

Phases of the Moon – Teacher Notes



Aim:

To model the motion of the Moon and its phases.

To observe how the position of the Sun, Earth and Moon influences the phase of the Moon.

To list the cycle of Moon phases in the correct order.

Activity 1

Materials:

- Polystyrene/ table tennis ball
- Black marker pen
- Drinking straw
- Tennis ball
- Sticky tape/ Blu tack

Method:

1. If your small ball is uncoloured, draw a face on one half of it and attach it to the straw with sticky tape, Blu tack or similar.
2. Hold the tennis ball “Earth” in one hand and the small ball “Moon” in the other with the ‘face’ towards Earth.
3. Slowly rotate the Moon around the Earth (anti-clockwise), keeping the ‘face’ pointing towards Earth.

- Does the Moon rotate as it orbits Earth? [Yes](#)

The Moon rotates once on its axis each time it completes one orbit of Earth. This is called synchronous rotation. This is caused by tidal forces between the Earth and Moon which have slowed the Moon’s rotation over millions of years.

Activity 2

Materials:

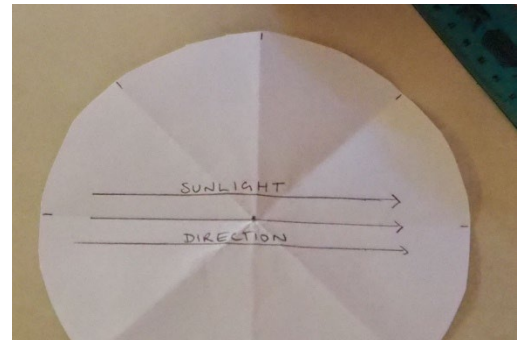
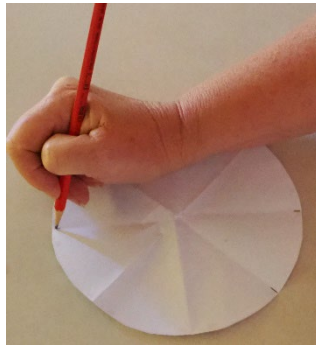
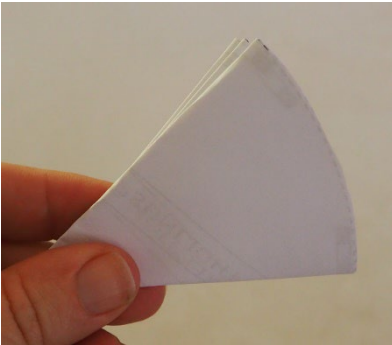
- Polystyrene/ table tennis ball with one hemisphere coloured black and the other white
- Paper plate
- Round paper (large filter paper/or appropriately sized circle of paper)
- Glue stick
- Moon phase diagrams
- Pencil, ruler, sticky tape, scissors
- iPad, smart phone, or laptop computer (optional)



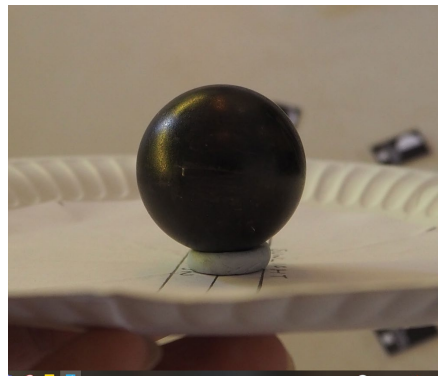
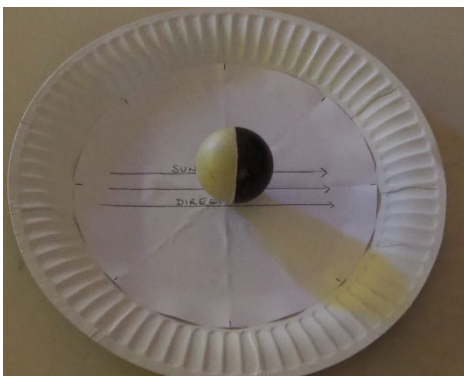
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Method

1. Fold the round paper in half, then half again, then half again, forming a circle of eight segments.
2. Unfold the paper and mark the outer edge of each segment, at the fold line, with a small pencil mark.
3. Draw an arrow along the centre line with one more running parallel either side of the centre arrow. Write sunlight direction along the arrows.



4. Stick the ball onto the centre point of the filter paper with the white side facing the sunlight direction. (Black half is towards the arrowhead)
5. Cut out the Moon phase tabs from the last page of this document.
6. Lift your model to eye height with the fully black side of the Moon facing you. Find the new Moon tab that matches what you see. Fold and stick tab directly behind the new Moon.



