

Earth and Space Science Partnership – Solar System Astronomy Workshop

The Common Reading Experience book for the Astronomy Workshop is “Origins” by Neil Degraffe Tyson and Donald Goldsmith. We encourage you to read the entire book! However, the questions below are associated with Chapters 9 to 13, and you are only required to have read these chapters prior to the workshop. These questions are intended as a formative assessment and not as traditional questions that can be answered entirely by searching through the book. They will help you to examine the evidence and central ideas about the formation of stars and planetary systems, like our own solar system. Moreover, they can also serve as a model for use with your students. Please write the responses to these questions in a Word document and upload it to the workshop website as described in the Common Reading section of the binder.

Chapter 9: Dust to dust

Q1: What is the difference (in terms of forces) between a cloud that has begun to collapse, one that is expanding, and one that is stable (unchanging).

Q2: Can you think of another (non-astronomy) situation where competing forces lead to expansion rather than collapse?

Chapter 9: Dust to dust and Chapter 10: Elemental Zoo

Q3: The early Universe only contained H, He, and trace amounts of Li. Remind yourself what the most common elements are in the human body and in the Earth’s crust. Where did these elements come from?

Chapter 11: When worlds were young

Q4: The authors (p. 184-190) claim that the planets were formed from gas and dust grains. What is the evidence that supports this claim? What basic science theories link this evidence to the claim?

Q5: The authors (p. 191-193) claim that Earth’s moon could have been formed from material from the Earth and some other material. What is the evidence for this claim? Can you suggest other possible evidence that, if found, might or might not support this claim?

Q6: What patterns are there in the masses of the planets' cores found in our Solar System? What does this pattern (evidence) tell us about the way the solar system might have formed (reasoning and potential claim)?

Q7: Why are half-mile wide planetesimals of interest to scientists working on improving the understanding of the formation of the Solar System?

Chapter 12: Between the planets

Q8: a) Most students think that there is nothing in the space between the planets. What evidence do we have that there is matter there? b) How does this interplanetary matter support the theory of solar system formation from Chapter 11?

Chapter 13: Worlds Unnumbered

Q9: Did the study of exoplanets (sometimes called extrasolar planets or exosolar planets) cause us to alter our story of the formation of the Solar System? Why or why not?

Q10: Compare the techniques astronomers use to study the planets in our Solar System, like Jupiter, to those they use to discover and learn about exosolar planets.

Q11: Light provides key pieces of evidence for astronomy. What properties of light do your students need to know in order to understand how scientists study astronomy?

Summary question

Q12: Sketch a multi-step model of your vision for the current understanding of the formation of the Solar System. Since we did not directly observe the process of our Solar System's formation that you sketched, how precisely do you think we know the details of this process?