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 Sun's changing apparent motion as it traces the analemma is the result of the variable orbital velocity of the Earth and is caused by:

- ☐ **a.** The Earth's elliptical orbit around the Sun.
- ☐ **b.** The rotation of the Earth's spin axis.
- ☐ **c.** The tilt of the Earth's spin axis.
- ☐ **d.** The precession of the equinoxes.

Question 3: The vertical extent of the analemma is:

- ☐ **a.** Equal to the tilt of the Earth's spin axis.
- ☐ **b.** Equal to twice the tilt of the Earth's spin axis.
- ☐ **c.** Equal to one half the tilt of the Earth's spin axis.
- ☐ **d.** Equal to the Sun's azimuth.

Question 4: Use the Run Time Forward button and the Stop button and note the date display on the Toolbar. Which of the following statements is not correct:

- ☐ **a.** The Summer Solstice occurs when the Sun is near the top of the analemma.
- ☐ **b.** The Winter Solstice occurs when the Sun is near the bottom of the analemma.
- ☐ **c.** The Sun crosses the Celestial Equator on the Equinoxes.
- ☐ **d.** The line of the analemma intersects with itself at the point marking the spring and autumn equinoxes.

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Question 5: What would be the shape of the analemma of a body whose orbital eccentricity and axial tilt are both zero?

- ☐ **a.** Asymmetrical figure-8.
- ☐ **b.** Symmetrical figure-8.
- ☐ **c.** Sun would be at the same spot.
- ☐ **d.** Symmetrical teardrop.

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 is zero at the vernal equinox.
- ☐ **d.** It would always be zero if the Earth’s orbit were perfectly circular.

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’s spin axis?

- ☐ **a.** 23º
- ☐ **b.** 10º
- ☐ **c.** 50º
- ☐ **d.** 25º

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

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