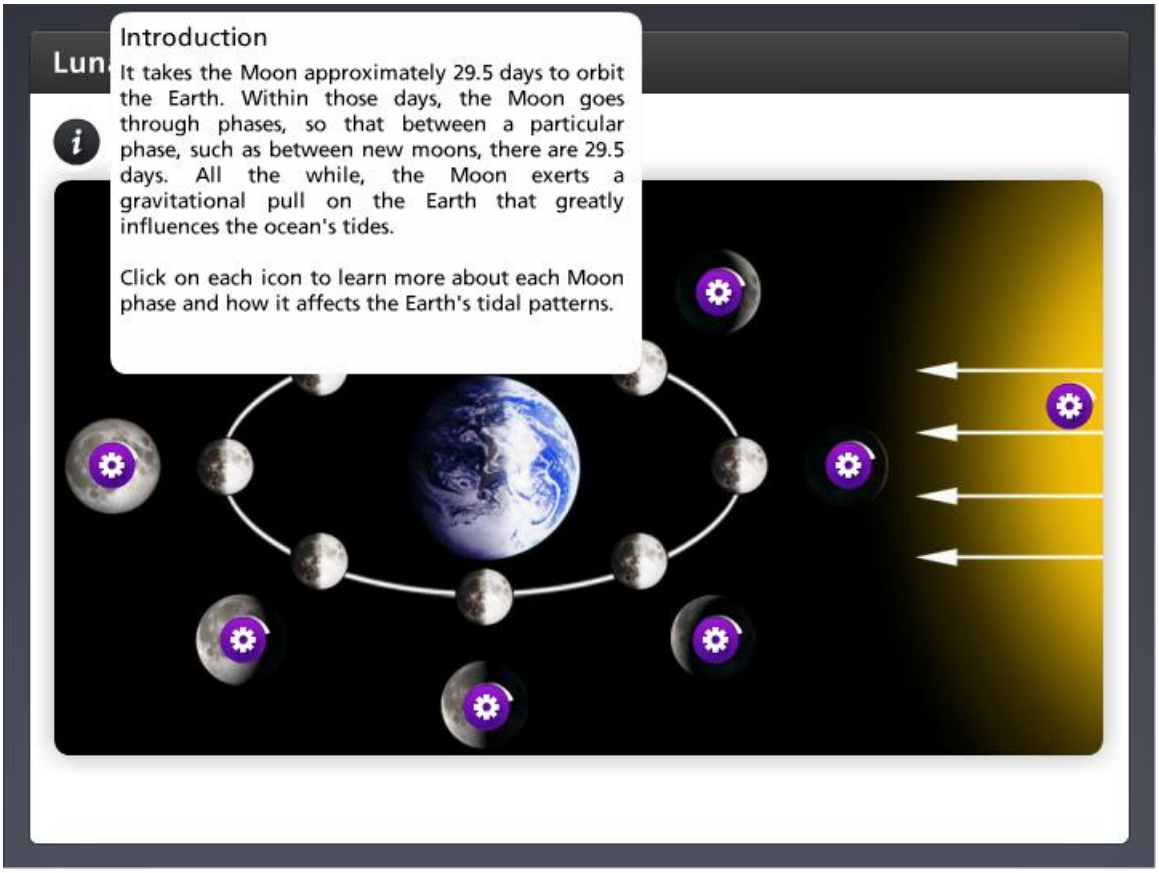
Module 1: What is Astronomy?
Topic 4 Content: Lunar Phases and the Tides Notes

Introduction



It takes the Moon approximately 29.5 days to orbit the Earth. Within those days, the Moon goes through phases, so that between a particular phase, such as between new moons, there are 29.5 days. All the while, the Moon exerts a gravitational pull on the Earth that greatly influences the ocean's tides.

Click on each icon to learn more about each Moon phase and how it affects the Earth's tidal patterns.

