

## Module 4: Astronomy – The Solar System

### Topic 6 Content: Lunar Phases and Tides Notes

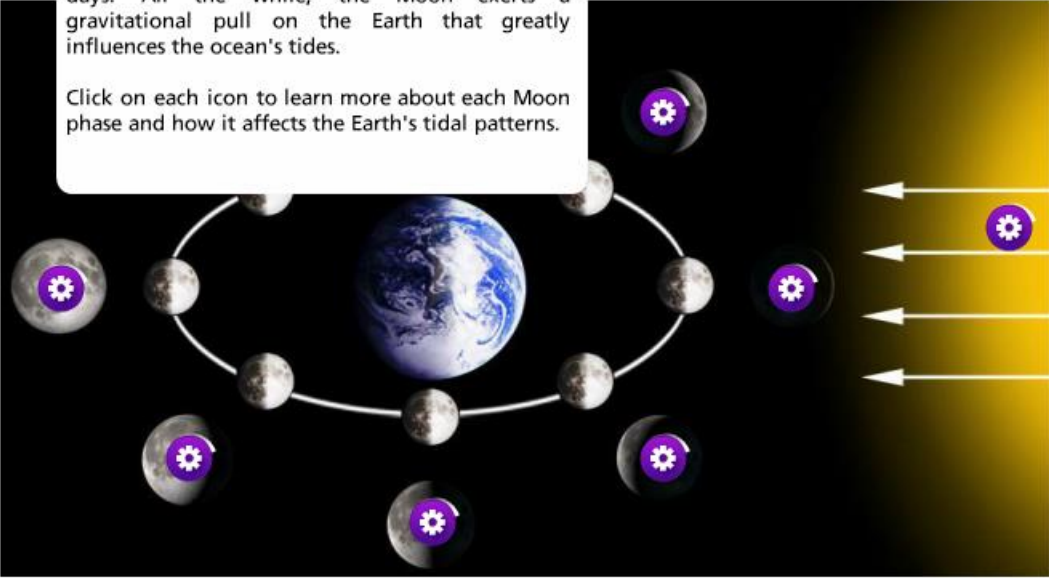
#### Introduction

**Lun**

**i** 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.



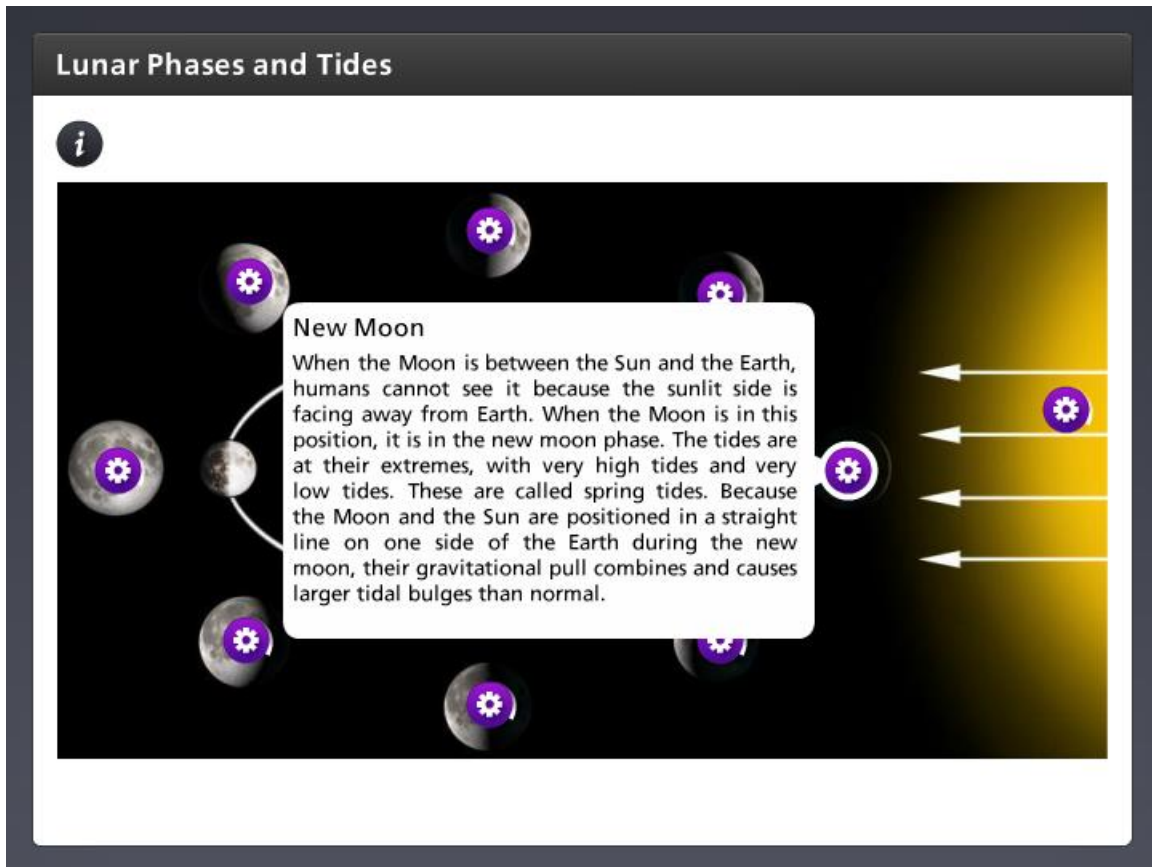
The diagram illustrates the Moon's orbit around Earth. The Earth is shown in the center, with the Moon orbiting in a circular path. Several Moon phases are depicted at different points in the orbit, each with a gear icon. To the right, a yellow gradient background represents the Sun, with white arrows pointing towards the Earth and Moon, indicating solar radiation. The gear icons are placed on the Moon's surface, suggesting they are interactive elements for learning more about each phase.

