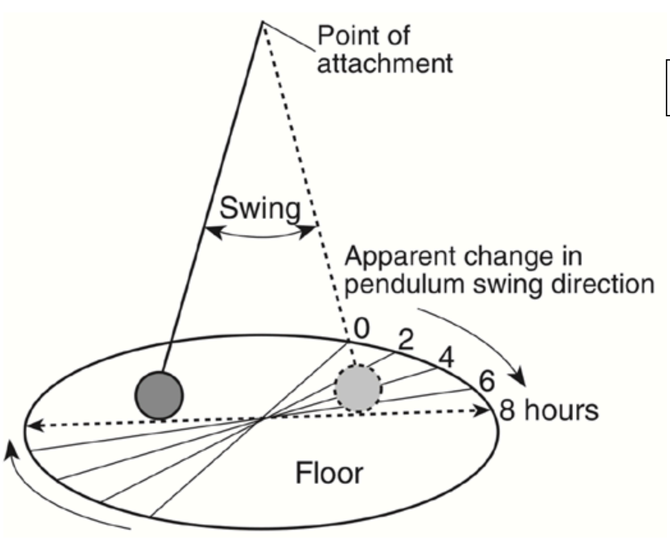
Name: ______________________________________________

Date: ______________________________ Period: __________

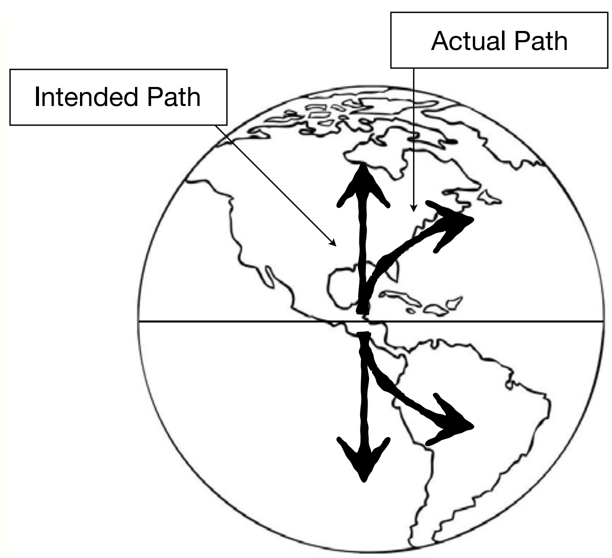
# Earth’s Motions

## CLASS NOTES

- Rotation - ____________________________________________________________
  ____________________________________________________________
- Period of Rotation - amount of time to make one complete rotation
  - Example: Earth rotates ______________ in ______________ hours
  - Earth’s axis of rotation is tilted ______________
- Evidence of Rotation
  - Foucault Pendulum - ____________________________________________________
    ____________________________________________________
  - Coriolis Effect - ____________________________________________________
    ____________________________________________________
    - N. Hemisphere to the right
    - S. Hemisphere to the left




