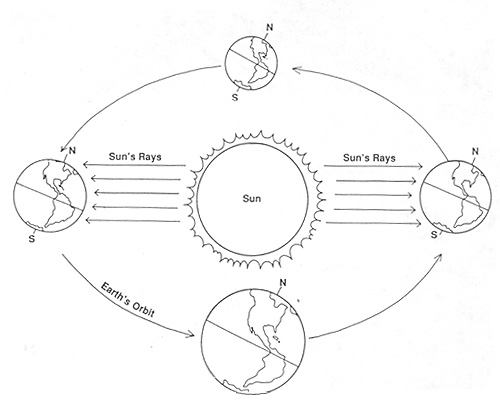
Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_

The Reason for the Seasons

Use the diagram to answer the questions.

Label **the winter solstice and date**, **summer solstice and date**,

**autumnal equinox and date** and **the vernal equinox and the date it occurs**



1. Use your pencil and **shade** the northern hemisphere for the Earth in the four positions shown.

2. When do the sun’s rays most directly hit the northern hemisphere? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Circle that on the diagram.* What season do the sun’s rays most directly hit the northern hemisphere? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

3. The southern hemisphere is the half of the Earth that is not shaded. What season does the southern hemisphere experience while the rays most directly hit the northern hemisphere? \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Explain how you got your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is different about the seasons in the northern hemisphere and the southern hemisphere?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What two reasons why we have seasons.

a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Previous MCAS Questions**

6. The winter solstice occurs on either December 21 or 22, depending on the year. Which of the following statements **best** explains why the time of the year the winter solstice occurs has the least amount of daylight in Massachusetts?

|  |  |  |
| --- | --- | --- |
|  | A. | Earth is farthest away from the Sun on the winter solstice. |
|  | B. | Earth’s rotational speed on its axis is greatest on the winter solstice. |
|  | C. | Earth is traveling around the Sun with the greatest speed on the winter solstice. |
|  | D. | Earth’s Northern Hemisphere is tilted away from the Sun on the winter solstice |

7. The diagram below shows the relative positions of Earth and the Sun at a certain time of year.



Based on the diagram, which season is occurring in the Southern Hemisphere of Earth? \_\_\_\_\_\_\_\_\_

How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Which of the following statements **best** explains why it is warmer at the equator than at the North Pole?

|  |  |  |
| --- | --- | --- |
|  | A. | The equator has a larger area than the North Pole. |
|  | B. | The equator is closer to the Sun than the North Pole. |
|  | C. | The equator receives more direct sunlight than the North Pole. |
|  | D. | The equator has more hours of daylight per year than the North Pole. |

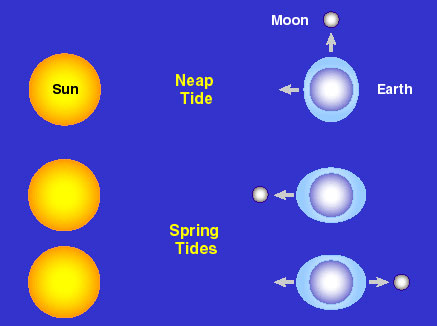
9. Which of the following statements **best** explains why the tilt of Earth on its axis causes summer to be warmer than winter in the Northern Hemisphere?

|  |  |  |
| --- | --- | --- |
|  | A. | The warm ocean currents flow from the tropics to the Northern Hemisphere in the summer. |
|  | B. | The rays of the Sun strike the Northern Hemisphere more directly in the summer. |
|  | C. | The greenhouse effect increases in the Northern Hemisphere in the summer. |
|  | D. | The Northern Hemisphere is closer to the Sun in the summer. |

10. Miriam notices when she goes to the beach that sometimes the water rises as high as the pier. At other times of the day, the water barely covers the pillars under the pier. These differences in water level are **primarily** due to the gravitational influence of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
|  |  |  |

11. Explain the difference between a spring tide and a neap tide. Use the diagram to help you.



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. Which tide produces the highest high tide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_