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.