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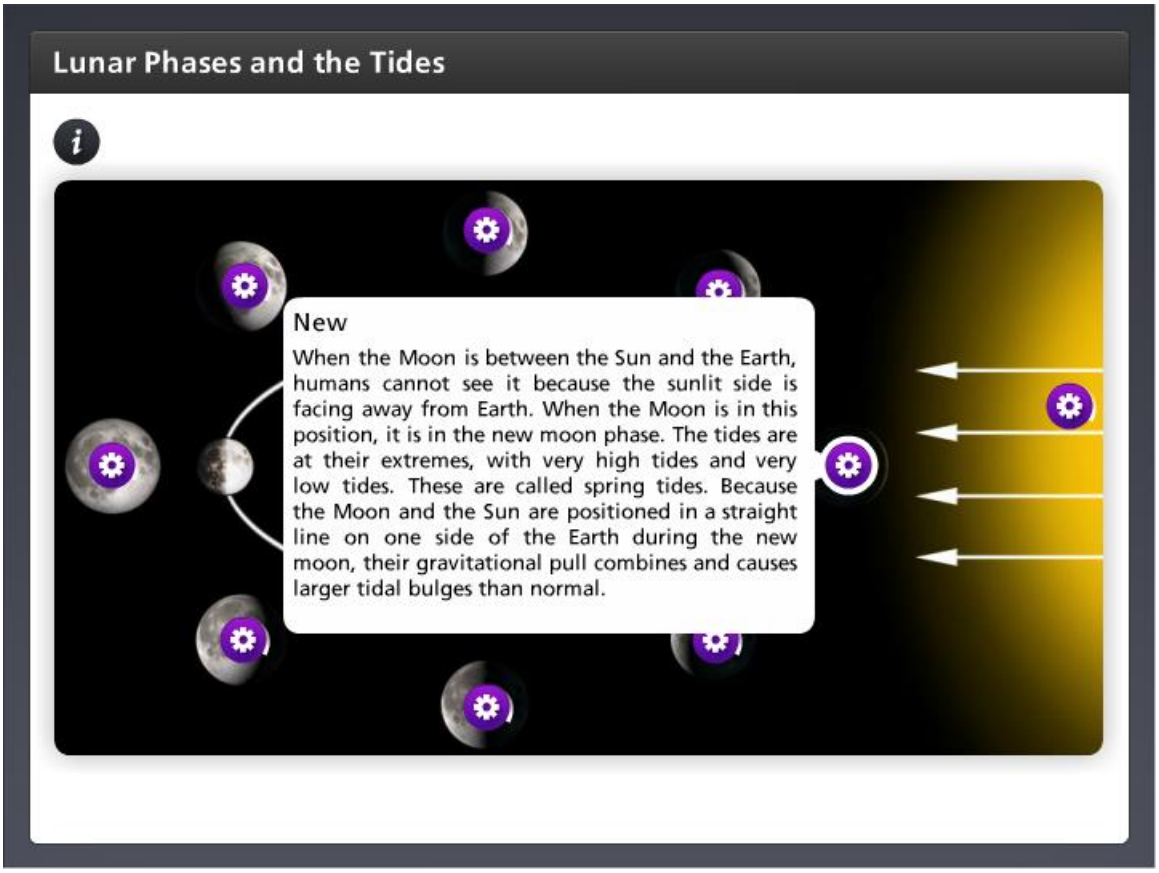
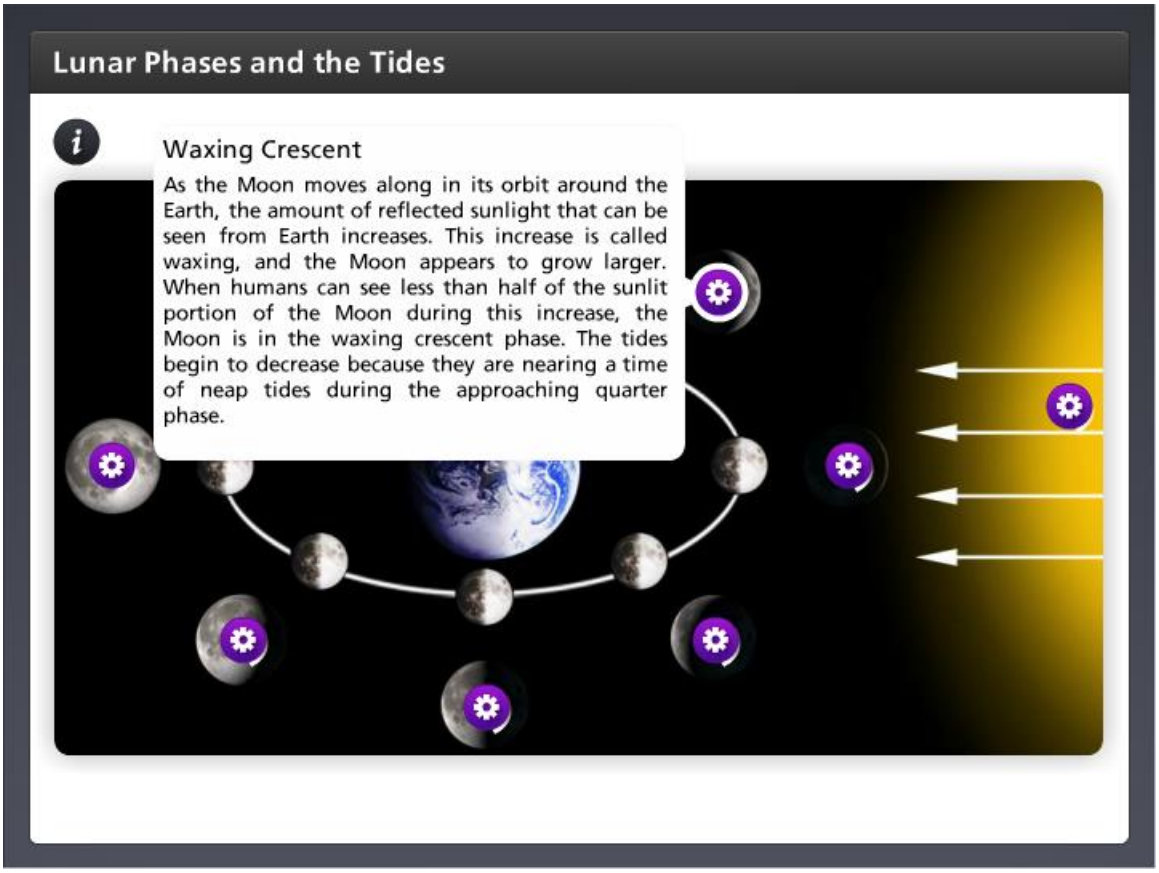
New