Foucault Pendulum




Coriolis Effect

# Earth's Motions

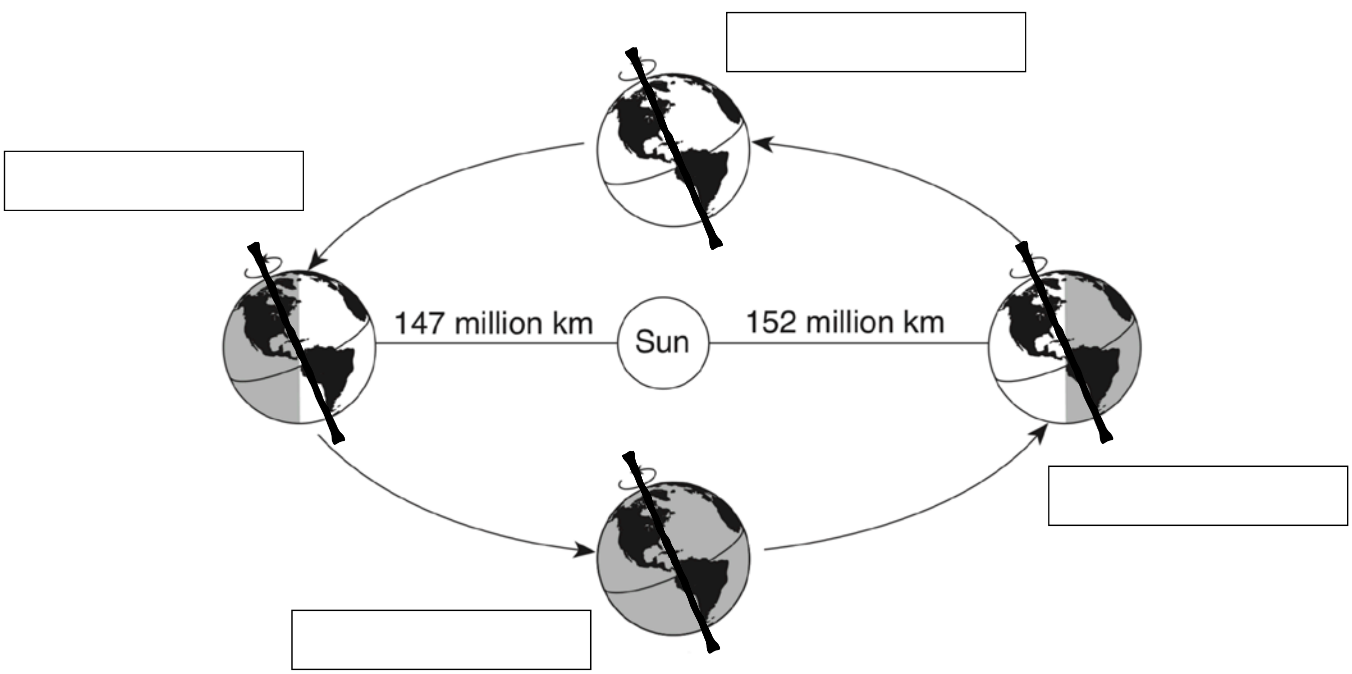
- Revolution - ____________________________________________

  ____________________________________________

- Period of Revolution - the amount of time required to orbit the Sun one time
  - Example: earth orbits the Sun in ______________ days
- Evidence of Revolution
  - Parallelism of Earth's Axis - ______________________________

    ______________________________

- Winter Solstice - first day of winter [N. Hemisphere] when the Earth leans away from the Sun
  - Approximate Date: ________________________
- Summer Solstice - first day of summer [N. Hemisphere] when the Earth leans towards the Sun
  - Approximate Date: ________________________
- Vernal Equinox - first day of spring [N. Hemisphere] when there are equal amounts of day and night
  - Approximate Date: ________________________
- Autumnal Equinox - first day of fall [N. Hemisphere] when there are equal amounts of day and night
  - Approximate Date: ________________________



# Earth's Motions

- Ellipse - ______________________________________________

  ______________________________________________
- Perihelion - ______________________________________________

  ______________________________________________
  - Distance: ________________________ km
- Aphelion - ______________________________________________

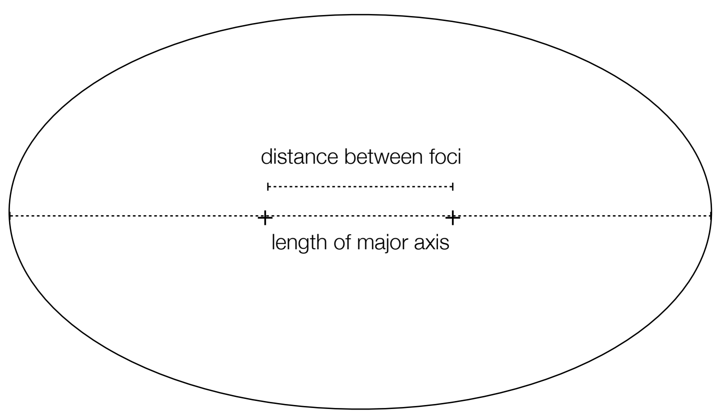
  ______________________________________________
  - Distance: ________________________ km
- Eccentricity - ______________________________________________

  ______________________________________________
  - Eccentricity of a perfect circle is __________
  - Eccentricity of a flat line is __________
- Foci - ______________________________________________

  ______________________________________________
- Major Axis - ______________________________________________

  ______________________________________________
- Use the formula from the ESRT to calculate eccentricity:

$$\text{Eccentricity} = \frac{\text{distance between foci}}{\text{length of major axis}}$$



