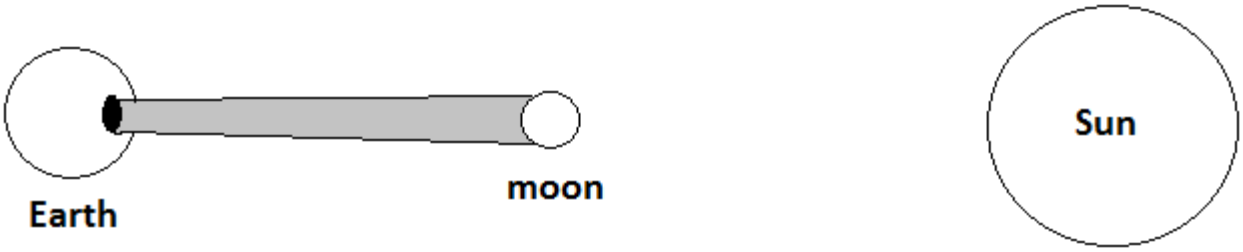
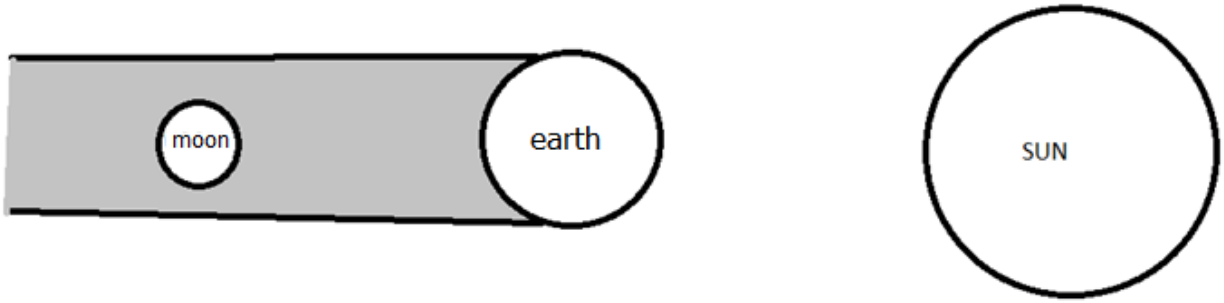
WHY ECLIPSES DON'T HAPPEN EVERY MONTH /27

NAME_____ **hr** ____

We know that eclipses don't happen every month, but why not? When we are in the new moon phase, why aren't we having a solar eclipse? When we are at the full moon phase, why aren't we having a lunar eclipse? So when do eclipses occur?



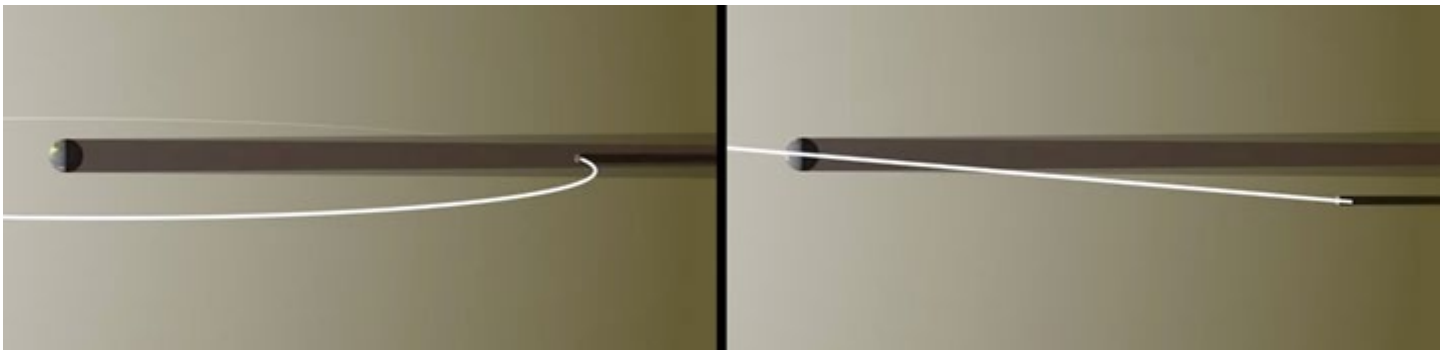
1. What eclipse is this? _____
2. What item is being eclipsed? (blocked) _____
3. Who is the monkey in the middle? _____
4. Who is casting a shadow on who? _____
5. What phase is the moon in?_____



6. What eclipse is this? _____
7. What item is being eclipsed? (blocked) _____
8. Who is the monkey in the middle? _____
9. Who is casting a shadow on who? _____
10. What phase is the moon in?_____

