Earth and Space

Learning Objective:
To learn about the phases of the Moon.

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When was the last time you saw the Moon?

Can you describe what you saw?

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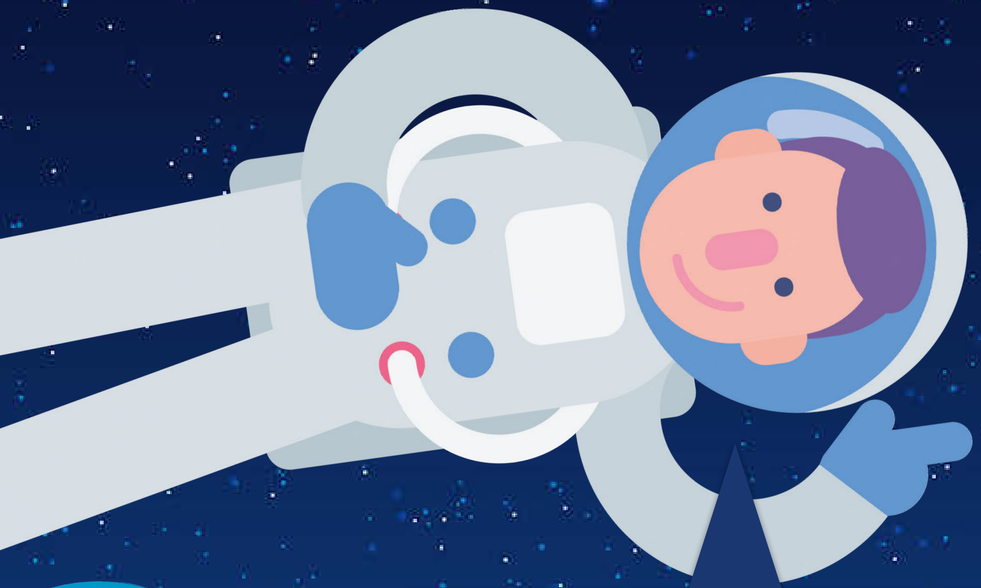
As the Moon orbits Earth, the way we see it in the sky changes.



What changes can you see here?

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Does the Moon change shape?

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The Moon is always a roughly spherical shape. Its shape does not change. The part which changes is the part of the Moon which is lit by the Sun.

The Moon does not produce its own light. The light we see is the Sun's light reflected off the Moon.

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The Moon orbits Earth in an anticlockwise direction. As it orbits, we see different phases of the Moon.

The Moon's phases will slowly change from being fully lit up, to fully in shadow in a repeating cycle. This orbit and cycle takes around 28 days or a lunar month to complete.

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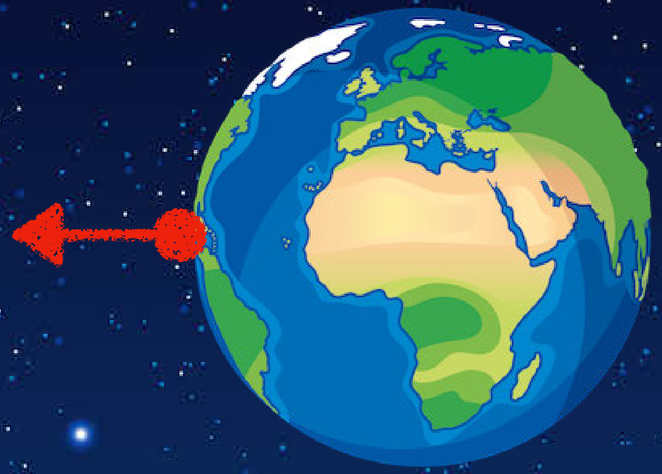
The Sun's light always lights up the half of the Moon facing the Sun.



If you looked at the Moon from the arrow on Earth, what would you see?

