

# Neptune

By Sharon Fabian

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<sup>1</sup> The story of Neptune's discovery is a story about math and chemistry. Neptune was discovered because of the predictions of two mathematicians. Later, *Voyager 2* gave us some clues as to Neptune's chemical makeup. Scientists have put all of these mathematical and chemical clues together to learn as much as they can about planet Neptune.

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## Neptune Math

<sup>3</sup> In the 1840s, astronomers were interested in the planet Uranus, the most recently discovered planet. Since it was so far away, one of the best ways they had to learn more details about Uranus was through math. Mathematicians were studying Uranus's orbit when they noticed something strange. Uranus didn't travel along its path at an even speed. It sped up sometimes, and sometimes it slowed down. What did this mean? What was causing Uranus to change its speed at certain times? The scientists had a theory. They thought the cause might be a pull from the gravity of another planet even farther out. In England, a mathematician named John Couch Adams worked on the problem. He was able to calculate Uranus's orbit and then predict where the gravitational pull should be coming from. In France another mathematician, Urbain Leverrier, studied the same problem and came up with a similar solution. Then two German astronomers, Johann Galle and Heinrich D'Arrest, began looking through their telescopes for the mystery planet. They used Adams's and Leverrier's calculations to tell them just where to look. This is how they discovered Neptune.

<sup>4</sup> Mathematical calculations have also made it possible for scientists to discover Neptune's moons. Its largest moon, Triton, was discovered in 1846, the same year that Neptune was discovered. In 1949 a second moon, Nereid, was discovered. Then, in 1989, six more moons were discovered when the *Voyager 2* spacecraft flew by Neptune. Only by precise mathematical calculation was this voyage even possible. Exact calculations of speed, time, distances, gravities, and orbits guided *Voyager 2*.

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## Neptune Chemistry

<sup>6</sup> Since Neptune is so far away, about 30 times the distance from the Earth to the sun, it is amazing that we know anything at all about what it is made of. Yet scientists have some pretty good theories about the makeup of Neptune. Chemists know about the properties of each chemical element, so they can make some predictions about what Neptune is made of from even basic information such as its size, mass, temperature, and even its color. By comparing Neptune to planets that they already know more about, they can make even more hypotheses about the chemical composition of Neptune. The fact that Neptune's mass is small compared to the giant size of the planet tells us that Neptune is one of the gas planets. Hydrogen, helium, and methane are probably present in Neptune's atmosphere. Scientists believe that Neptune has a core of melted rock, just as Earth does, but they cannot be sure. Neptune has a dark band around the middle, and it is brighter on both sides of the dark band. The brightness may originate from sunlight reflecting from methane ice crystals in the atmosphere.

<sup>7</sup> Scientists continue to use clues from math and chemistry to discover more about Neptune. Four more moons were discovered in 2002, and another one in 2003.

<sup>8</sup> We still have more questions than answers about Neptune. One interesting question is what happened to Neptune's giant dark spot. The dark spot was a huge storm, similar to Jupiter's giant red spot. Scientists had watched it for years, but no one has seen it lately. The scientists wonder if it has really disappeared, or if we are just not able to see it from Earth now. They have lots of other questions about Neptune too. That is why astronomers try to get every bit of knowledge that they can from even the smallest fact like a measurement or a chemical property.

# Neptune

<p>1. According to this article, math and chemistry _____. <input type="radio"/> A Made it possible to discover Neptune <input type="radio"/> B Were Urbain Leverrier's favorite subjects <input type="radio"/> C Were used to discover all of the planets <input type="radio"/> D Are no longer necessary subjects</p>	<p>2. Neptune was discovered in _____. <input type="radio"/> A 1800 <input type="radio"/> B 1989 <input type="radio"/> C 1949 <input type="radio"/> D 1846</p>
<p>3. The article names _____ spacecraft that flew by Neptune. <input type="radio"/> A Five <input type="radio"/> B Two <input type="radio"/> C One <input type="radio"/> D No</p>	<p>4. Neptune was discovered by _____. <input type="radio"/> A Astronomers <input type="radio"/> B Mathematicians <input type="radio"/> C Both <input type="radio"/> D Neither</p>
<p>5. From this article, we know that _____. <input type="radio"/> A Neptune is the last planet in the solar system. <input type="radio"/> B Pluto is the last planet in the solar system. <input type="radio"/> C It does not say. <input type="radio"/> D Neptune is the last planet visited by <i>Voyager 2</i>.</p>	<p>6. The <i>Voyager 2</i> spacecraft used math to guide its journey. <input type="radio"/> A False <input type="radio"/> B True</p>
<p>7. Parts of Neptune appear very bright, even though Neptune is far away from the sun. This may be because sunlight reflects from _____ in Neptune's atmosphere. <input type="radio"/> A Water vapor <input type="radio"/> B Methane gas <input type="radio"/> C Ice crystals <input type="radio"/> D Dust storms</p>	<p>8. Do some research, and compare Neptune to one of the other planets. Tell how they are similar and how they are different.</p> <hr/> <hr/>