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**New Moon**



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.

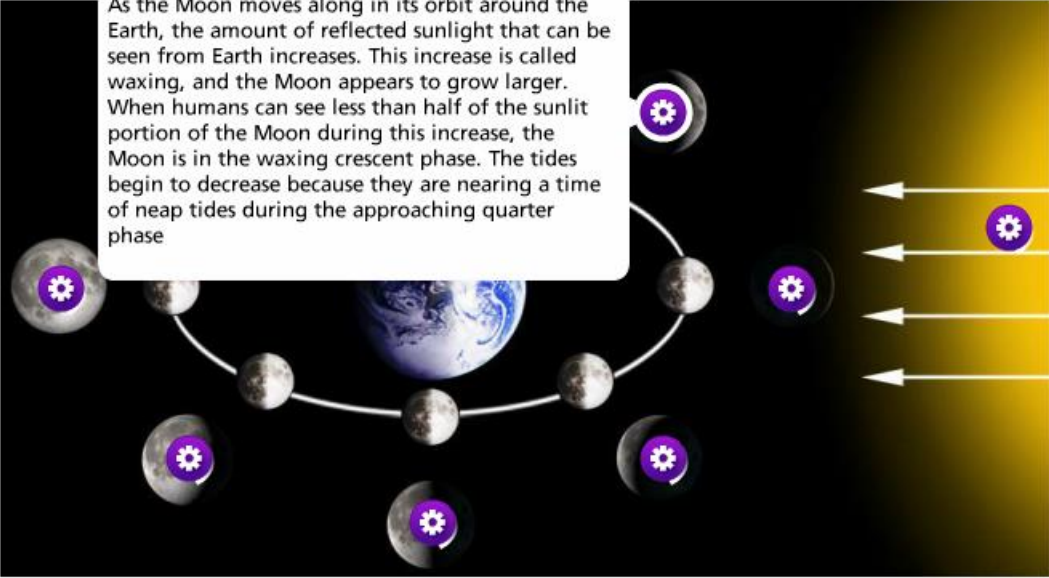
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**Waxing Crescent**

**Lunar Phases and Tides**

**i** **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



The diagram illustrates the Moon's orbit around Earth. The Earth is shown in the center, and the Moon is in the waxing crescent phase. Sunlight is shown coming from the right, illuminating the Moon. The Moon's shadow is cast on the Earth, and the tides are shown to be decreasing.