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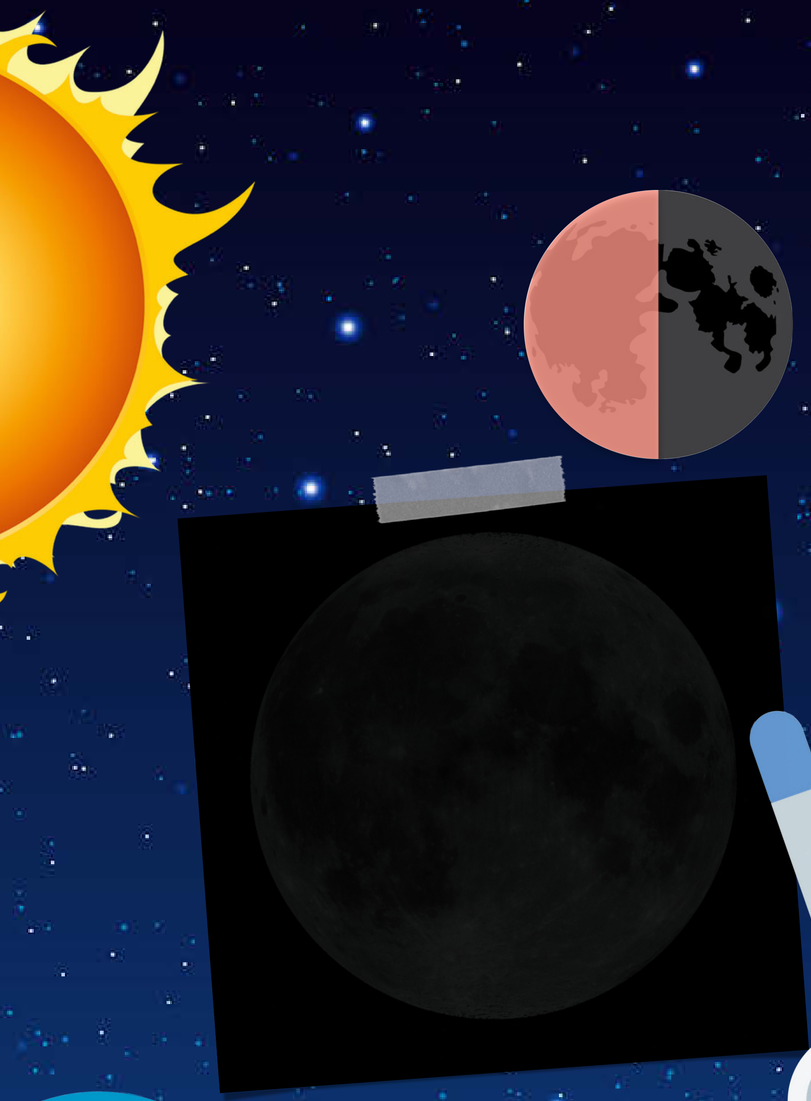
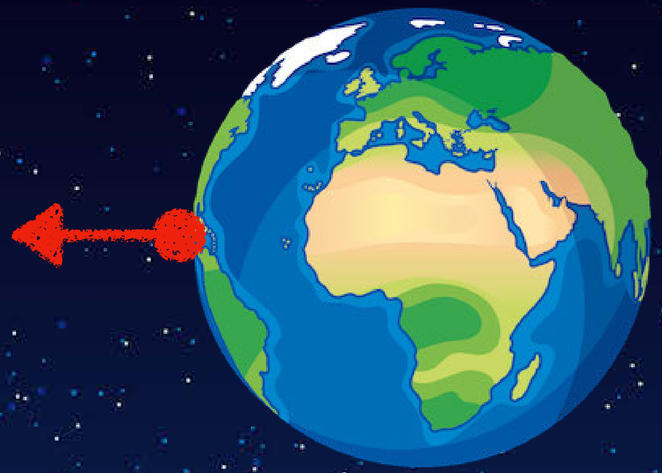
If we looked at the Moon in this position, we would see the part of the Moon which is completely in shadow.





We call this a new moon. The part of the Moon shown in red is the part we cannot see, even though it is fully lit by the Sun.

