

composition: the parts something is made of, and how the parts are put together

calculations: results or answers found by solving mathematical problems

Astronomers at the Lowell Observatory chose to name the new planet *Pluto*, which was suggested by an 11-year-old girl from England. Hundreds of different names had been sent to them for consideration, but *Pluto*'s first two letters worked as a tribute to the man they wanted to honor—Percival Lowell.

After more than 70 years as our solar system's ninth planet, *Pluto*'s status was recently changed to that of dwarf planet. *Pluto* is considered one of the largest objects in an area called the *Kuiper Belt*.

Has the mysterious Planet X been found?

By the beginning of the 1800s, astronomers had discovered seven of our solar system's planets. Each planet's mass, **composition**, and orbit were studied carefully. Astronomers noticed that *Uranus*'s orbit was slightly different than their **calculations** predicted it should be. Their explanation was that gravity from an undiscovered planet was affecting it. New calculations were made to predict where this unknown planet might be.

On September 23, 1846, *Neptune* was discovered where the astronomers had said it would be. They realized that *Neptune*'s orbit wasn't following the predicted path, either. Their explanation was yet another planet.

Astronomer Percival Lowell named this undiscovered planet *Planet X*. Lowell had used his fortune to build the Lowell Observatory in Flagstaff, Arizona. He spent nearly ten years calculating where to find the planet and observing the skies. When he died in 1916, *Planet X* still hadn't been found. The search stopped for more than a decade.

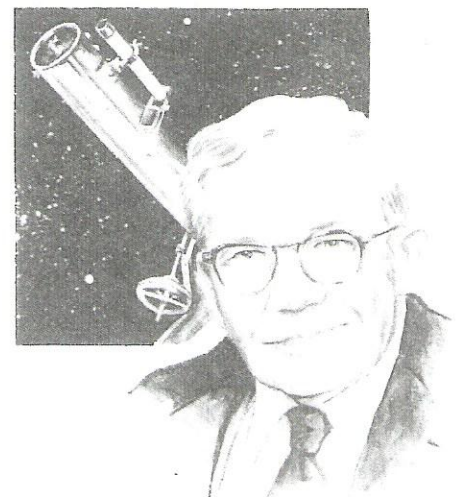
During the 1920s, Lowell's reputation began to suffer. One of his most famous theories had been that life existed on *Mars*. Lowell thought he had seen canals on the planet's surface and argued that they must have been built by intelligent creatures. By the 1920s, it was clear that no life existed on *Mars*, and that Lowell's "canals" were natural parts of the Martian landscape.

The new owners of the observatory wanted to restore some dignity to Lowell's name, so in 1928, they resumed searching for *Planet X*. A young astronomer from Kansas named Clyde Tombaugh was hired for the task.

Tombaugh used Lowell's calculations, but he also compared photos of the night sky taken one night with photos taken several nights later. He looked carefully for any points of light that had moved. Tombaugh knew that stars would be in the same position night after night, but a planet would have moved along in its orbit. On February 18, 1930, Tombaugh spotted *Pluto*.

Tiny *Pluto* wasn't nearly as massive as Lowell's *Planet X* was supposed to be. Was there still a giant *Planet X* orbiting even farther out in space? For decades this remained a mystery.

In 1989, the *Voyager 2* spacecraft flew near *Neptune* and sent back precise measurements of the planet's mass. Earlier calculations had been wrong. *Neptune*'s orbit made perfect sense based on the new information and was not affected by the mysterious *Planet X*.



Circle the letter of the best answer to each question below.

1. Percival Lowell
 - a. discovered Pluto.
 - b. discovered Neptune.
 - c. made predictions about where to find Planet X.
 - d. Both a and c

2. Lowell's reputation suffered because
 - a. he believed intelligent creatures lived on Mars.
 - b. he predicted a giant Planet X existed in the solar system.
 - c. Pluto wasn't found during his lifetime.
 - d. Clyde Tombaugh took over his job at the observatory.

Write your answers on the lines below.

3. After Uranus was discovered, why did astronomers believe they should begin looking for another planet?

4. In order to solve the mystery of Planet X, why were observing and collecting evidence used instead of experimenting?

5. How did advances in scientific technology help solve the mystery of Planet X?

Unifying Concepts and Processes

When you think of scientific tools, you might imagine test tubes, rulers, and microscopes. A tool can be anything that helps get a job done, though. For example, math and photography were tools used to discover Pluto. Explain how they were used.