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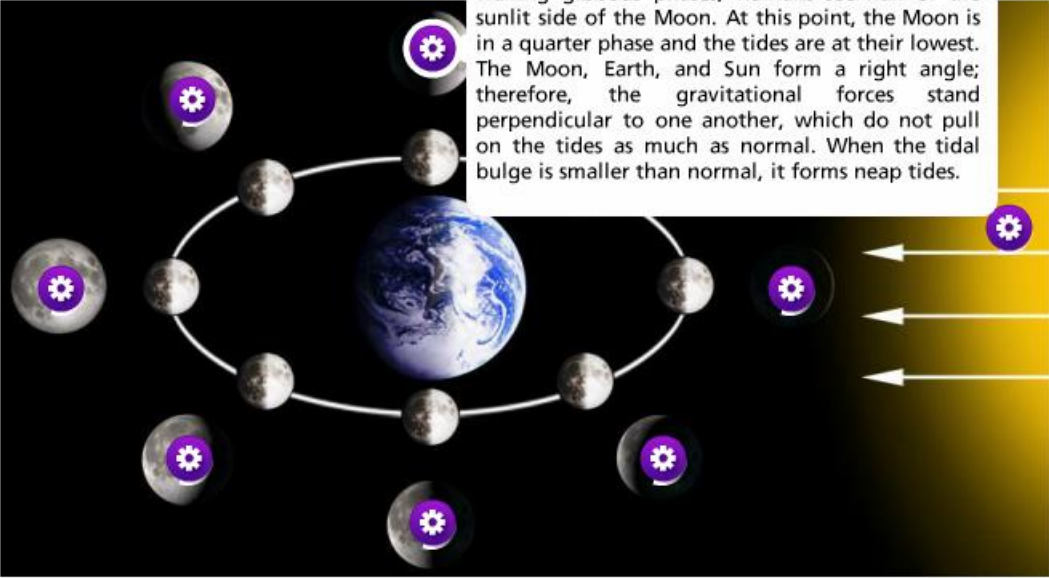
### Topic 6 Content: Lunar Phases and Tides Notes

#### First Quarter

**Lunar Phases and Tides**

**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.



The diagram illustrates the First Quarter moon phase and neap tides. It shows the Earth at the center, with the Moon in a quarter phase. The Sun is positioned to the right, and its rays are shown as parallel lines. The Moon, Earth, and Sun form a right angle. The Moon's phase is shown as a half-moon. The Earth's tides are shown as two small bulges, indicating neap tides. A yellow bar on the right indicates the Sun's position and rays. A purple gear icon is present in the top right corner of the diagram area.

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.

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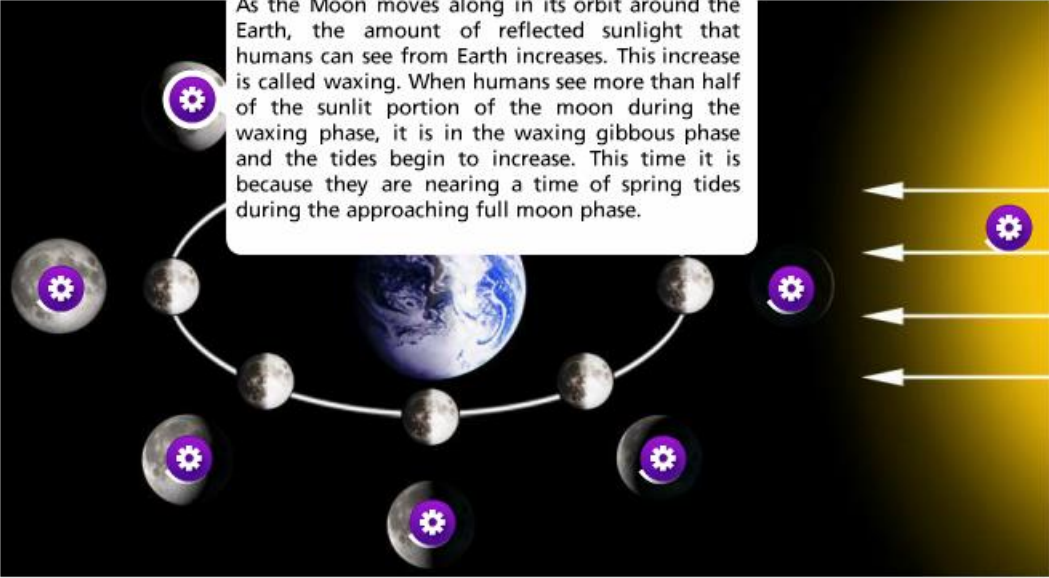
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#### Waxing Gibbous