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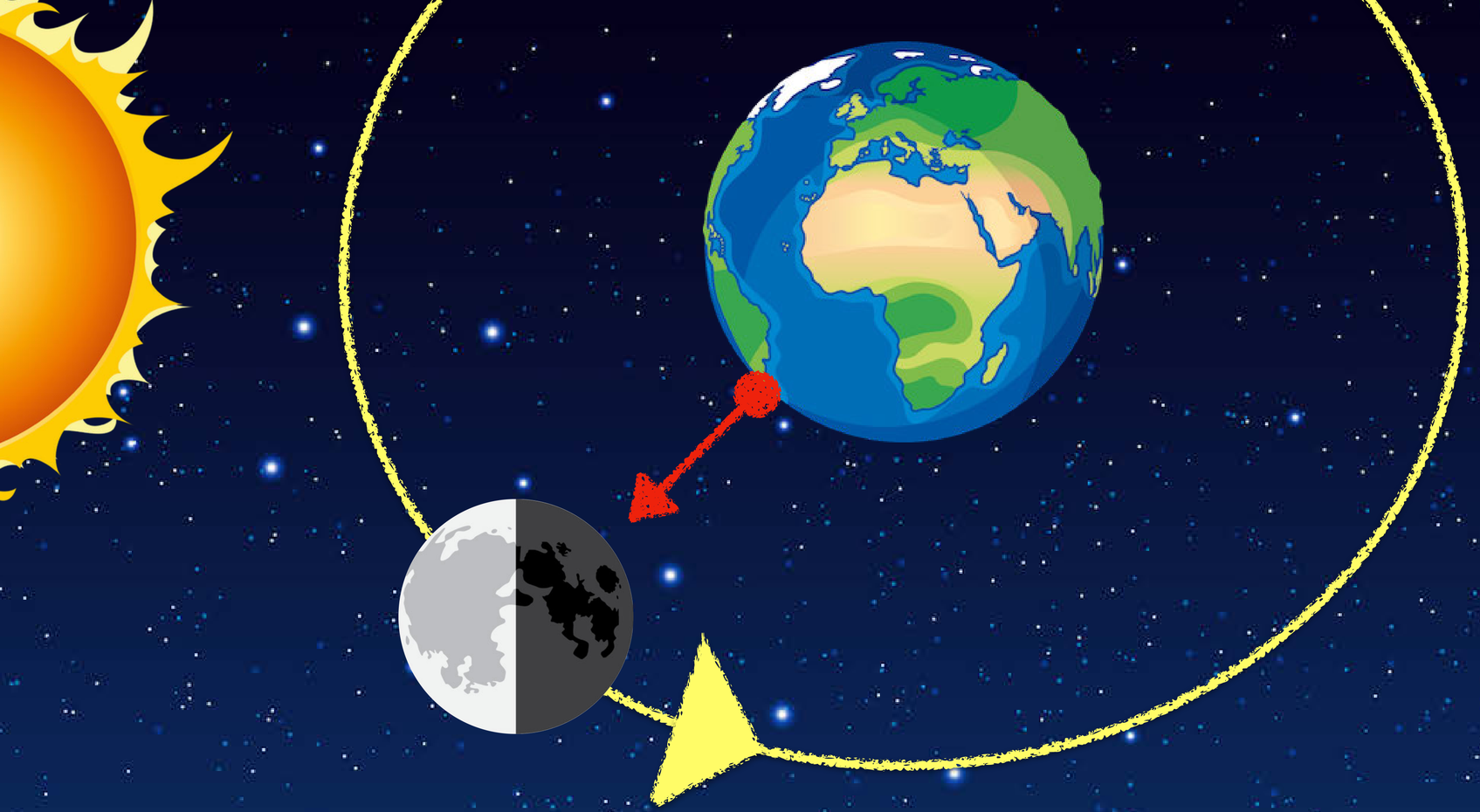

What would we see when the Moon is in this position?

As the Moon moves around its orbit of Earth, we begin to see more of the lit-up portion of the Moon.

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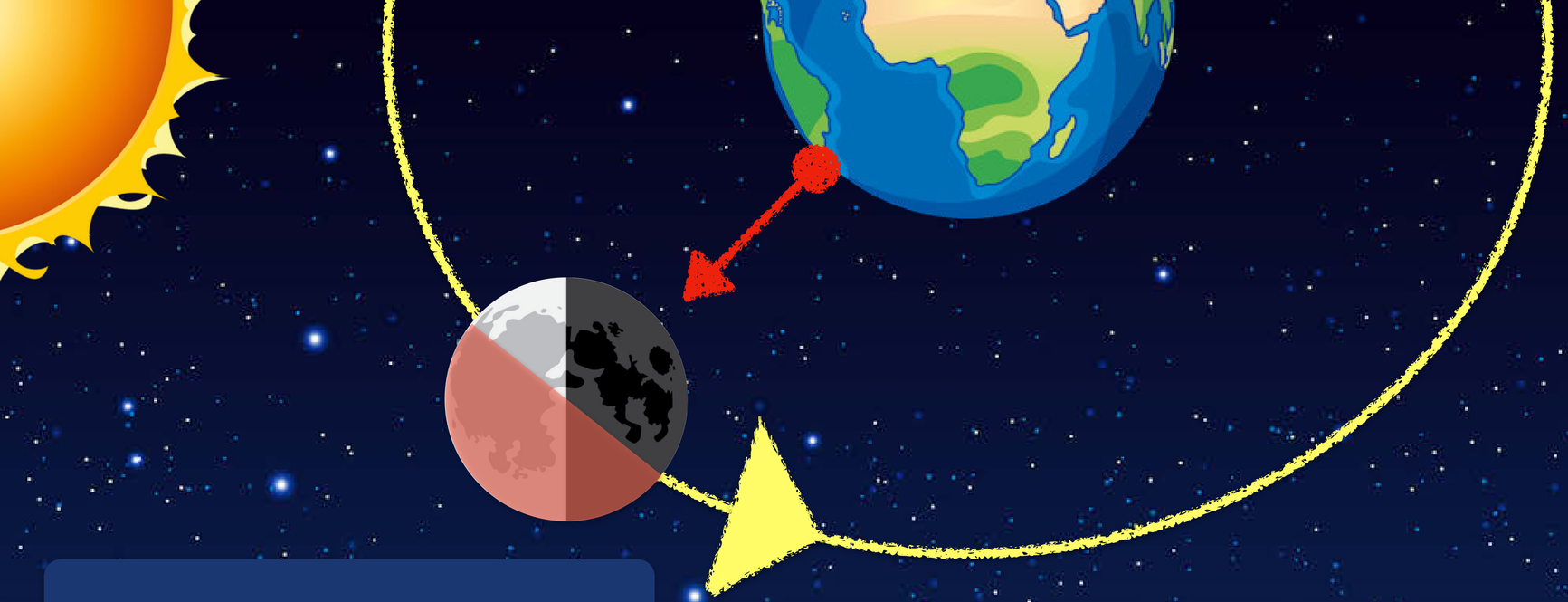

