Exercise A9: The Analemma

Student name: ________________________  Class: ____________ Date: _____________

Check the box with the correct answer.

Question 1: What is the shape of the analemma over the course of a full year?
   □ a. Teardrop
   □ b. Circular
   □ c. Figure 8
   □ d. Ellipse

Question 2: The variable velocity of the Earth in its orbit is responsible for the Sun’s changing apparent motion as it traces the analemma. The Earth’s variable velocity is caused by:
   □ a. the elliptical shape of the Earth’s orbit.
   □ b. the variation in the rotation rate of the Earth around its spin axis.
   □ c. the tilt of the Earth’s spin axis to its orbital plane.
   □ d. the gravitational effect upon the Earth of the major planets such as Jupiter.

Question 3: The vertical extent of the analemma, in angular measure, is equal to
   □ a. the tilt angle of the Earth’s spin axis.
   □ b. twice the tilt angle of the Earth’s spin axis.
   □ c. one-half the tilt angle of the Earth’s spin axis.
   □ d. the observer’s latitude on the Earth.
Question 4: Use the Run Time Forward and Stop buttons in the Time Flow bar and the Date display on the Toolbar to help you to answer the following question. Which of the following statements is correct?
- a. The Summer Solstice occurs when the Sun is near the bottom of the analemma.
- b. The Winter Solstice occurs when the Sun is near the top of the analemma.
- c. The line of the analemma intersects with itself at the point marking the spring and autumn equinoxes.
- d. The Sun is at the top of the analemma at Summer Solstice.

Question 5: What would be the observed shape of the analemma seen from a body whose orbital eccentricity and axial tilt are both zero?
- a. An asymmetrical figure 8
- b. A symmetrical figure 8
- c. A point; the Sun would remain in the same position throughout the whole year.
- d. A single loop.

Question 6: Which of the following statements concerning the Equation of Time is correct?
- a. It reaches its maximum "Sun fast" value in November.
- b. It reaches its maximum "Sun slow" value in November.
- c. It has the value of zero at the time of vernal equinox.
- d. It has a value of close to zero at times of solstice.

Question 7: What is the shape of the Martian analemma over the course of a full year?
- a. Teardrop
- b. Circular.
- c. Figure 8.
- d. Ellipse.
Question 8: What is the approximate tilt of Mars' spin axis?

☐ a. 23.5 degrees  
☐ b. 10 degrees  
☐ c. 50 degrees  
☐ d. 25 degrees

Question 9: The shape of the analemma on Mars suggests that

☐ a. Mars' orbit has a low eccentricity value compared to the orbit of Earth.
☐ b. Mars' orbit has a high eccentricity value compared to the orbit of Earth.
☐ c. Mars' orbit has an eccentricity value of zero.
☐ d. Mars' axial tilt is zero.