

CASE TEACHING NOTES

for

“A Rose By Any Other Name: The Peculiar Case of Pluto”

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INTRODUCTION / BACKGROUND

This two-part interrupted dilemma case study is suitable for a general astronomy course. It provides an introduction to our solar system by highlighting the peculiarities of Pluto. The storyline reveals scientific data, historical events, and personal stories regarding the status of Pluto as the ninth planet. The main character, Dr. Maria Ocasio, is the chair of the Committee on Small Body Nomenclature of the International Astronomical Union (IAU), which is the organization charged with assigning permanent names to asteroids and comets. She is faced with the dilemma of evaluating this information and deciding “What is Pluto?” by answering the question “What is a planet?” While the characters and the scenes in this case study are fictional, the arguments and events are factual (for example, see Freedman, 1998).

Objectives

By the end of this case, a student should be able to do the following:

- Define orbital parameters such as semi-major axis, eccentricity, orbital inclination, orbital period, and orbital resonance; define Kuiper Belt Object (KBO) or Trans-Neptunian Object (TNO) and Plutinos.
- Discuss the similarities of the orbital characteristics among the terrestrial and the Jovian planets.
- Describe the differences between the physical characteristics (mass, radius, density, and composition) of the terrestrial and the Jovian planets.
- Compare and contrast the physical and orbital properties of Pluto with those of the other planets.
- Evaluate the arguments both for and against Pluto’s status as a planet.
- Synthesize all the above and compose a working definition for the word “planet.”

CLASSROOM MANAGEMENT

Before students read any part of the case, ask each individual student to write his/her definition for a planet. While many may think “What is a planet?” is an easy question, some struggle with a precise definition. Students can discuss their results in small groups and come up with one definition to report to the class. The instructor can post these definitions for later reference.

This case works best if students are assigned Part I and its accompanying activities and questions as homework. They will learn the vocabulary of orbital and physical parameters and they will compare and contrast the physical and orbital characteristics of the planets. An introductory astronomy book will contain most of this information; however, the students may need to research other sources for information about Plutinos.

Students can discuss their results for Part I in small groups or as a class during the following session. The answers for the factual questions should be reviewed, their opinions about the vote should be expressed,

and any outstanding questions should be posed. A poll can be taken at this time to see how the students themselves would vote. This review may take 30 minutes or more.

Part II presents the dilemma. Each student group meets as the Committee on Small Body Nomenclature, using the questions at the end of Part II to facilitate their discussion. After ample time, students can summarize their discussion in a written statement and submit it as the official IAU position. It should include their final definition for the word “planet,” and, as a result, determine Pluto’s status. The Committee chair reads the statement to the class. The class might then compare these definitions to their original definitions (composed in the previous class) and comment on what they have learned. Part II may take 60 minutes to complete.

Students may be interested in reading the actual letter from the DPS and the official response of the IAU (see References). They may be surprised that the IAU’s definition for “planet” is not as concrete or as “scientific” as they might have expected, or may think that it is arbitrary. It may reveal to some students the gray areas in science—a subject frequently misconceived as black-and-white and factual. It usually stimulates lively discussion.

BLOCKS OF ANALYSIS

Detailed case analysis is provided in a separate file that is password-protected. To access this information, go to the [detailed case analysis](#). You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our [password policy and then apply online](#) or write to answerkey@sciencecases.org.

SOME FINAL NOTES

The Pluto Express mission was scrapped in 2000 due to budget constraints. However, after massive grass-roots lobbying, Congress granted funding for a new interplanetary probe, called the New Horizons Pluto-Kuiper Belt mission. It is scheduled for launch in 2006. It will rendezvous with Pluto in 2015 (Johns Hopkins University, 2001). In addition, the classification “Minor Planet 10,000” was given to a small asteroid in the main belt and officially named “Myriostos,” which means “10,000” in Greek (Minor Planet Center, 2004). Furthermore, since the events in this case have happened, Project LINEAR—an automated telescope dedicated to asteroid and comet tracking—has sent over 12 million observations to the Minor Planet Center, contributing to the discovery of over 1,000 minor planets each month (Project LINEAR, 2004). As of February 2005, there were officially 99,906 minor planets (Minor Planet Center, February 24, 2005). Should we consider assigning Minor Planet Number 100,000 to Pluto?

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