We call this phase a waxing crescent.

The lit-up part of the Moon we can see will slowly grow as the Moon completes this part of its orbit.
When the lit section is getting larger, we say the phases are ‘waxing’.

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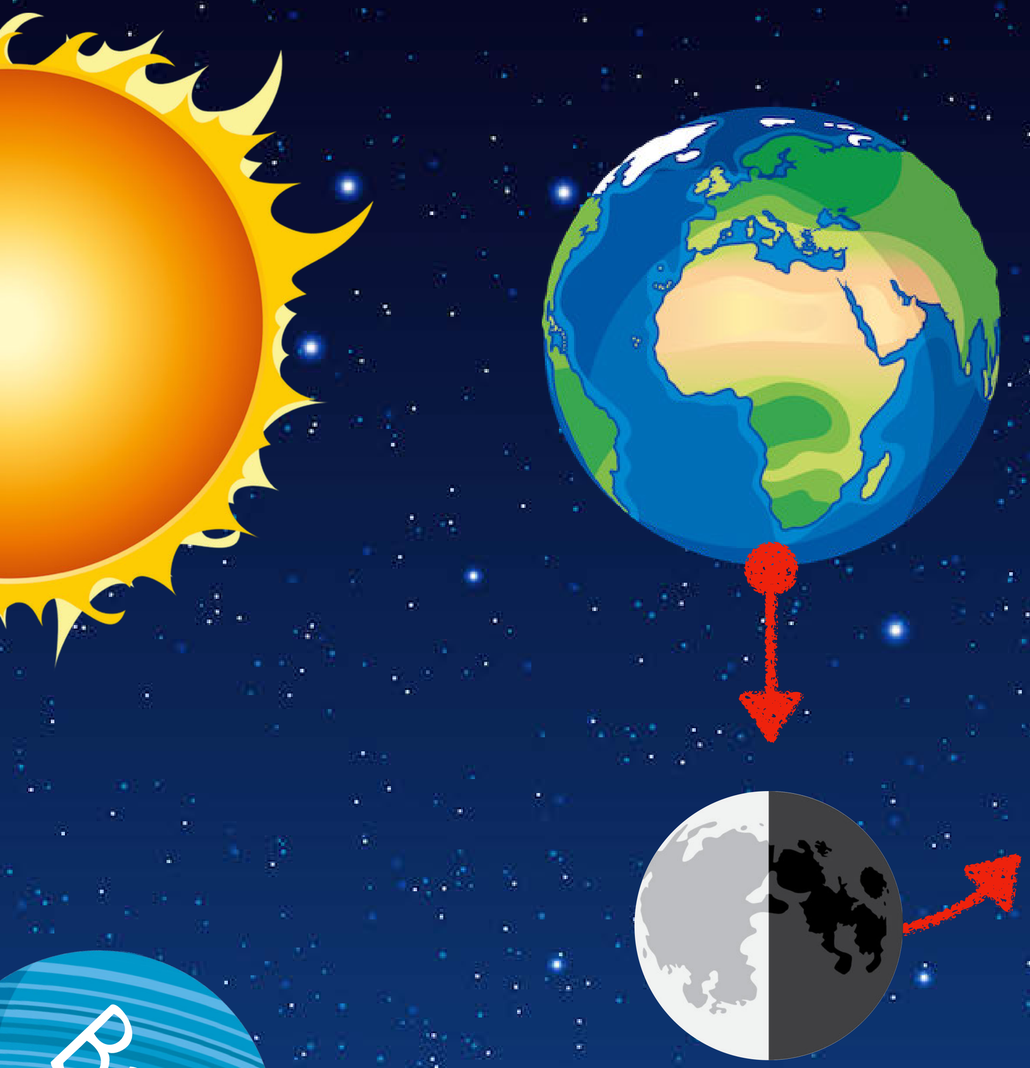
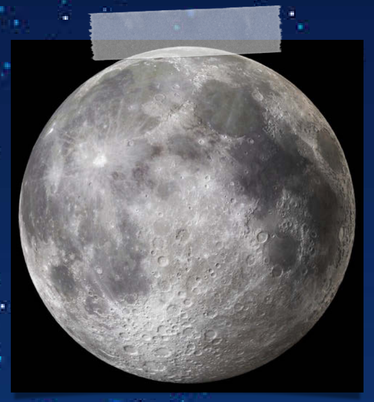
Which of these Moon phases would you see when the Moon is in this position?



