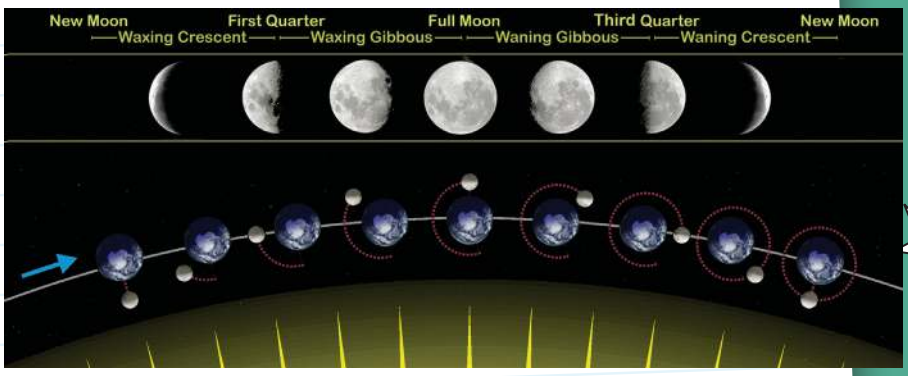
TEACHER RESOURCE

STARDOME OBSERVATORY & PLANETARIUM
FACTS, RESOURCES AND ACTIVITIES ON...

THE DARK SIDE OF THE MOON

SCIENCE CONTENT/ CURRICULUM LINK
INVESTIGATE THE CONDITIONS ON THE PLANETS AND THEIR MOONS, AND THE FACTORS AFFECTING THEM. USE A WIDER RANGE OF SCIENCE VOCABULARY, SYMBOLS AND CONVENTIONS.

Like Earth, the Moon does not emit its own light. Instead it reflects light from the Sun. When the Sun is shining on Earth we have day, while the part of Earth that is not facing the Sun experiences nighttime. The Moon also experiences day and night in a similar way. The daytime half of the Moon being bathed in sunlight, and the nighttime half of the Moon in darkness. So why do we see different shapes of the Moon in our sky when the Moon is always half-light/ half-dark? It all has to do with the position of the Moon as it orbits Earth.



Original image: Orion 8. Edited for southern hemisphere perspective.

> It takes the Moon about one month to complete an orbit around Earth, and that is originally where we got the month time period from.

When the Moon is between the Earth and the Sun and the nighttime half of the Moon is facing Earth we have a new moon. About two weeks later, when the Moon is on the opposite side of Earth from the Sun we have a full moon because we are seeing the full daytime side of the Moon. However, we are really only seeing half of the Moon, as the other side is not visible from our perspective on Earth.

Moving through the Moon cycle from new moon to full moon, we gradually see more and more of the daytime half of the Moon. We see the first quarter phase when half the daytime side is facing us, which is one quarter of the Moon. We refer to all the phases of the Moon as it moves towards full moon as 'waxing', and 'waning' when the Moon moves from full moon to new moon, and we see less and less of the daytime half.

Looking closely at the phases of the Moon, you'll notice that more of the same face of the Moon is revealed. This is because the Moon orbits the Earth at the same rate that it turns on its axis, a phenomena known as "tidal locking". This is the reason why we have seen the same craters every night, throughout human history.

The side of the Moon that never faces Earth is often referred to as the dark side of the Moon. However, it receives sunlight during the new Moon phase.It was a mysterious, unseen place until the dawn of the space age when an orbiter was sent into space.

In the 1950s the USSR launched a Lunar orbiter and saw the far side of the Moon for the first time. Before then, for all we knew, there could have been an alien space station placed just out of our view!

However, the Soviet spacecraft Luna-3 did not find an alien base. Instead, it saw a rather unremarkable landscape of more craters and Moon rocks.

NASA then confirmed the lack of alien life on the Moon with the Apollo manned missions to its surface in the 1960's and '70's.

Check out these other resources...
- http://en.wikipedia.org/wiki/Moon
- http://en.wikipedia.org/wiki/Luna_3

DISCUSSION POINTS

If Earth orbited the Sun the way the Moon orbits Earth, one day on Earth would last an entire year.

On July 20th 1969 the first person landed on the Moon. What do you think that would have felt like?

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ACTIVITY

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DISCOVERING THE PHASES OF THE MOON

Objective...

