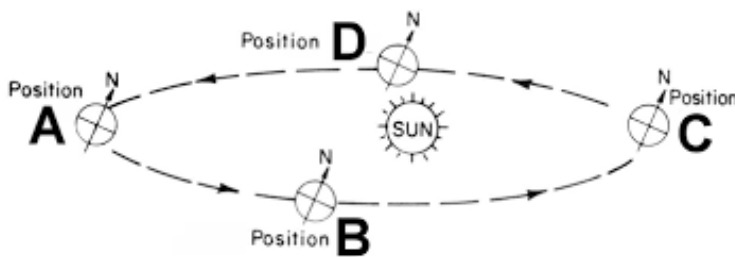


Patterns of Change-Shadows, Tides, Seasons, and Moon Phases

1. What causes earth to have seasons?
2. The seasons change as _____, which takes _____.
3. Seasons in the Northern Hemisphere are _____ those in the Southern Hemisphere. When it is winter in the northern hemisphere, it is _____ in the southern hemisphere. When it is spring in the northern hemisphere, it is _____ in the southern hemisphere.
4. Why do temperatures and hours of daylight change as the seasons change?
5. Label the seasons when the earth is in the following positions for the Northern Hemisphere.



- A _____
- B _____
- C _____
- D _____

6. In winter, the North pole is tilted _____ the sun. There are _____ daylight hours and _____ temperatures and the sun is _____ in the sky.
7. In spring, the North pole is tilted neither _____ from the sun. There are _____ daylight and night time hours.
8. In summer, the North pole is tilted _____ the sun. There are _____ daylight hours and _____ temperatures and the sun is _____ in the sky.
9. In autumn, the North pole is tilted neither _____ from the sun. There are _____ daylight and night time hours.
10. What causes shadows?
11. Shadows can change _____ and _____ throughout the day and year depending on the sun. Daily changes are caused by the apparent motion of the _____ across the sky, due to _____. Yearly, or seasonal, changes are due to the revolution of the earth around the sun as it is _____ on its axis
12. The length of the shadow depends on the height of the _____ in the sky. The _____ the sun in the sky, the longer the shadow. The _____ the sun in the sky, the shorter the shadow.
13. The direction of the shadow depends on the location of the _____ in the sky. The shadow will be _____ the direction of the sun. If the sun is in the east, the shadow will be to the _____. If the sun is in the southern sky, the shadow will be to the _____.

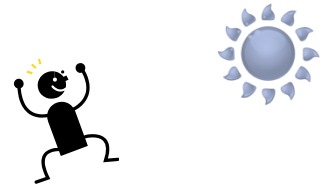
14. In the winter, shadows will be _____ because the sun is _____ in the sky. In the summer, shadows will be _____ because the sun is _____ in the sky.

15. Draw where the shadow would be in each picture and the approximate length.

a.



b.



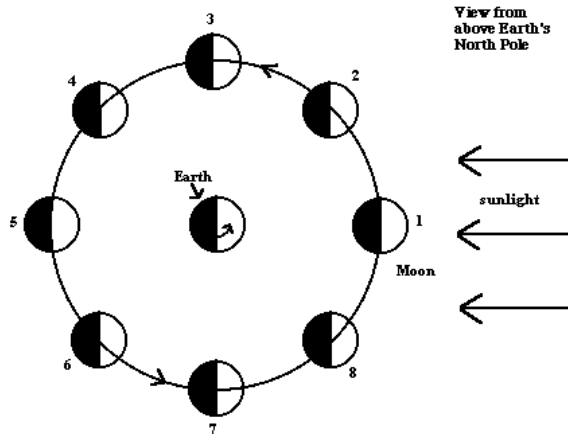
16. Describe your shadow changes throughout the day with the apparent movement of the sun across the sky. Start with what it would look like and where it would be in the morning and end in the evening before sunset.

17. Why does the moon have phases?

18. The pattern of moon phases we see is called the _____ cycle and takes about _____ days to complete.

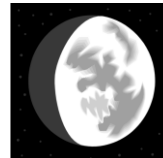
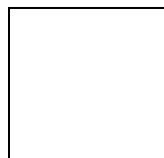
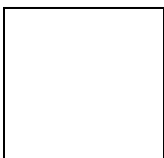
19. When we see the half of the moon facing us completely lit it is called a _____ moon. A moon that is less than half lit is a _____ moon. When we see half of side of the moon facing us lit it is called a _____ moon. A moon that is more than half lit is a _____ moon. Waxing means _____ and the _____ side is lit. Waning means _____ and the _____ side is lit.

20. Identify each moon phase.

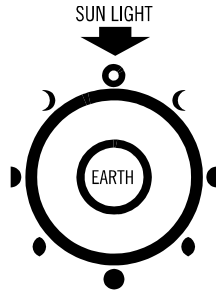


- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____

21. Draw and label the missing phases.



22. Look at the moon diagram below. Think about the phases of the moon in relation to the position of the sun. Circle the location that represents the new moon phase. Put a square around the full moon phase.



23. What are tides and what causes them?
24. Due to the earth's rotation on its axis tides on earth tides change _____ and occur approximately every _____ hours with _____ high tides each day and _____ low tides each day.
25. The sun's gravity and the earth's position in relation to the moon also makes tides change _____ with the lunar cycle. Strong _____ tides happen when the earth, sun, and moon are in line, during a full or new moon. Weaker _____ tides happen during quarter moons.
26. Look at the tide data below. Predict what time the second high tide will occur on the 2nd. _____

Date	First Low Tide	First High Tide	Second Low Tide	Second High Tide
2/1	8:46 am	3:54 am	8:01 pm	10:42 am
2/2	9:32 am	4:49 am	8:52 pm	?

27. Which statement incorrectly describes a pattern of change?
- The moon seems to change shape daily.
 - The tides change twice a day.
 - The seasons change once a month.
 - Day changes to night once every 24 hours.
28. Which statement correctly describes a pattern of change?
- The sun appears to change shape throughout the day.
 - Shadows change throughout the day as the sun appears to move across the sky.
 - The moon takes about a week to go through all the phases of the lunar cycle.
 - The earth revolves around the earth once every 24 hours.
29. Which pattern takes the longest amount of time to occur?
- Lunar cycle
 - Seasonal cycle
 - Day and night cycle
 - Daily High and Low Tides