

Seasons, Moon Phases and Tides

- Know your vocabulary!

- **Day & Night / Seasons**

- Revolution / Rotation
- Cause
- Why is the axis important
- How day & night and seasons change
- Similarities and differences at various points on Earth
- Solstices and Equinoxes- when and where they occur

1. The study of the moon, stars, and other objects in space is called astronomy
2. B Axis
a. The movement of one object around another object
3. D Rotation
b. The imaginary line that passes through Earth's center and the North and South poles
4. A Revolution
c. The path of an object as it revolves around another object in space
5. C Orbit
d. The spinning motion of a planet around its axis

6. Each 24-hour cycle of day and night is called a(n) day (one rotation)

7. Why is an extra day added to February every four years?

Earth's orbit around the sun takes about 365 ¼ days. Four years of about 365 ¼ days each can be approximated by taking three years of 365 days and a fourth year of 366 days

8. What causes day and night? **Earth's rotation on its axis**
9. Why is it warmer near the equator than near the poles? **Because sunlight hits Earth's surface directly and is less spread out at the equator.**
10. Why does Earth have seasons? **Because its axis is tilted as it moves around the sun.**

11. Circle the letter of each sentence that is true when the Northern Hemisphere has summer.

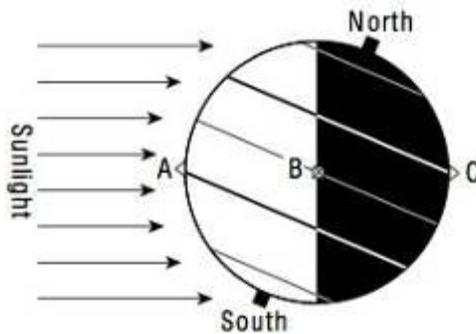
- a. The Southern Hemisphere is tilted away from the sun.**
- b. The Northern Hemisphere is tilted away from the sun.
- c. The Southern Hemisphere is tilted toward the sun.
- d. The Northern Hemisphere is tilted toward the sun.**

12. What is latitude?

A measurement of distance from the equator, expressed in degrees north and south; horizontal lines

13. Circle the letter of each sentence that is true about Earth's seasons.

- a. Earth is closest to the sun when it is summer in the Northern Hemisphere.
- b. The hemisphere that is tilted away from the sun has more daylight than the other hemisphere.
- c. When it is summer in the Northern Hemisphere it is winter in the Southern Hemisphere.**
- d. In December, the sun's rays in the Northern Hemisphere are indirect.**



14. In the diagram above, what season is it in North America? **Due to the tilt of the axis, the sun shines less directly on the surface. The sun is above the horizon for a shorter amount of time so **it is winter.****

15. What season is it in South Africa? **Because the tilt of the axis, the sun shines more directly on the surface so **it is summer.****

16. Would a person at each of the points A, B, and C see the sun? If so, where would the sun be in the sky?

Point A—yes, the sun would be up in the sky

Point B—yes, the sun would be just setting

Point C—no, the sun would not be visible because it would be night. It would be rotating toward sunrise

17. Which is a person standing at point B seeing, sunrise or the sunset? Explain. **Sunset because the earth rotates counterclockwise (from the left to the right) so Point A would have the sun overhead and Point B is where the sun would be lowering in the sky, becoming darker.**

18. Each of the two days of the year when the sun is overhead at either 23.5° south or 23.5° north is called a(n)

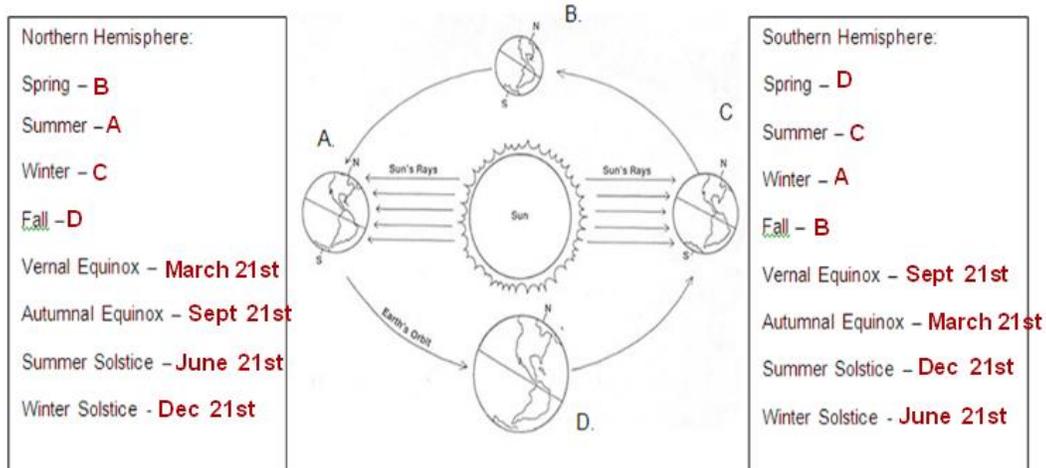
solstice.