The aim of this class activity is to demonstrate the Moon cycles.

You'll need...

- 1 white Styrofoam ball (Moon representation)
- 1 bamboo skewer (to hold the Moon)
- Black marker or paint to make the night half of the Moon.
- Earth globe
- Lamp/yellow circle (Sun representation)

Instructions...

Step 1: Paint half of the Styrofoam ball black to show the night and day sides of the Moon.

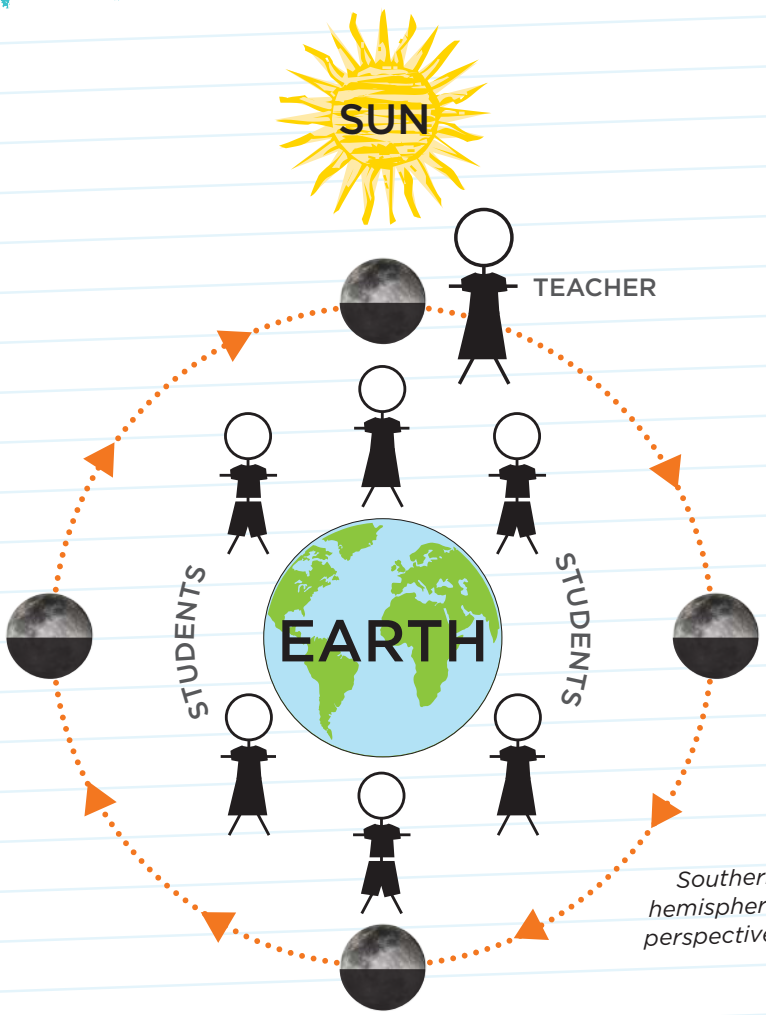
Step 2: Stick a skewer into the Moon so you can hold it above your head while orbiting the Earth.

Step 3: Place the Earth globe in the centre of the room and ask the students to sit around it.

Step 4: Place the Sun on or near one of the walls of the classroom. If you can, make the room dark and turn a lamp on for the Sun.

Step 5: Hold the Moon with the daytime side facing towards your Sun so while standing between the Sun and the Earth, the students should only see the black side of the Moon. Ask your students if the Moon has disappeared, or if it is just too dark to see.

Step 6: Begin to walk in a circle around the globe and the students, keeping the black side of the Moon facing the same way as before, and the white side of the Moon facing your Sun. The students should begin to notice that as you walk in a circle around them that they see more and more of the daytime side of the Moon.



Southern hemisphere perspective.

Step 7: Once you reach the full moon position, find out from the students the percent of the Moon they can actually see. It is true that they can see 100% of the daytime side, but how much of the entire Moon is actually being seen?

Step 8: Complete your orbit around the Earth showing them how less and less of the daytime side of the Moon is visible.

The Moon orbits the Earth, but it doesn't always orbit perfectly between the Earth and the Sun, otherwise we would have a solar eclipse every new Moon. The Moon's orbit is tilted about 5° off Earth's orbit.

