

## Quiz 02: Solar and Sidereal Day

Answer each of the following questions using your clicker. You must respond using your clicker; papers will not be marked by hand.

You may use your lab notebook and a calculator. Each question is worth **3 points**, and there is no partial credit. When you have completed both quizzes, please return this quiz paper to me, and you are free to leave.

71. True or **false**: The sun is directly overhead (Alt = 90°) on 06/21 at precisely noon (12:00) for every location on the Earth.
72. For our location here in Conway, when is the sun is directly overhead (Alt = 90°)?  
 A) At 13:11:44 on 06/21. C) At 12:08:14 on 12/21. E) **Never. The sun never actually reaches Alt = 90° in Conway.**  
 B) At 13:02:36 on 09/21. D) At 13:16:50 on 03/21.
73. True or **false**: When the sun crosses the meridian on **06/21/16**, it will appear directly overhead (alt = 90°) if you are standing on the Earth's equator (latitude = 0°).
74. At precisely noon (12:00) on **09/21/16**, where is the sun located in the sky? Choose the answer which *most closely* matches your coordinates.  
 A) Az = 121°59'20" Alt = 70°32'47" C) **Az = 153°48'45"** Alt = 52°18'33"  
 B) Az = 148°26'10" Alt = 51°03'13" D) Az = 177°47'22" Alt = 31°26'33"
75. At what time does the sun cross the meridian on **12/21/16**? Choose the answer which *most closely* matches your own data.  
 A) 12:00. Noon is noon, no matter what/no matter where! B) **12:08:14** D) 13:11:44  
 C) 13:02:36 E) 13:16:50
76. When the sun crosses the meridian on **03/21/17**, what is its altitude? Choose the answer which matches your observation *most closely*.  
 A) 31°29' B) 45° C) **55°26'** D) 78°21' E) 90°
77. How long is one **solar day**?  
 A) 23h56m B) **24h** C) 24h4m D) 24h56m E) 365d6h
78. How long is one **sidereal day**?  
 A) **23h56m** B) 24h C) 24h4m D) 24h56m E) 365d6h
79. A star trail on a photograph is measured to have an angle of arc  $\theta = 75.5^\circ$ . The exposure time of the photograph is known to be  $t = 300$  **minutes**. Use this information to calculate the length of a sidereal day in **hours**. Submit your answer numerically, with a single decimal and no units (XX.x).

$$day = (t) \left( \frac{360^\circ}{\theta} \right) = (300 \text{ min}) \left( \frac{360^\circ}{75.5^\circ} \right) = 1430 \text{ min}$$

$$hours = \frac{1430 \text{ min}}{60 \left( \frac{\text{min}}{\text{hour}} \right)} = 23.8 \text{ h}$$

80. Is this experimental value a little longer or a little shorter than the known length of a sidereal day?  
 A) A little bit longer. B) **A little bit shorter.**