A

B



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The lit-up quarter of the Moon we can see.

The shadowed quarter of the Moon we can't see.

The half of the Moon we can't see.

We would see what looks like a half moon.

We call this phase the first quarter.
We call it a quarter because we can only see a quarter of the entire surface of the Moon.

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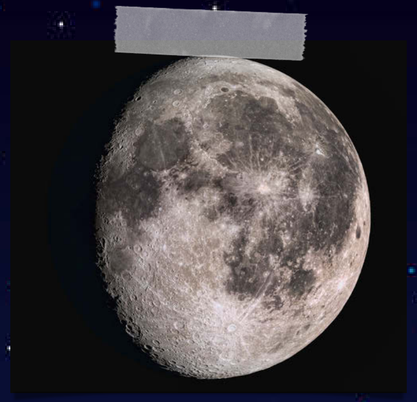

In this position in the Moon's orbit, we can see most of its lit-up side, but not all of it.

When we can see <u>most</u> of the lit-up side of the Moon, we describe phases like this as <u>gibbous</u>.
As this gibbous phase is still getting larger as the Moon orbits, this phase is called a <u>waxing gibbous</u>.

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The Moon's orbit is not perfectly perpendicular to Earth's equator; it tilts slightly. This means that most of the time the Sun's light can still reach the Moon and is not blocked by Earth.

If you looked at the Moon from the arrow, what would you see? Do you know what this phase is called?

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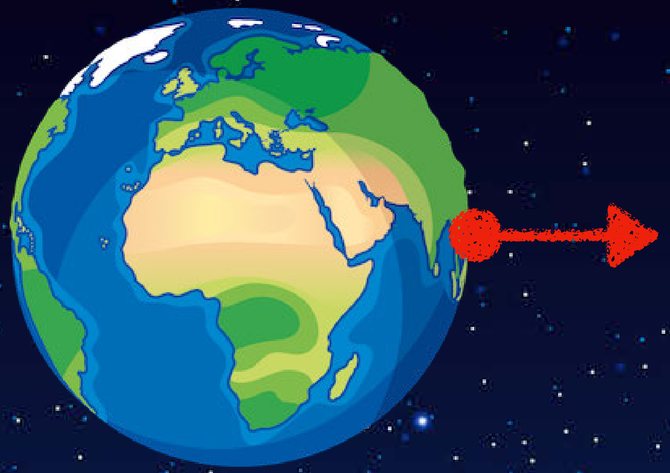
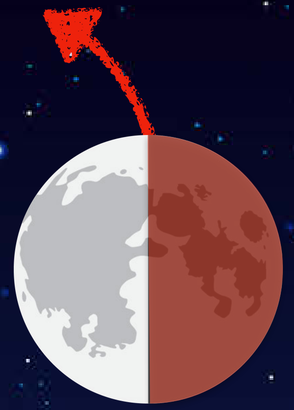
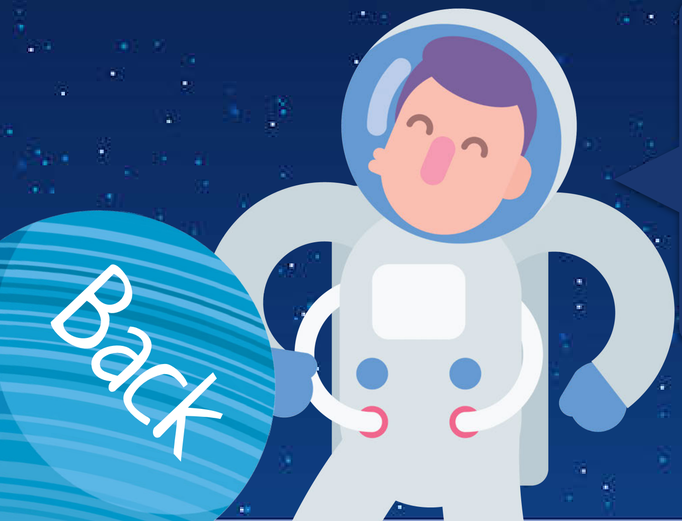




This diagram shows the Moon's position when we see a full moon.

