

Phases of the Moon - Exercise

Student Name: _____

Step 1.

- A. Start Stellarium. It should be in the default configuration you setup in the Using Stellarium exercise. You should be viewing to your South and set the program to full screen.
- B. Use the Location Window to set your latitude to 25° North.
- C. Use the Sky and Viewing Window to check Scale Moon. Set the landscape to "Ocean" to give a clear horizon.
- D. Use the Date/Time Window to set the date to 2009/9/18 and the time to 18:00:00 and leave the Date/Time Window in the upper right hand corner of the screen. Set the FOV to about 60°. Turn off atmosphere.
- E. Move the horizon until the West compass mark is in the lower right corner of the screen. Keep the horizon low on the screen. You are now facing to the Southwest just prior to sunset during a New Moon.
- F. Use the Search Window to locate the Moon. Now advance the time, in one hour increments, forward or backward to just before sunset.
- G. Now advance the date by one day. The Waxing crescent Moon should be clearing the horizon.
- H. Keep advancing the date by one day until 2009/9/25. If the Moon gets close to leaving the screen, move the horizon to keep the Moon in view.

- **Question 1:** Did you observe any change in the phase of the Moon?

- **Question 2:** What was the phase on 2009/9/20? _____

- **Question 3:** What was the phase on 2009/9/25? (if you saw no difference, repeat your answer)

- **Question 4:** What named bright star is near the Moon on 2009/9/20?

- **Question 5:** What named bright star is near the Moon on 2009/9/23?

Step 2.

- I. Use the Location Window to reset your default location, turn off the landscape.
- J. Use the Date/Time Window to set the date to 2010/2/14 and the time to 19:00:00 Local Time and leave the Date/Time Window in the upper right hand corner of the screen.
- K. Use the Search Window to find the Moon and set the FOV to about 10° .
- L. Use the Sky and Viewing window to un-check Scale Moon.

You should have the Moon centered in the screen very close to New Moon (hard to see) and the Moon very close to the bright star Ancha (in Aquarius). The Moon may be covering Ancha. Zoom into about 5° FOV just so you can see the Moon has a faint, thin waxing crescent towards one edge. Zoom back out to about 10° . Use the Center on the Selected Object Button to center the Moon.

Step 3.

- M. Using the Date/Time Window, advance the day value one day at a time until the Moon and the star Ancha are again in the same field. While advancing the days, watch the image of the Moon
 - **Question 6:** Did the illumination of the face of the Moon change?

 - **Question 7:** How many days did it take to get the Moon and Ancha in the same field? _____
- N. Now use the Date/Time Window to advance the hours one hour at a time until the Moon approaches its closest to Ancha.
 - **Question 8:** How many more hours did it take to get close to Ancha?

 - **Question 9:** Would the Days + the Hours equal the Synodic or Sidereal period?

- O. Record the total time to return to Ancha in Table 1.
- P. Zoom in on the Moon, at about 3° FOV. Notice the moon has not yet returned to New Moon, but is still shows a slight waning crescent.
- Q. Now advance the Days and Hours to get the Moon back to New Moon, or a very slim waxing crescent, keeping track of the additional time.

- **Question 10:** How many total days and hours did it take to get back to New Moon? _____

- **Question 11:** Would this equal the Synodic or Sidereal period?

R. Record the total time to return to a New Moon in Table 1.

S. Using the actual values of:

- Sidereal = 27.32 days
- Synodic = 29.53 days

Calculate your % error using Equation 1. and place your answers in Table 1.

	Days	Hours	Decimal Days*	% Error
Return to Ancha				
Return to New Moon				

Table 1.

* - To convert to Decimal Days, divide the Hours by 24 and add the fractional result to the whole number Days

$$((\text{Measured value} - \text{Actual value})/\text{Actual value}) \times 100\%$$

Equation 1.