# Earth's Motions

PART I QUESTIONS: MULTIPLE CHOICE

1. The Coriolis effect occurs as a result of Earth's
    a. rotation
    b. revolution
    c. tilted axis
    d. magnetic field

2. In 1851, French physicist Léon Foucault used a swinging pendulum to demonstrate that Earth
    a. is rotating
    b. is revolving
    c. has a curved surface
    d. has a gravitational pull

3. The deflection of Earth's planetary winds is an example of
    a. the Coriolis effect
    b. the Doppler effect
    c. convection
    d. gravitational pull

4. The best evidence of Earth's rotation is provided by the
    a. Foucault pendulum and global warming
    b. Foucault pendulum and Coriolis effect
    c. Moon phases and global warming
    d. Moon phases and Coriolis effect

5. On the Earth, a freely swinging pendulum gradually shows a change in the direction of its swing. This change is evidence that the Earth
    a. is an orbiting natural satellite
    b. revolves around the Sun
    c. rotates on its axis
    d. has an elliptical orbit

6. The orbiting motion of the Earth is best described as
    a. inclination
    b. revolution
    c. rotation
    d. declination

7. The day of the year, as units of time, are based upon motions of
    a. the Moon
    b. the Earth
    c. the Sun
    d. the Stars

# Earth’s Motions

8. Which is the best evidence for the Earth's rotation?
    a. the rising of the Sun
    b. the motion of a Foucault pendulum
    c. the changing of the seasons
    d. the phases of the Moon

9. The Coriolis effect provides evidence that the Earth
    a. revolves around the Sun
    b. rotates on its axis
    c. has a magnetic field

10. The predictable changes in the direction of swing of a Foucault pendulum would be influenced by
    a. Earth’s angle of tilt
    b. Earth’s intensity of insolation
    c. Earth’s rate of rotation
    d. Earth’s period of revolution

11. In New York State, which day has an equal period of daylight and nighttime?
    a. December 21
    b. March 21
    c. June 21
    d. none of the above

12. The actual shape of the Earth's orbit around the Sun is best described as
    a. a slightly eccentric ellipse
    b. an oblate spheroid
    c. a perfect circle
    d. a very eccentric ellipse

13. What is the eccentricity of an orbit having a major axis length of 100 million miles and a focal distance of 10 million miles?
    a. 1.0
    b. 0.01
    c. 10.0
    d. 0.1

14. According to the Earth Science Reference Tables, which planet has the most eccentric orbit?
    a. Earth
    b. Mars
    c. Venus
    d. Saturn

15. According to the Earth Science Reference Tables, which planet has the least eccentric orbit?
    a. Earth
    b. Mars
    c. Venus
    d. Saturn

PART II QUESTIONS: FREE RESPONSE

Base your answers to questions 16 through 18 on the Eccentricities of the Planets chart below and your knowledge of Earth Science. The planets are listed in order from the Sun.

ECCENTRICITIES OF THE PLANETS

| Planet | Eccentricity |
|---|---|
| Mercury | 0.206 |
| Venus | 0.007 |
| Earth | 0.017 |
| Mars | 0.093 |
| Jupiter | 0.048 |
| Saturn | 0.056 |
| Uranus | 0.047 |
| Neptune | 0.009 |