**Lunar Phases and Tides**

**i** **Waxing Gibbous**

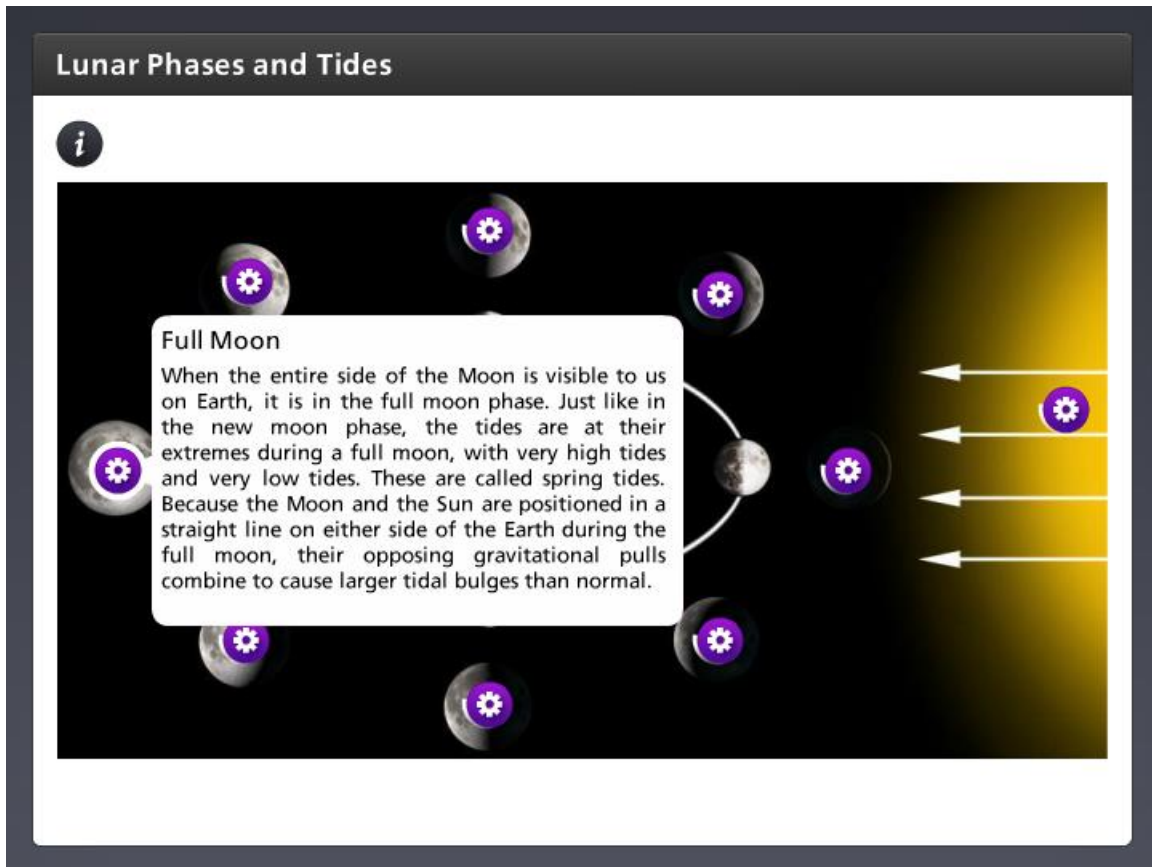
As the Moon moves along in its orbit around the Earth, the amount of reflected sunlight that humans can see from Earth increases. This increase is called waxing. When humans see more than half of the sunlit portion of the moon during the waxing phase, it is in the waxing gibbous phase and the tides begin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



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.