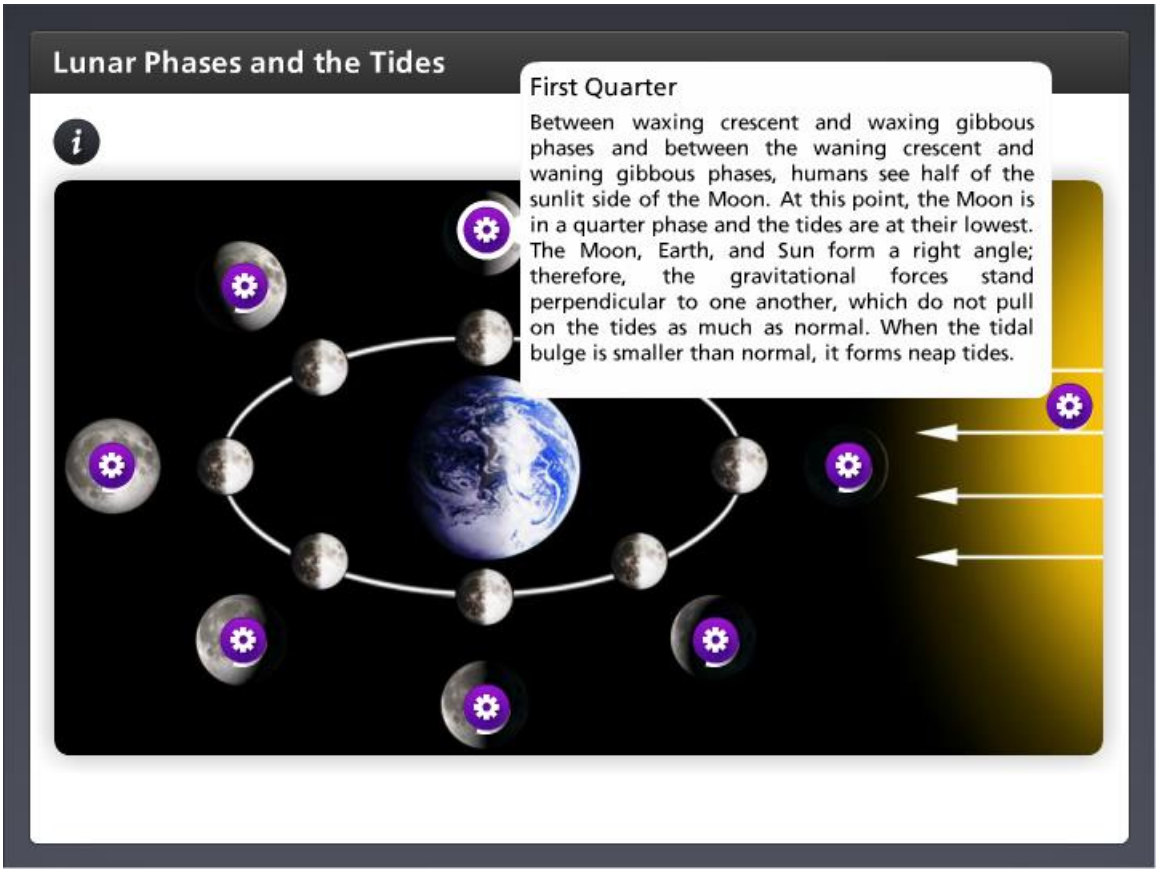
When the Moon is between the Sun and the Earth, humans cannot see it because the sunlit side is facing away from Earth. When the Moon is in this position, it is in the new moon phase. The tides are at their extremes, with very high tides and very low tides. These are called spring tides. Because the Moon and the Sun are positioned in a straight line on one side of the Earth during the new moon, their gravitational pull combines and causes larger tidal bulges than normal.