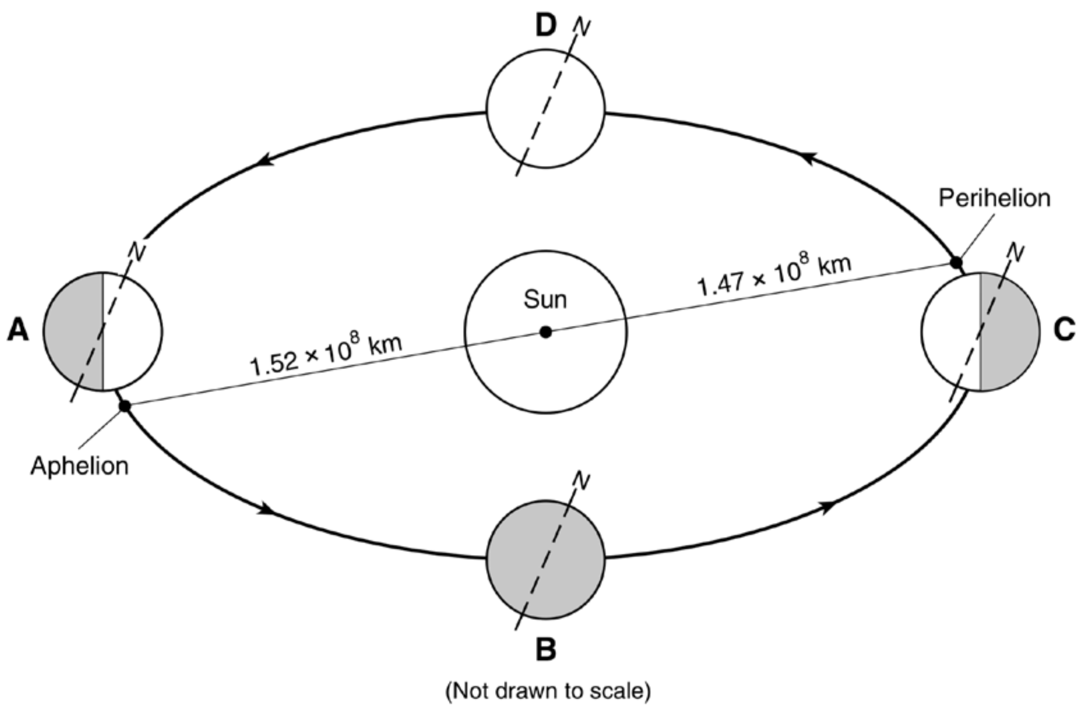
16. Which two sets of planets have nearly the same eccentric obits?

17. List the planets in order of increasing eccentricity of their orbits.

18. Is there a direct relationship between the eccentricity of orbit and the distance from the Sun?

# Earth's Motions

Base your answers to questions 19 through 22 on the diagram below and on your knowledge of Earth science. In the diagram, letters A, B, C, and D represent Earth's location on the first day of the four seasons as it orbits the Sun. Aphelion [Earth's farthest distance from the Sun] and perihelion [Earth's closest distance to the Sun] are labeled to show the approximate positions where they occur in Earth's orbit. The dashed lines represent Earth's axis, and the North Pole is labeled N.




19. State the number of degrees that Earth's axis is tilted perpendicular to the plane of its orbit.

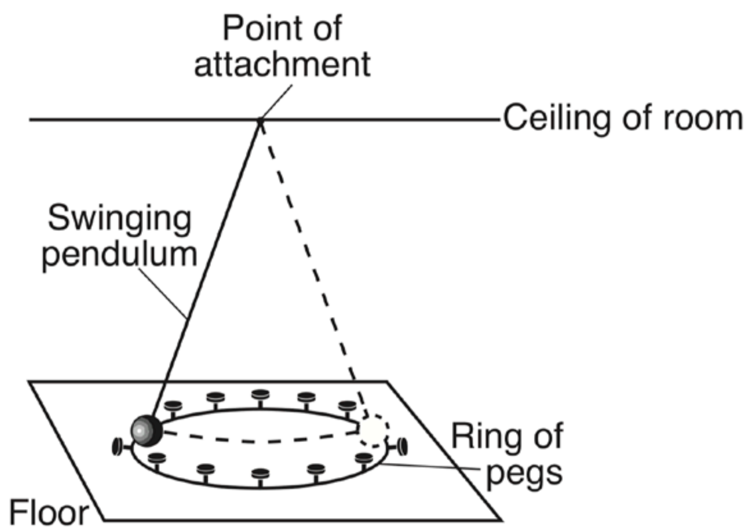
20. Identify the season in New York State during which Earth is at perihelion.

21. State the number of daylight hours that an observer in New York State will experience at position D.

22. Identify the name of the star that is aligned with Earth's axis above the North Pole.

# Earth's Motions

Base your answers to questions 23 through 24 on the diagram below and on your knowledge of Earth science. The diagram below represents a swinging pendulum located in Earth's Northern Hemisphere. The pendulum knocked over two pegs during its first swing.




23. The swinging pendulum provides evidence of what Earth motion?

24. The diagram below represents a top view of the same pegs. Circle the next two pegs that would fall as the pendulum appears to change its direction of swing in the Northern Hemisphere.