We can see the entire lit-up side of the Moon. In the past, societies have linked the full moon to a time of the month where very good, or very bad things happen!

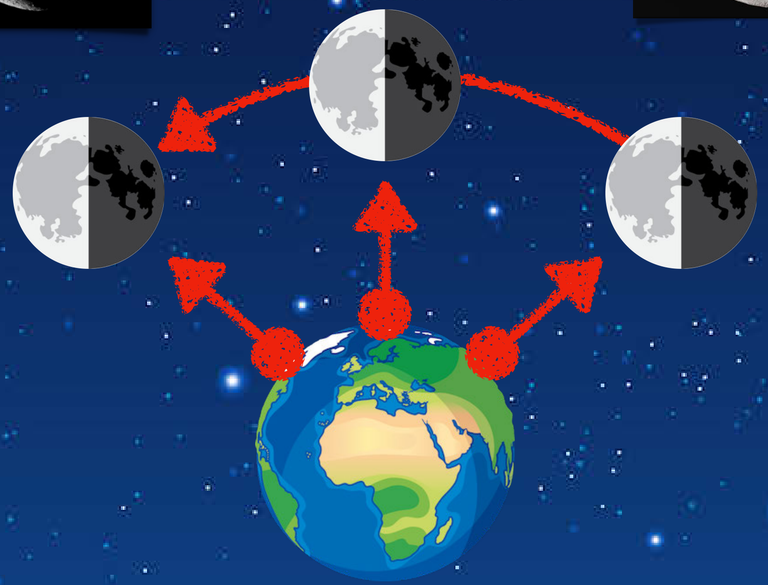


As the Moon completes its orbit, we see the same phases as before, but in reverse order.

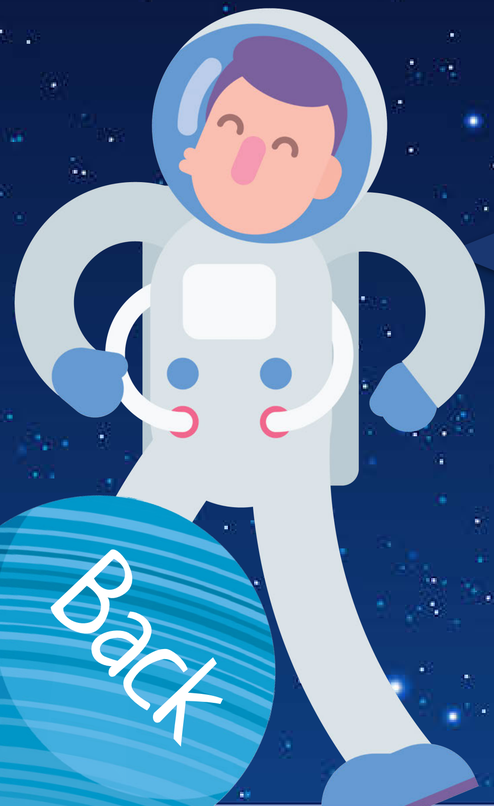
Third quarter

Waning gibbous

Waning crescent



However, the lit-up portion of the Moon's surface we can see is getting smaller. For these phases we say that they are waning. Do you think you could label these phases?



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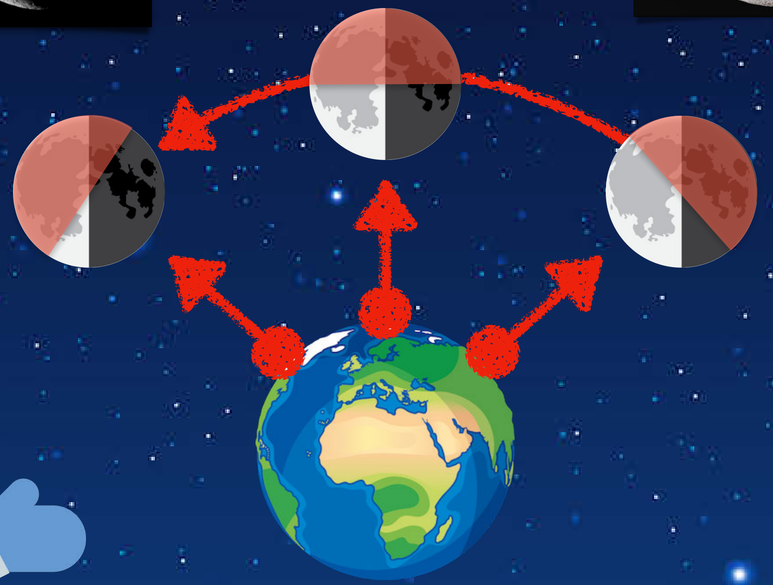
Third quarter

Waning crescent

Waning gibbous



Did you label them correctly?