Waxing Crescent



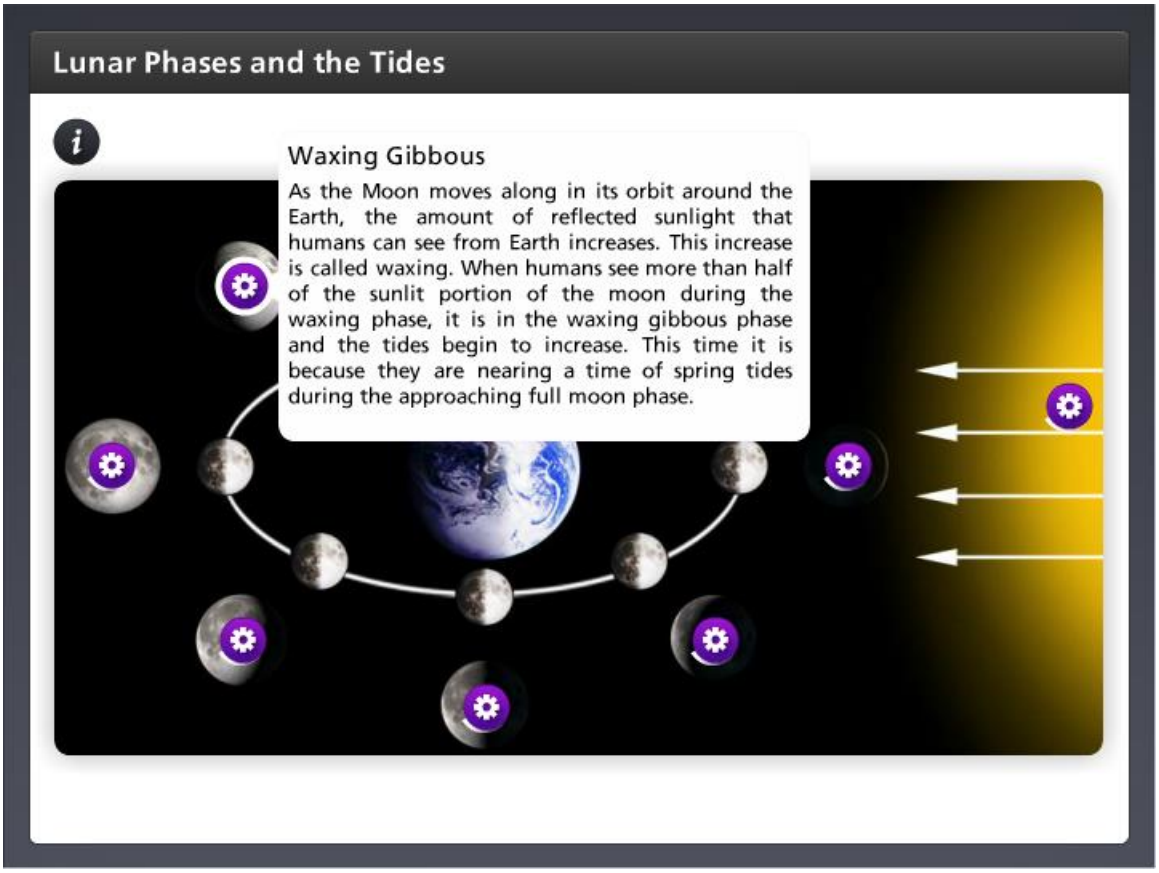
As the Moon moves along in its orbit around the Earth, the amount of reflected sunlight that can be seen from Earth increases. This increase is called waxing, and the Moon appears to grow larger. When humans can see less than half of the sunlit portion of the Moon during this increase, the Moon is in the waxing crescent phase. The tides begin to decrease because they are nearing a time of neap tides during the approaching quarter phase.