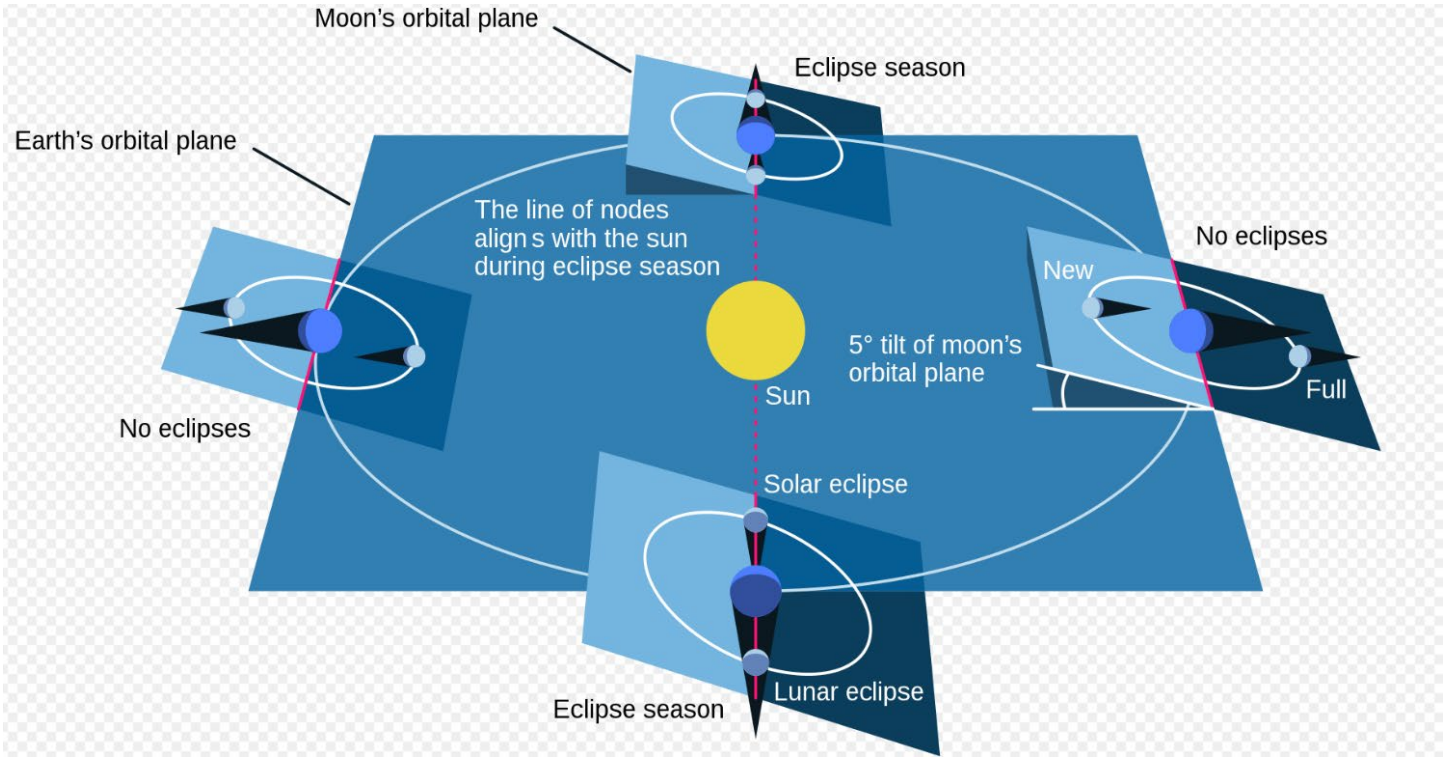
Background

Eclipses can occur when the Sun, Moon, and Earth align. Lunar eclipses can happen only during a full moon, when the Moon and Sun are on opposite sides of Earth. At that point, the Moon can move into the shadow cast by Earth, resulting in a lunar eclipse. However, during most full moons, the Moon's slightly tilted orbit brings it above or below Earth's shadow.



These side-by-side graphics show how the Moon, Sun, and Earth align during a lunar eclipse (left) versus a non-eclipse full moon (right).

The time period when the Moon, Earth and Sun are lined up and on the same plane – allowing for the Moon to pass through Earth's shadow – is called an eclipse season. Eclipse seasons last about 34 days and occur just shy of every six months. When a full moon occurs during an eclipse season, the Moon travels through Earth's shadow, creating a lunar eclipse.



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Unlike solar eclipses, which can only be viewed through special glasses or equipment for a few short minutes in a very limited area, a total lunar eclipse can be seen with the naked eye for up to an hour by anyone on the nighttime side of Earth – as long as skies are clear.

