ASTR 100 - HW #1 Solutions

John Capone

September 14, 2010

2.7 [B] The cycle of the phases of the Moon begin with the new Moon. The full cycle is completed in one month ($\sim$ four weeks). One week after a full Moon, the phase will be half way between being full and being new. This corresponds to the third quarter Moon.

2.8 [B] The Moon's surface has identifiable features, allowing one side to be distinguished from another. If the Moon's rotation period were either longer or shorter than its orbital period, the same side could not always face the earth.

2.9 [B] Because the Moon's orbital plane is inclined relative to the Earth's orbital plane, the new Moon does not always appear at the same position in the sky. Only rarely will it obstruct the view of the Sun.

2.11 [B] As the Earth passes Saturn, the change in its position in the sky will reverse for a time. This appearance is because Saturn is being projected onto a background of fixed stars.

2.12 [B] Since the ancient Greeks could not detect stellar parallax, it was believed that the Sun orbited the Earth. They were unaware of the vast distances between the Earth and these seemingly fixed stars which makes it impossible to detect the stellar parallax with the unaided eye.

***1.19**

$$speed = \frac{distance}{time}$$

divide both sides by speed, $\frac{speed}{speed} = \frac{distance}{time \times speed}$

multiply both sides by time, $1 \times time = \frac{distance \times time}{time \times speed}$

$$time = \frac{distance}{speed}$$

distance $= 1\,AU = 1.50 \times 10^8\,m/s$

speed $= c = 3.00 \times 10^5\,km/s$

plugging these values into the equation for time,

$$time = t_{Sun \to Earth} = (1\,AU)\left(\frac{1.50 \times 10^8\,km}{1\,AU}\right) \times \left(\frac{1}{3.00 \times 10^5\,km/s}\right)$$

$$t_{Sun \to Earth} = 500\,s = \boxed{8.33\ \text{min}}$$