First Quarter



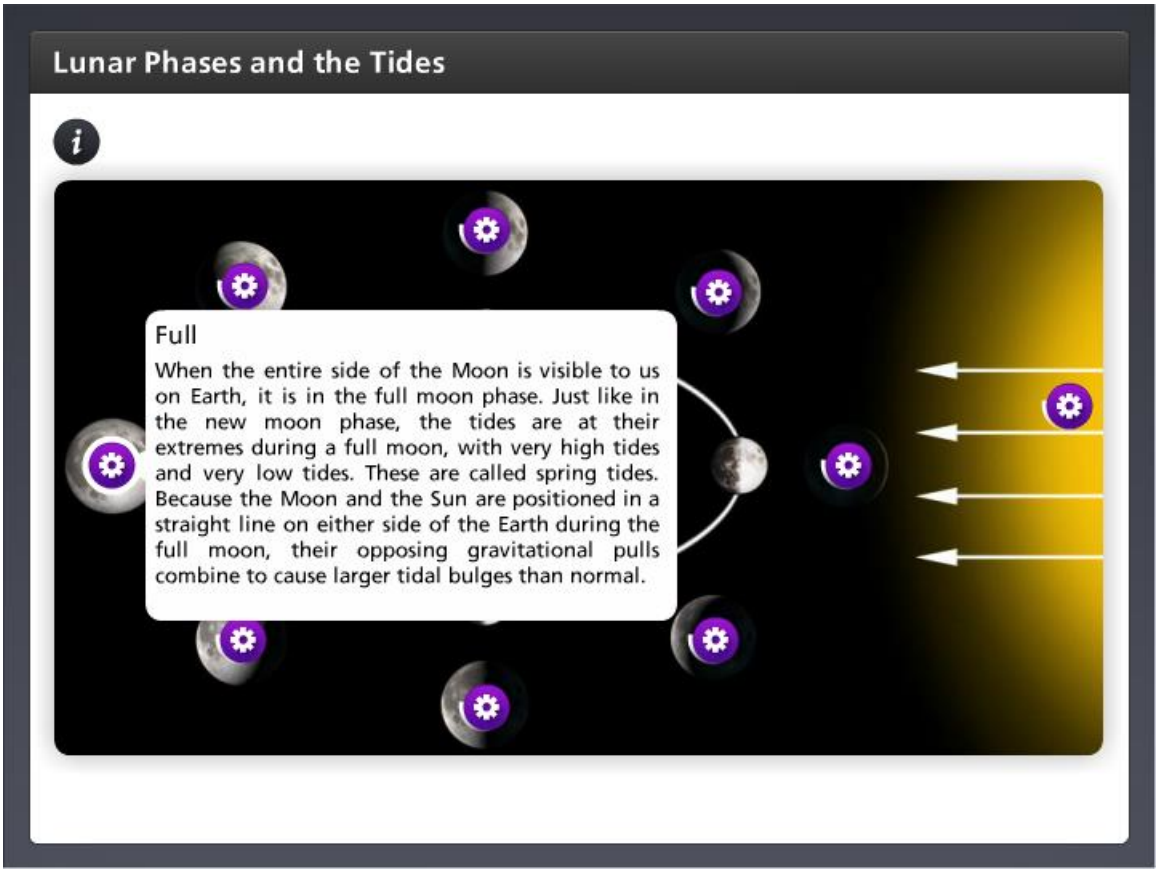
Between waxing crescent and waxing gibbous phases and between the waning crescent and waning gibbous phases, humans see half of the sunlit side of the Moon. At this point, the Moon is in a quarter phase and the tides are at their lowest. The Moon, Earth, and Sun form a right angle; therefore, the gravitational forces stand perpendicular to one another, which do not pull on the tides as much as normal. When the tidal bulge is smaller than normal, it forms neap tides.