19. Each of the two days of the year when neither hemisphere is tilted toward or away from the sun is called a(n)

equinox .

20. Complete the table.

Earth's Seasons			
Day in Northern Hemisphere	Approximate Date Each Year	Length of Daytime	Which Hemisphere Is Tilted Toward the Sun?
Summer solstice	June 21	Longest daytime	Northern Hemisphere
Autumnal equinox	September 21	Daytime equals nighttime	Neither
Winter solstice	December 21	Shortest daytime	Southern Hemisphere
Vernal equinox	March 21	Daytime equals nighttime	Neither



• Moon Phases

- Causes
- Names and which part of the moon is lit
- Where the moon is located in its revolution for each phase
- What do we see from Earth at the different phases
- Solar and Lunar Eclipses- causes and parts

21. What causes the phases of the moon, eclipses, and tides? **The positions of the moon, Earth, and sun**

22. Circle the letter of each sentence that is true about motions of the moon.

- a. The moon revolves around the Earth once a year.
- b. The "near side" of the moon always faces Earth.**
- c. The moon rotates slowly on its axis once every 27.3 days.**
- d. The moon's orbit around Earth is an oval shape.**

23. The different shapes of the moon you see from Earth are called **phases**.

24. How often does the moon go through a whole set of phases? **Each time it revolves around Earth, or about once a month (29.5 days)**

25. What does the phase of the moon you see depend on? **It depends on how much of the sunlit side of the moon faces Earth**

26. What causes the moon's phases? **Changes in the relative positions of the moon, Earth, and the sun**

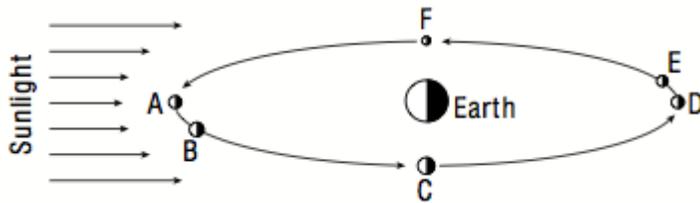
27. Complete the table about phases of the moon.

Phases of the Moon	
Phase	What You See
New moon	The side of the moon facing Earth is dark.
First quarter	Half the moon is lighted.
Full moon	Whole side of the moon is lighted.
Third quarter	Half the moon is lighted.

28. Is the following sentence **true** or false? Half the moon is almost always in sunlight.

29. How long after the last new moon until a new moon occurs again? **A new moon occurs again in 29.5 days**

Use the diagram below to answer question 30.



30. What phases of the moon would someone on Earth see when the moon is at positions A - F?

- a. **New moon**
- b. **Waxing crescent**
- c. **first quarter**
- d. **Full moon**
- e. **Waning gibbous**
- f. **Third quarter**

31. In what position must the moon be to cause a solar eclipse? Explain your answer.

The moon passes between the Earth and the sun, blocking the sunlight from reaching Earth. The solar eclipse is a new moon where the moon blocks your view of the sun.

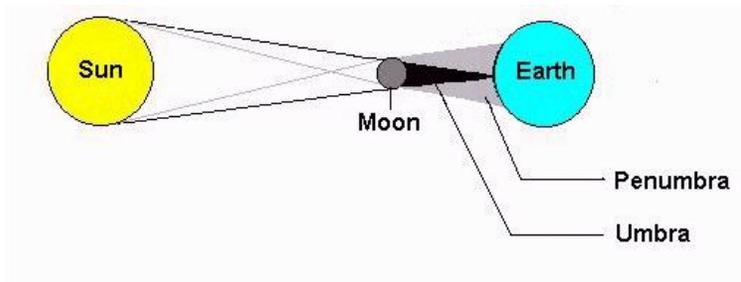
32. When the moon's shadow hits Earth or Earth's shadow hits the moon, what occurs? **An eclipse occurs**

33. What are the two types of eclipses?

- a. **solar**
- b. **lunar**

34. Draw and picture and label the arrangement of Earth, moon and sun during a solar eclipse.

For a solar eclipse, the moon is between the Earth & the sun. The moon is in the new moon phase.