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**Full Moon**



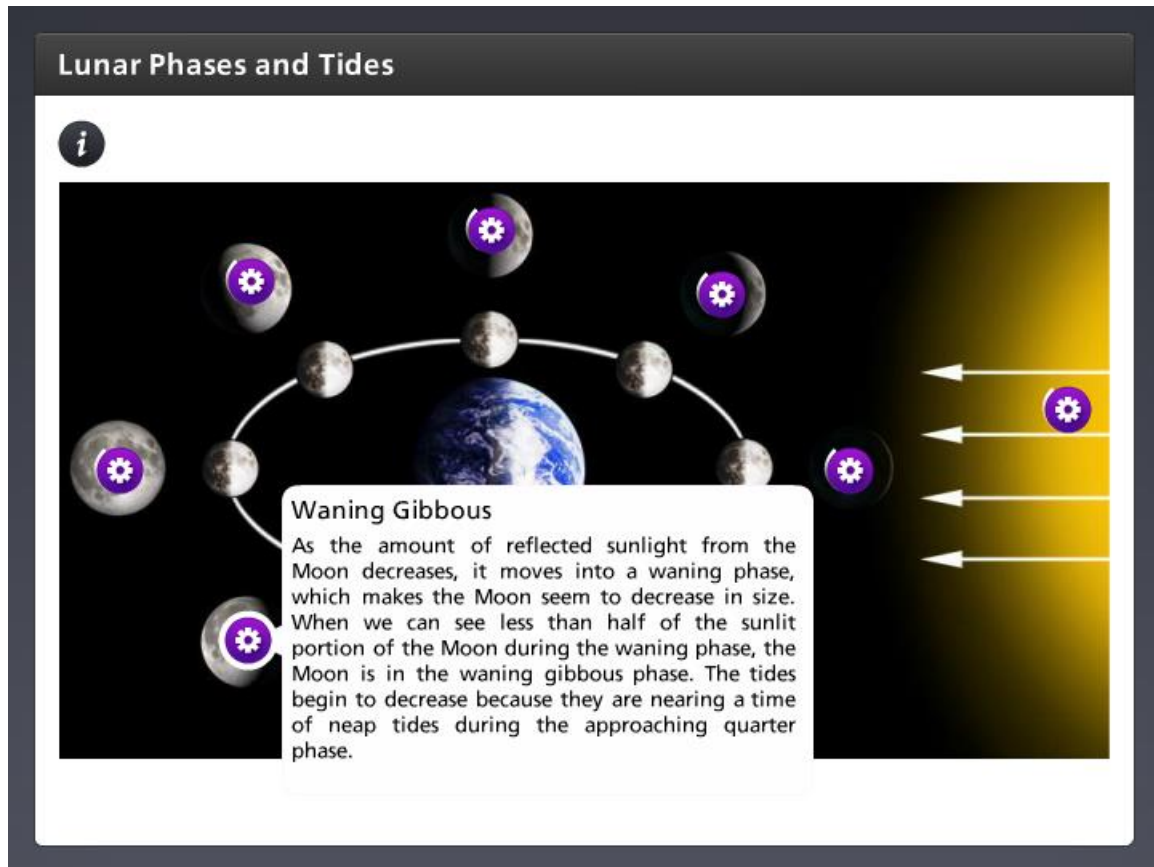
When the entire side of the Moon is visible to us on Earth, it is in the full moon phase. Just like in the new moon phase, the tides are at their extremes during a full moon, with very high tides and very low tides. These are called spring tides. Because the Moon and the Sun are positioned in a straight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