Waxing Gibbous



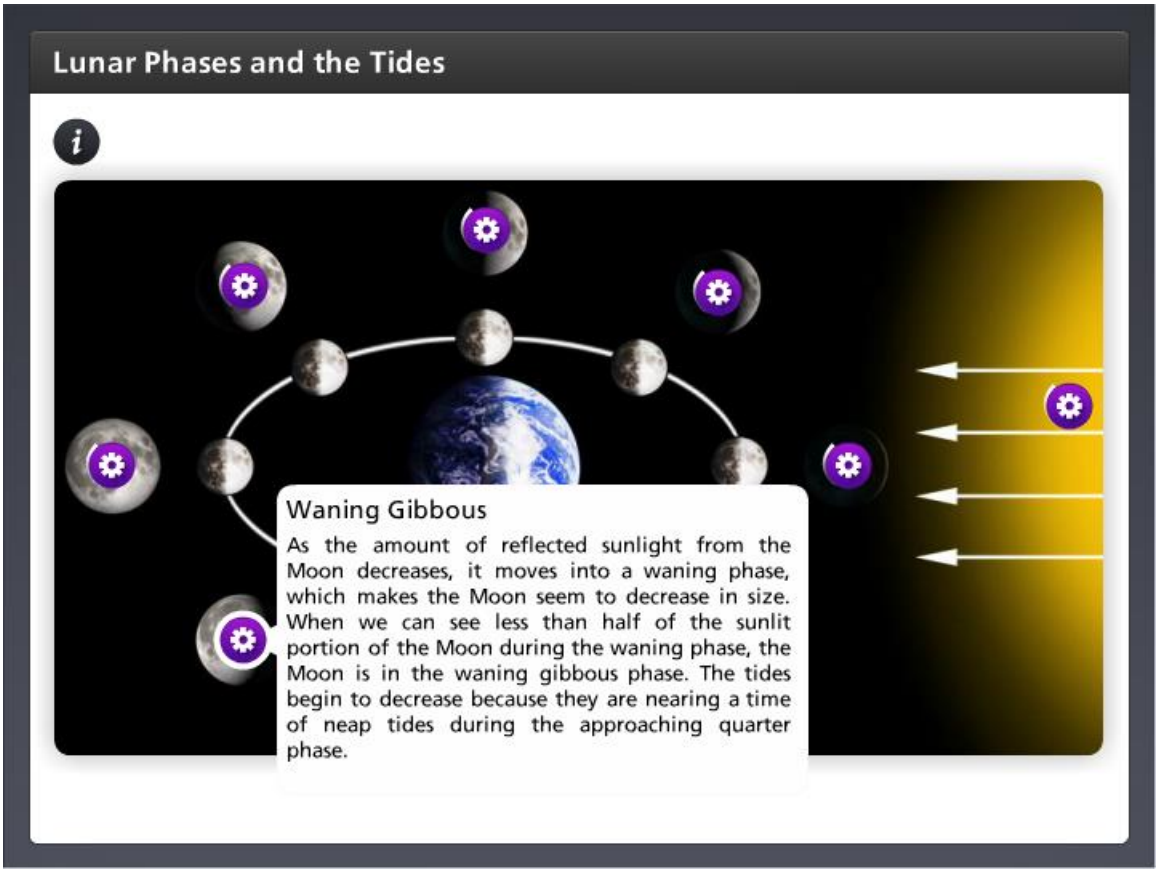
As the Moon moves along in its orbit around the Earth, the amount of reflected sunlight that humans can see from Earth increases. This increase is called waxing. When humans see more than half of the sunlit portion of the moon during the waxing phase, it is in the waxing gibbous phase and the tides begin to increase. This time it is because they are nearing a time of spring tides during the approaching full moon phase.

Full



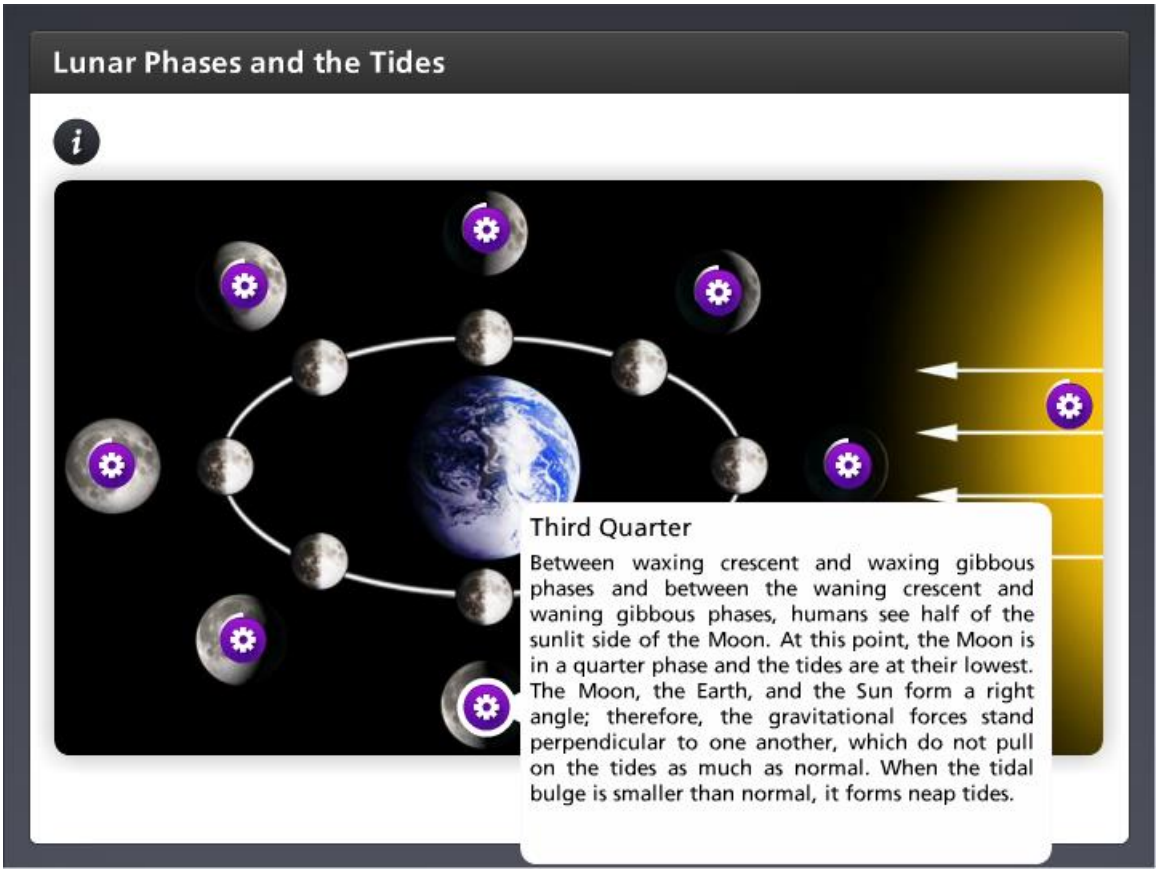
When the entire side of the Moon is visible to us on Earth, it is in the full moon phase. Just like in the new moon phase, the tides are at their extremes during a full moon, with very high tides and very low tides. These are called spring tides. Because the Moon and the Sun are positioned in a straight line on either side of the Earth during the full moon, their opposing gravitational pulls combine to cause larger tidal bulges than normal.