7. Holding your model up rotate it one segment clockwise, match what your model looks like with the tab. Write two (2) in the box and stick that into position to the left of the new Moon.
8. Repeat Step 6 for the rest of the tabs, until you have numbers 1-8.
9. Optional: Using the camera on your computer or phone take a photo of the ball with the black side facing the camera (New Moon). Move the plate around clockwise to the next segment and take another photo. Continue this process until you have photographed all 8 segments. You can then use iMovie to make a magic movie of your photos.
HINT: Make sure they end up in the right order.

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- If a lunar cycle is approximately 29 days long, how long does it take for the Moon to go from one phase to the next? ~3-4 days (~7 days for each major phase)

In reality the phases don't jump from one to the next they change slightly each day or night.

Activity 3

Materials:

- Polystyrene/ table tennis ball with one hemisphere coloured black and the other white.
- Black marker pen if ball not already coloured in
- Drinking straw
- Powerful light (or indirect sunlight)

Caution: Never look directly at the Sun.

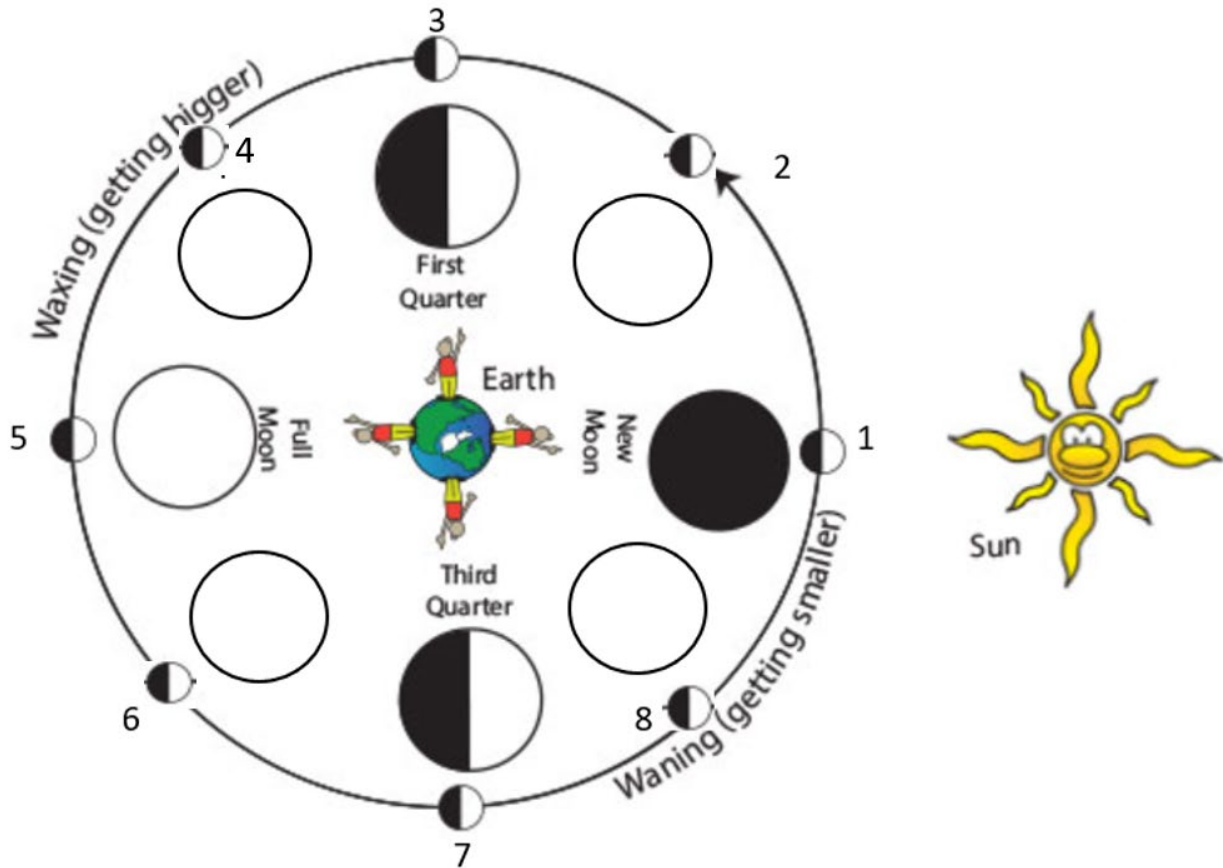
1. Using the ball and straw from the first activity, colour in exactly half of the ball black if not already done for you.
2. Stand in a position where there is light coming from directly in front of you (either a powerful light or brightly lit window). Hold the model "Moon" out in front of you as in the picture below and spin slowly around in a full circle.