## Module 4: Astronomy – The Solar System

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#### Waning Gibbous

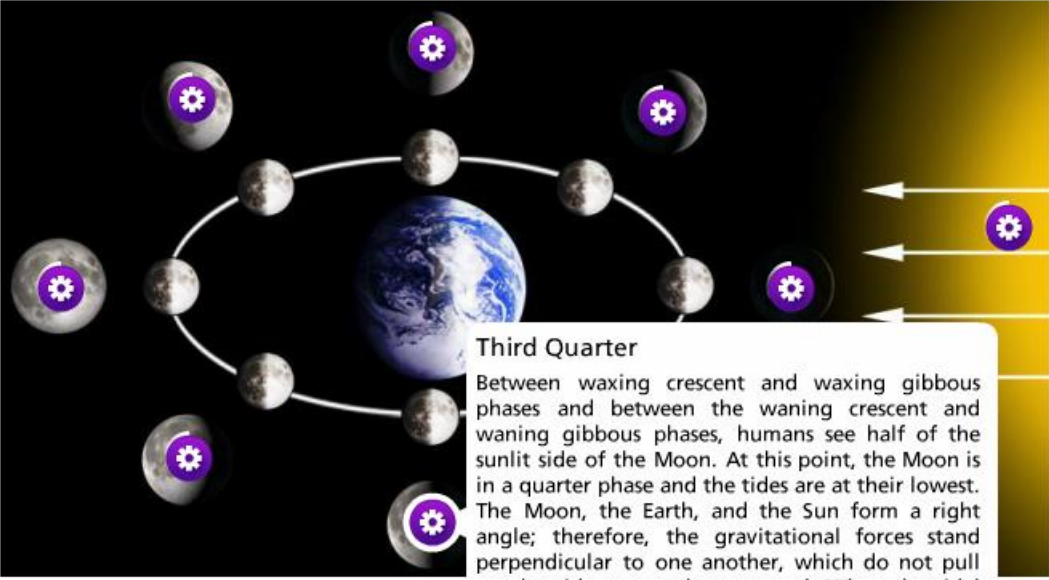


As the amount of reflected sunlight from the Moon decreases, it moves into a waning phase, which makes the Moon seem to decrease in size. When we can see less than half of the sunlit portion of the Moon during the waning phase, the Moon is in the waning gibbous phase. The tides begin to decrease because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

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**Third Quarter**

**Lunar Phases and Tides**



**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.

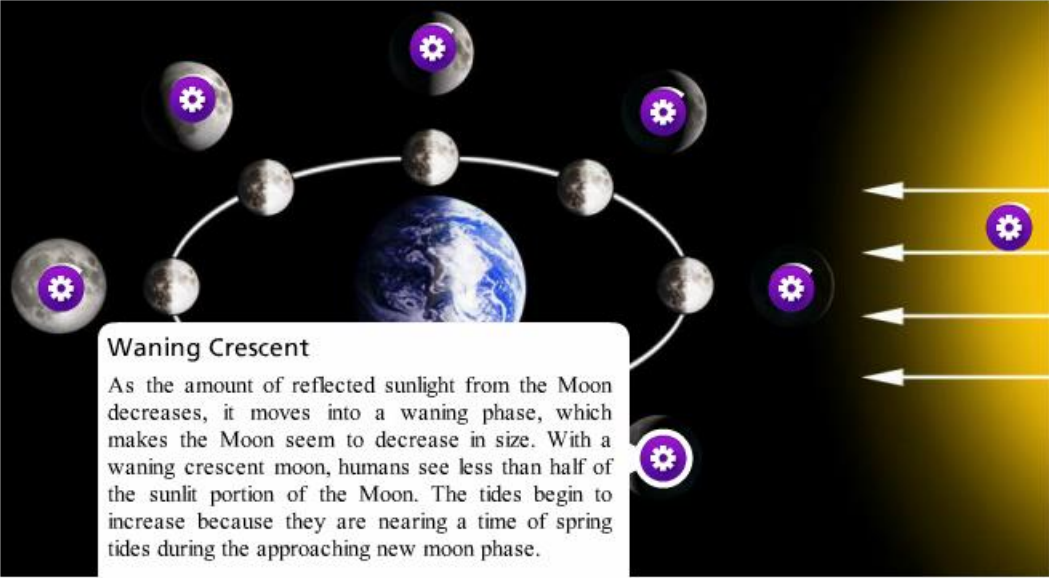
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**Waning Crescent**