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ACTIVITY

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DISCOVERING THE FACES OF THE MOON

Objective...

The aim of this class activity is to show that one side of the Moon is never visible to us on Earth.

You'll need...

- 1 white Styrofoam ball (Moon representation)
- 1 bamboo skewer (to hold the Moon)
- Black marker or paint to make craters
- Earth globe
- Lamp/yellow circle (Sun representation)

Instructions...

Step 1: Colour in one half (face) of the styrofoam ball in a particular pattern that the students can recognize, and draw a question mark on the opposite side of the Moon. Then colour in black circles on the rest of the surface of that ball to show the other craters. Cultures from around the world have made up stories about images they have created out of the shapes in the Moon. Here in New Zealand we have the pattern of Rona and her Taha.

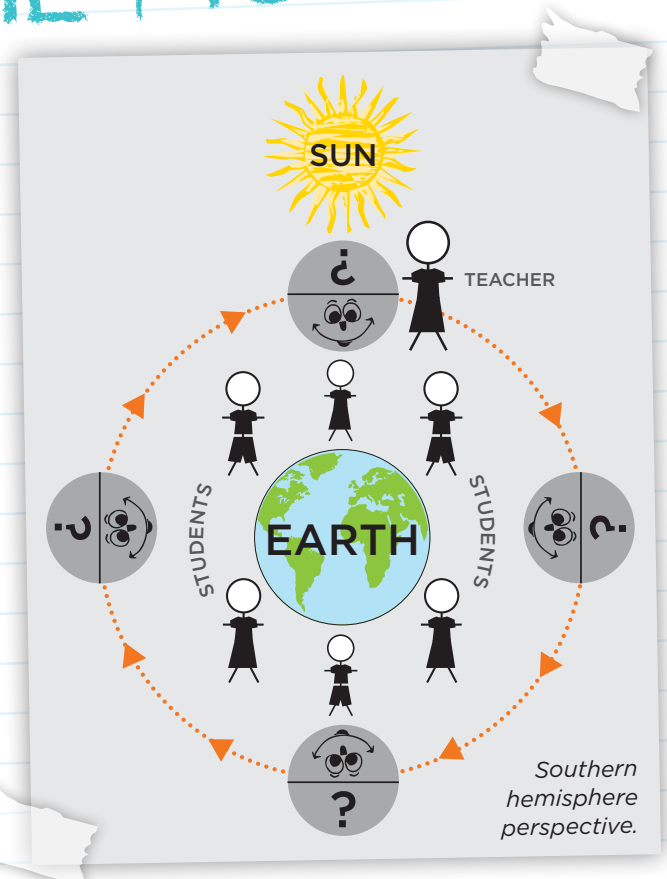
Step 2: Place a skewer into the Moon so you can hold it above your head while orbiting the Earth.

Step 3: Place the Earth globe in the centre of the room and ask the students to sit around it.

Step 4: Place the Sun on or near one of the walls of the classroom. If you can, make the room dark, and turn on a lamp for the Sun.

Step 5: Hold the Moon with the pattern facing the students, and the '?' facing away from them. Standing between the Sun and the Earth, explain how the Sun is lighting up the other half of the Moon, and that if the room were completely dark that they wouldn't be able to see the Moon from this position.

Step 6: Begin to walk in a circle around the globe and the students, keeping the pattern of craters facing the Earth, and the '?' facing away from Earth. The students should begin to notice that as you walk in a circle around them that they see more and more of the same side of the Moon.



Southern hemisphere perspective.

Step 7: Once you reach the full moon position, find out from the students the percent of the Moon they can actually see. It is true that they can see 100% of the daytime side, but how much of the entire Moon is actually being seen? Also have them note that they never get to see what is on the other side of the Moon as you complete the orbit around the Earth.

Step 8: Now have the students stand by the Sun, and orbit the Earth again with the Moon. This time they will be able to see the "?" on the far side of the Moon from Earth while the Moon is near the new moon phase. This should show them that all sides of the Moon get to see the Sun, but the Moon needs to complete one full orbit before every side gets daylight.

The Moon's orbit is tilted about 5° off Earth's orbit. Otherwise we would have a lunar eclipse every full Moon.

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