Waning Gibbous



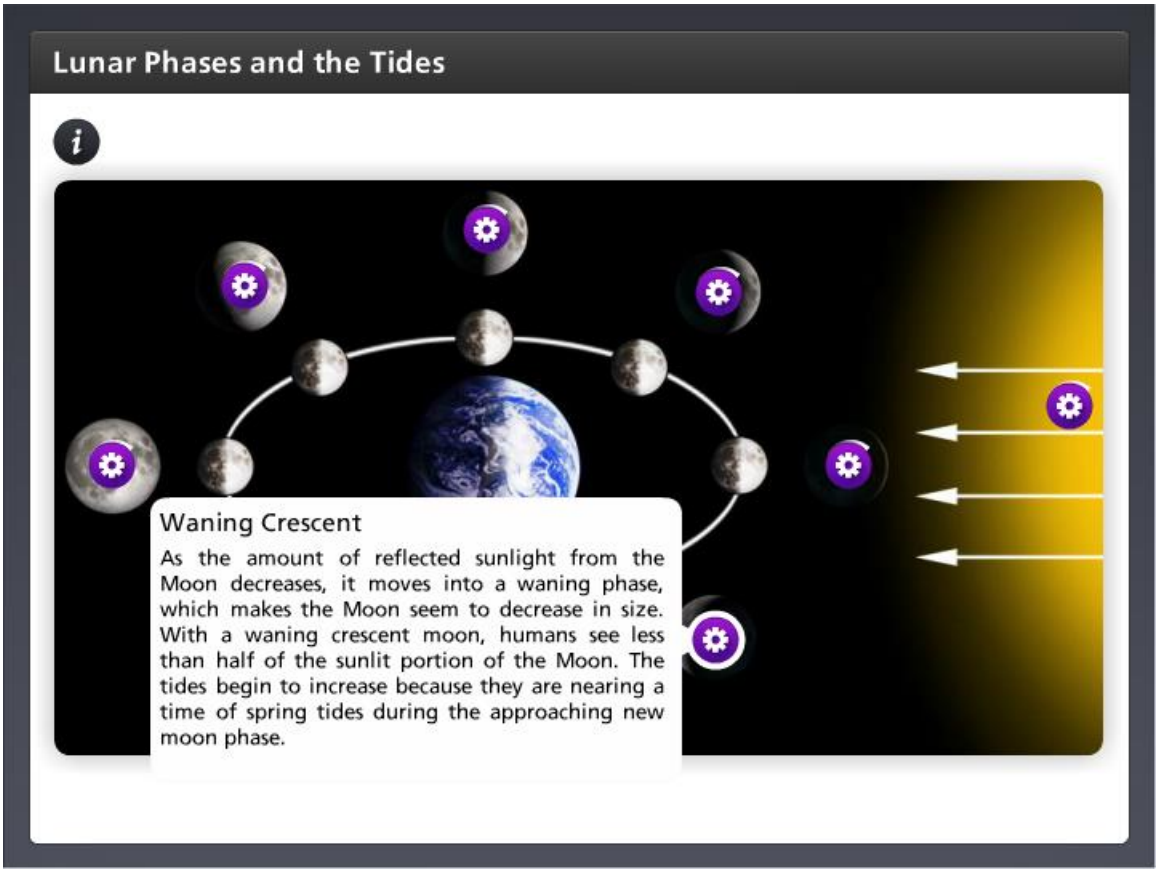
As the amount of reflected sunlight from the Moon decreases, it moves into a waning phase, which makes the Moon seem to decrease in size. When we can see less than half of the sunlit portion of the Moon during the waning phase, the Moon is in the waning gibbous phase. The tides begin to decrease because they are nearing a time of neap tides during the approaching quarter phase.

