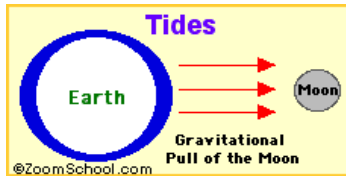


# TIDES

<http://www.enchantedlearning.com/subjects/astronomy/moon/Tides.shtml>



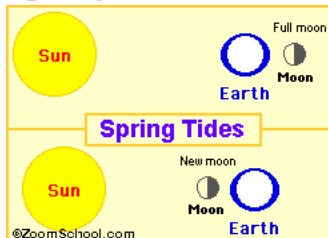
Tides are periodic rises and falls of large bodies of water. Tides are caused by the gravitational interaction between the Earth and the Moon. The gravitational attraction of the moon causes the oceans to bulge out in the direction of the moon. Another bulge occurs on the opposite side, since the Earth is also being pulled toward the moon (and away from the water on the far side). Since the earth is rotating while this is happening, two tides occur each day.

[Isaac Newton](#) (1642 -1727) was the first person to explain tides scientifically. His explanation of the tides (and many other phenomena) was published in 1686, in the second volume of the Principia.

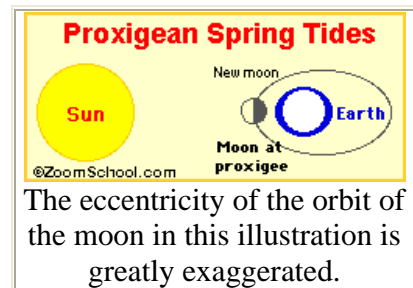
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## The Sun's Interaction with the Tides

### Spring Tides



Spring tides are especially strong tides (they do not have anything to do with the season Spring). They occur when the Earth, the [Sun](#), and the Moon are in a line. The gravitational forces of the Moon and the Sun both contribute to the tides. Spring tides occur during the full moon and the new moon.



The eccentricity of the orbit of the moon in this illustration is greatly exaggerated.

The **Proxigeon Spring Tide** is a rare, unusually high tide. This very high tide occurs when the moon is both unusually close to the [Earth](#) (at its closest [perigee](#), called the

[proxigee](#)) and in the New Moon phase (when the Moon is between the Sun and the Earth). The proxigean spring tide occurs at most [once every 1.5 years](#).

### Neap Tides



Neap tides are especially weak tides. They occur when the gravitational forces of the Moon and the Sun are perpendicular to one another (with respect to the Earth). Neap tides occur during quarter moons.