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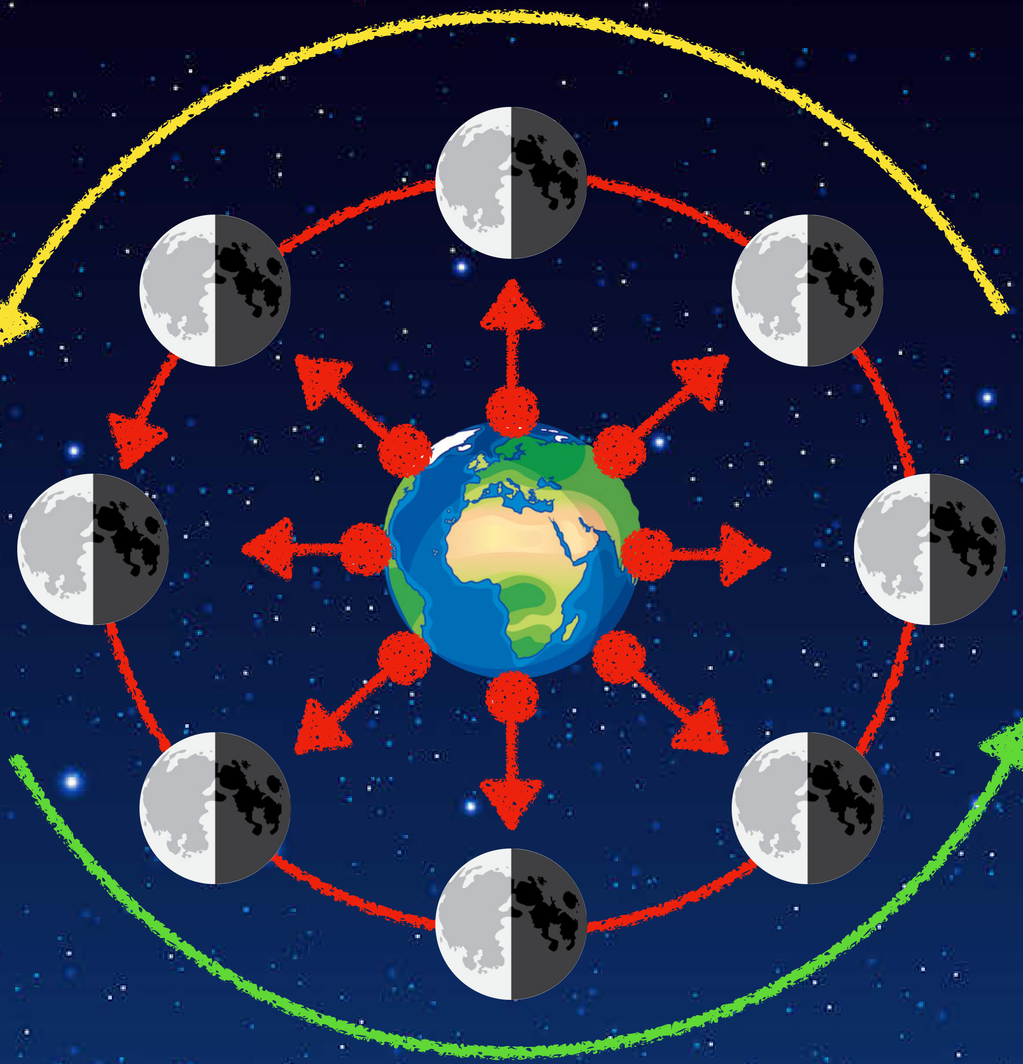
waning



waxing

Are you ready to have a go at labelling the Moon's phases yourself?