Third Quarter



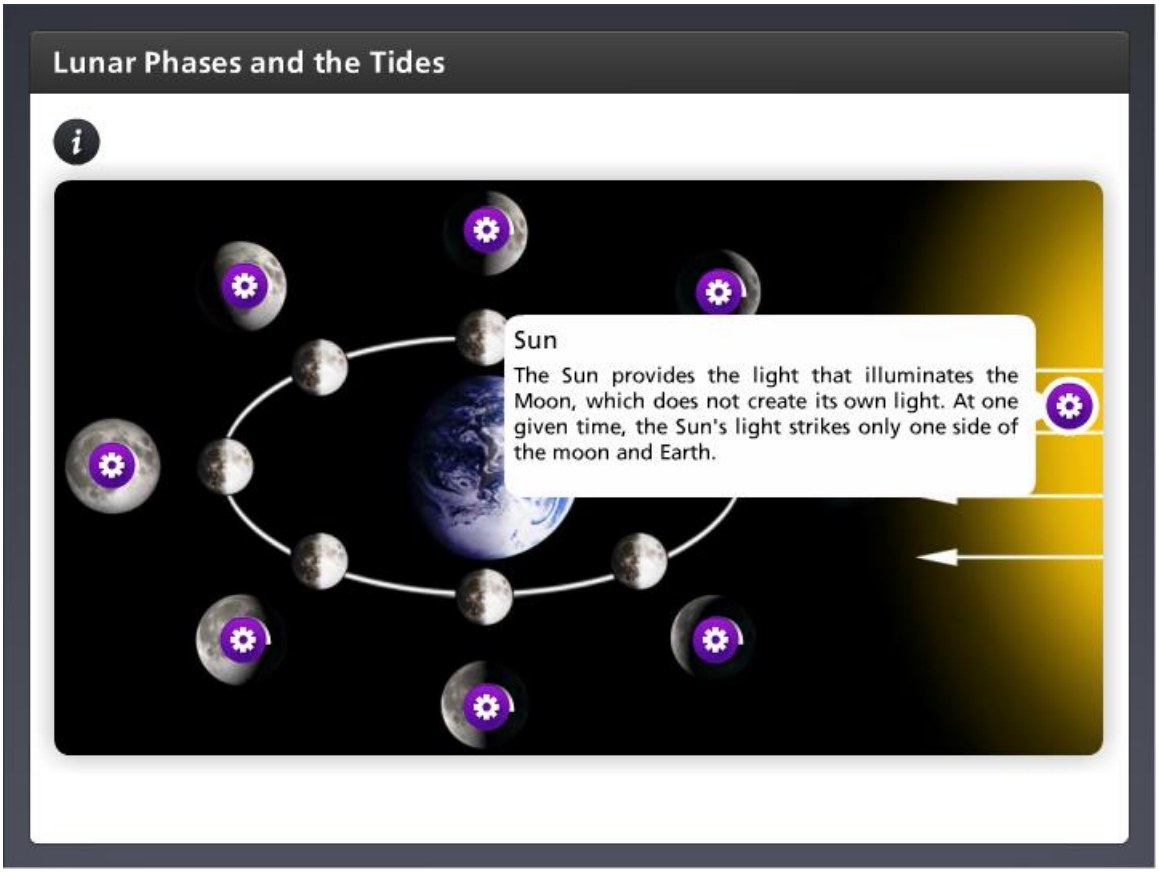
Between waxing crescent and waxing gibbous phases and between the waning crescent and waning gibbous phases, humans see half of the sunlit side of the Moon. At this point, the Moon is in a quarter phase and the tides are at their lowest. The Moon, the Earth, and the Sun form a right angle; therefore, the gravitational forces stand perpendicular to one another, which do not pull on the tides as much as normal. When the tidal bulge is smaller than normal, it forms neap tides.

Waning Crescent



As the amount of reflected sunlight from the Moon decreases, it moves into a waning phase, which makes the Moon seem to decrease in size. With a waning crescent moon, humans see less than half of the sunlit portion of the Moon. The tides begin to increase because they are nearing a time of spring tides during the approaching new moon phase.

Sun



The Sun provides the light that illuminates the Moon, which does not create its own light. At one given time, the Sun's light strikes only one side of the moon and Earth.