Procedures

1] Have students draw or trace a circle 3-5 inches (8-13 centimeters) in diameter in the approximate middle of the plate. 	2] In the center of that circle, students should draw a small circle and label it "Earth." 
3] At the edge of the paper plate, students need to make a small arrow pointing outward that they will use as a reference in the next step and later in the lesson. 	4] On the inside edge of the larger circle, students will mark four evenly spaced points at the12, 9, 6, and 3 o'clock spots, respectively. Students should align the 0 degree (12 o'clock) point with the reference mark they made in Step 3. **THE BLACK DOTS REPRESENT THE MOON.** 

5] Students will need to carefully cut along the larger circle they drew, as follows. They should stop cutting at point 2 and point 4, and be left with a circle still connected to the plate in those spots.

6] With both cuts made, students will need to gently twist the cut circle in the center of the plate. It should pivot at point 2 and 4, rise up slightly at point 1, and dip down slightly at point 3. Students should be careful not to tear the paper between the two cuts.

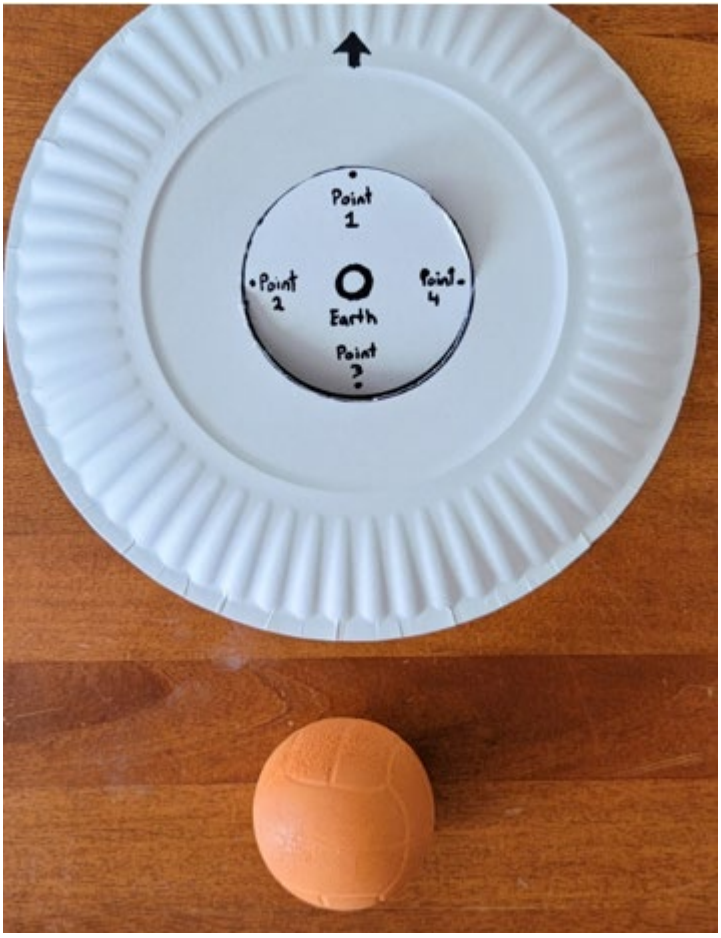
***The edge of the tilted circle represents the tilted orbit of the Moon around Earth.**
***The flat part of the plate represents the plane in which Earth's shadow falls.**

Place the Sun on the opposite side of the plate from the reference arrow and answer the following questions.

11. In this orientation, where would the full moon be located?

12. Is it in the same plane as Earth's shadow?

13. Would there be a lunar eclipse during this full moon?



Move your plate counter-clockwise 90 degrees, or to the 9 o'clock position, relative to the Sun, while keeping your reference arrow pointed in the same direction. As Earth orbits the Sun, the orientation of the Moon's tilt stays the same.

14. In this orientation, where would the full moon be located?

15. Is it in the same plane as Earth's shadow?

16. Would there be a lunar eclipse during this full moon?

17. If the moon were at point 4, what type of eclipse would it be?

Now, repeat these steps for the 6 o'clock and 3 o'clock positions relative to the Sun.

EARTH AT 6 O'CLOCK POSITION

18. In this orientation, where would the full moon be located?

19. Is it in the same plane as Earth's shadow?

20. Would there be a lunar eclipse during this full moon?

21. Would there be a solar eclipse during the new moon?

EARTH AT 3 O'CLOCK POSITION

22. In this orientation, where would the full moon be located?

23. Is it in the same plane as Earth's shadow?

24. Would there be a lunar eclipse during this full moon? Solar? (2pts)

25. What is it called when the Moon is in the same plane as Earth's shadow?

26. Based on your model, predict how often eclipse seasons occur.