3. Note how the shape of the lighted and shadowed parts of the ball changes as you turn from position 1 -8 (below).



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Watch the sunlit part of your Moon:

- When does it grow bigger? As you spin away from the Sun or towards it? [Away](#)
- When does it shrink? [As you spin towards the Sun](#)
- Imagine you are standing on Earth in position 1 looking at the Moon. What does the Moon look like? It is completely in shadow. We have shaded the circle at 1 to show this.
- Next, turn your page and imagine you are standing at position 2 looking at the Moon. It now has a small crescent of lighted area and a large, shadowed area. Shade in the inner circle on the diagram above to represent what you see.
- Repeat the above process of turning your page, imagining you are looking up at the Moon from each remaining position. Draw what you see in the appropriate inner circle as you go (four have been done for you).



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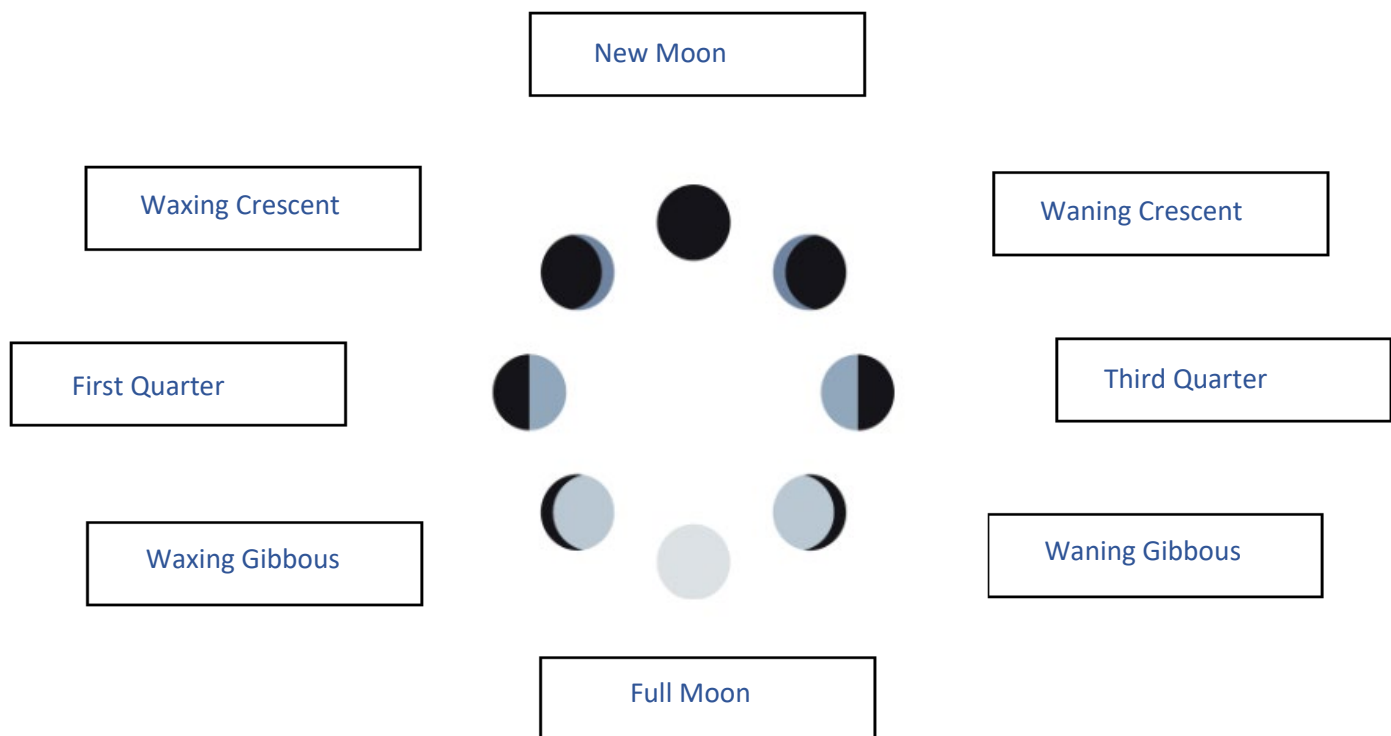
The Moon's Phases

Your diagrams should look something like the one below.

Here are the names of the phases out of order. Use an internet search of the Phases of the Moon to put the correct name into each box.

First quarter, third quarter, waxing crescent, new moon, full moon, waning crescent, waxing gibbous, waning gibbous.

The phases of the Moon always follow the same pattern.



When we talk about the phase of the Moon, we are always referring to the lighted part. In other words, Full Moon refers to the full face of the Moon being bright. Research the meaning of the following words:

- Waxing Moon
The Moon at any time after New Moon and before Full Moon when the lighted part of the moon is getting bigger.
- Waning Moon
The Moon at any time after Full Moon and before New Moon when the lighted part of the moon is getting smaller.

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MOON PHASE TABS