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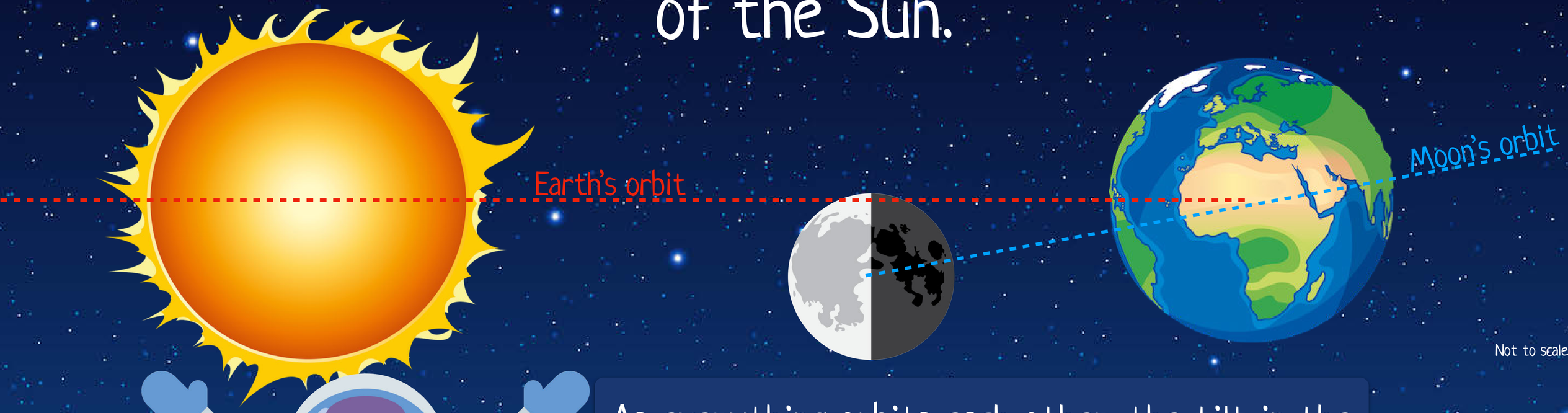
We mentioned before that the Moon's orbit of Earth is slightly tilted compared with Earth's orbit of the Sun.



As everything orbits each other, the tilt in the Moon's orbit can vary between a few degrees North or South in relation to Earth.

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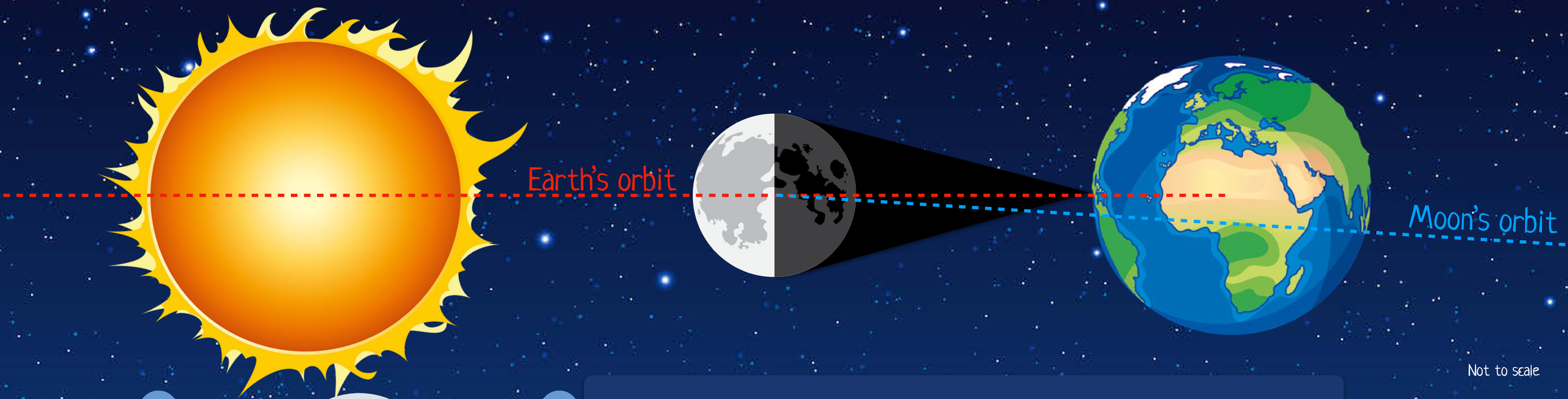
Plenary

Sometimes the Moon's orbit crosses with Earth's orbit so that the Moon moves directly between Earth and Sun. This blocks the light and casts a shadow on specific locations on the planet.



Not to scale

In these locations, we experience a fascinating phenomenon called a solar eclipse.

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Plenary

When this happens we can see the shadow of the Moon moving across the shape of the Sun in the sky. It can block the Sun totally (which happens rarely in each location) or partially block the Sun.

WARNING: You should <u>never</u> look directly at the Sun, even when wearing sunglasses.

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The last total eclipse to happen in parts of the UK was in 1999. The next total eclipse in the UK won't be until 2081!

Click here to watch a video about eclipses.

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