

## ROMANO

### Earth Motions Practice Worksheet #1 – ANSWERS AND EXPLANATIONS

- (1) – The apparent daily motion of celestial objects, such as the Sun, are a result of the Earth's real motion: rotation. The key word in the question is daily – day and night changes result from the rotation of the Earth toward and away from the Sun.
- (3) – The rate of rotation of the Earth is  $15^\circ/\text{hr}$ . Therefore, the Sun and other celestial objects appear to move across the sky at that same rate.  $90^\circ/15^\circ/\text{hr}$  yields 6 hours of apparent motion.
- (4) – The March 21<sup>st</sup> path starts right where east is labeled in the diagram.
- (2) – March 21<sup>st</sup> is an equinox. On an equinox, a location will experience 12 hours day and 12 hours night.
- (2) – The Sun is at its maximum altitude at point F which means that the Sun will start to get lower in the sky each day that follows. The lower the Sun is in the sky, the longer the shadows of objects on the Earth's surface.
- (4) – The December path shows that the noon Sun is lower than on any other date. That would mean that shadows would be longest on December 21<sup>st</sup>.
- (2) – The noon Sun looks about halfway between the horizon and the zenith. If you use the technique we learned to find the altitude of an object, you would have made a tick mark representing  $45^\circ$  on the southern side of the dome. The noon Sun on September 23<sup>rd</sup> would be right near this tick mark, so  $48^\circ$  is the best answer.
- (3) – Look at the highest point on each arc (this point would represent noontime) until you find the one that reads  $74^\circ$ .
- (2) – The noon Sun on December 21<sup>st</sup> is  $43^\circ$  above the horizon, and on June 21<sup>st</sup> it is  $90^\circ$ . Subtract the two to get  $47^\circ$ .
- (1) – Just like in question 6 - the lower the Sun, the longer the shadow.
- (4) – Similar to question 1 – The apparent path of the Sun is caused by Earth's rotation.
- (3) – Once again, noon is the highest point on the arc- for C-C' the Sun reaches  $60^\circ$ .
- (2) – The paths are not labeled, but by reading the introduction to the question, it says that two of the paths are Dec. 21 and June 21. Those would be the two extreme paths – just like in question 9. By subtracting the two altitudes ( $70^\circ-23^\circ$ ), the answer comes out to  $47^\circ$ .
- (1) – In this diagram, the western horizon is in the back where A', B', C', and D' are all plotted (due west is exactly where B' is). D' is the point you should look to see the sun set – it is located between north and west.
- (4) – At noon (12:00pm), the Sun is highest in the sky and therefore would create the shortest shadows for objects on Earth.