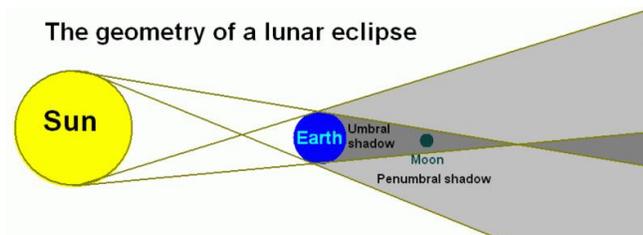
35. The darkest part of a shadow is called the umbra .

36. The larger part of a shadow, surrounding the umbra, is called the penumbra.

37. Circle the letter of each sentence that is true about solar eclipses.

- a. People in the umbra see only a partial solar eclipse.
- b. During a partial solar eclipse, part of the sun remains visible.**
- c. During a total solar eclipse, the sky is dark.**
- d. People in the penumbra see a total solar eclipse.

38. Draw a picture and label the arrangement of Earth, moon, and sun during a lunar eclipse.

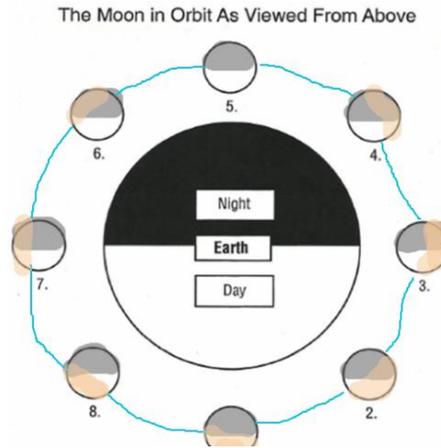


For a lunar eclipse, the Earth is between the moon & the sun. The moon is in the full moon phase.

39. Circle the letter of each sentence that is true about lunar eclipses.

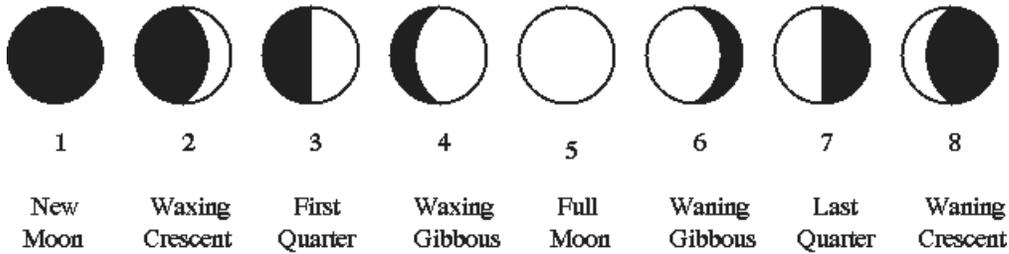
- a. People in Earth's umbra see a total lunar eclipse.**
- b. A lunar eclipse occurs at a full moon.**
- c. During a lunar eclipse, Earth blocks sunlight from reaching the moon.**
- d. A partial lunar eclipse occurs when the moon passes partly into the umbra of Earth's shadow.

40. Shade in each moon position as viewed from Earth in *Diagram 1*. **Notice where the sun is!!!**



41. Shade in the moon

phases as viewed from Earth.



• **Tides**

- Cause of tides
- High and low tides- when do they occur / how often
- Spring and Neap tides- when do they occur

42. The rise and fall of the level of the ocean are called **tides**.

43. What force pulls the moon and Earth toward each other? **gravity**

44. Why do tides occur? **Mainly because of differences in how much the moon pulls on different parts of Earth.**

45. Circle the letter of each sentence that is true about tides.

- a. The point on Earth that is closest to the moon has a high tide.**
- b. Every location on Earth has two high tides per month.
- c. A low tide occurs at the point on Earth farthest from the moon.
- d. The water left behind at the point on Earth farthest from the moon has a high tide.**

46. What does the force of gravity between two objects depend on? **The masses of the objects and the distance between them**

47. Is the following sentence true or **false**? The sun has no influence on Earth's tides.

48. What factors can make tides vary, even in places that are close to each other?

The shapes of bays, inlets, and the ocean floor can affect the flow of water, so that the height and timing of the tides can vary, even in places that are close to each other.

49. Label each picture below as Spring or Neap Tide

