curiosity and the desire to discover. He says, “This explanation was the closing of a door. It doesn’t lead to other questions.” Based on history, is he correct?

## **Reaching Beyond**

9. If a comet does not disintegrate, how soon will it reappear where we can see it from earth?

10. What “laws of nature” control the movements of the planets and of comets? How were they discovered?

## **Suggestions for Further Investigation**

God designed the solar system, with the sun and the planets that orbit it, to be governed by forces that predictably keep the planets and even comets in predictable orbits. Johannes Kepler and Isaac Newton described the elliptical orbits that result. For further study, here are a couple objectives for you to complete:

- Look up Kepler's three laws of planetary motion.
- Learn how to draw an ellipse (older students can learn how to mathematically describe an ellipse).