**Lunar Phases and Tides**



The diagram illustrates the Moon's orbit around Earth. The Sun is on the right, emitting parallel rays of light. The Moon is shown at various positions in its orbit, with its illuminated side facing the Sun. The waning crescent phase is highlighted, showing the Moon's illuminated portion decreasing as it moves towards the new moon phase. A text box provides a detailed explanation of this phase and its tidal effects.

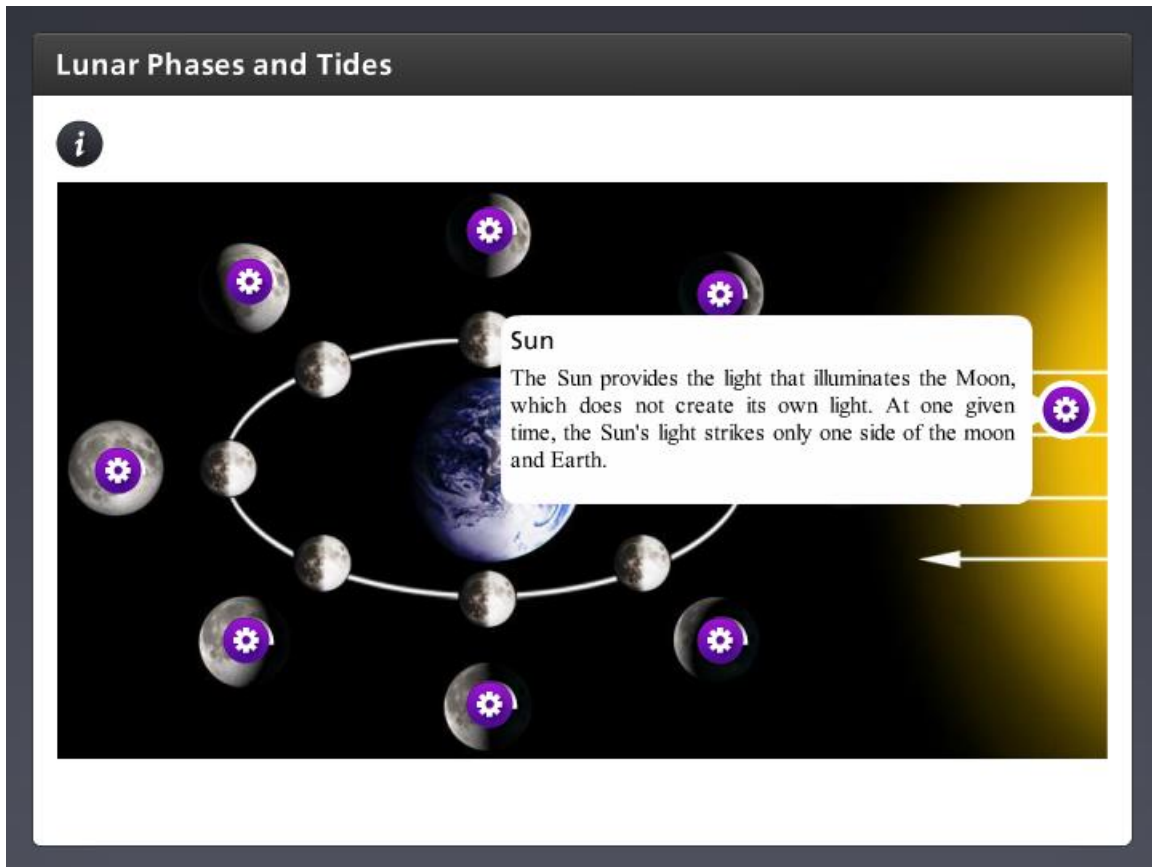
**Waning Crescent**

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.

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**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.