Name: _____

Quiz 04: Lunar Synodic and Sidereal Month

Answer each of the following questions as you complete the lab exercise.

Synodic Month: (10 points) Fill in the table below as you complete your observations.

Date	Time	Synodic Month	
		(hours)	(days)
07/11/16	17:03	713.27	29.72
08/10/16	10:19		
10/08/16	23:40	709.62	29.57
11/07/16	12:17		
01/05/17	12:27	707.20	29.47
02/03/17	23:39		
04/03/17	11:49	706.37	29.43
05/02/17	22:11		
Average Synodic Month (Days)			29.55

Sidereal Month: (10 points) Fill in the table below as you complete your observations.

Date	Time	Lunar Phase	Waxing (+) or Waning (–)	Sidereal Month	
				(hours)	(days)
07/13/16	20:08:59	0.69	+	656.76	27.37
08/10/16	4:54:25	0.47	+		
10/03/16	20:33:27	0.08	+	652.83	27.20
10/31/16	1:23:11	0.004	+		
01/20/17	19:51:26	0.39	–	656.01	27.33
02/17/17	3:51:57	0.62	–		
04/12/17	19:46:42	0.97	–	657.40	27.39
05/10/17	5:10:50	0.99	+		
Average Sidereal Month (Days)					27.32

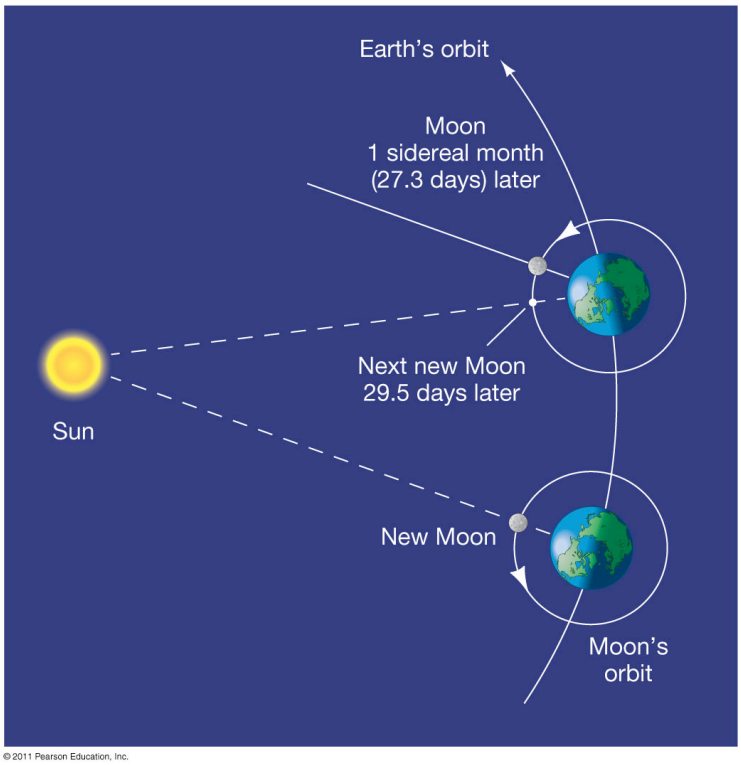
1. (3 points) Calculate the **% error** in your average value of the **synodic month**, compared to the accepted value of **29.5 days**.

$$\%error=\left(\frac{29.55-29.5}{29.5}\right)\times 100=0.16\%$$

2. (3 points) Calculate the **% error** in your average value of the **sidereal month**, compared to the accepted value of **27.3 days**.

$$\%error=\left(\frac{27.32-27.3}{27.3}\right)\times 100=0.08\%$$

3. (2 points) Explain briefly why the lunar phase was different for each of your sidereal month observations. (A picture might help!)



As shown on the picture, the moon orbiting the earth is not the only motion involved. The synodic month, or phase-to-phase measurement, actually ignores the motion of the Earth-Moon system around the Sun, assuming that when the cycle of phases is complete, the moon has orbited 360° around the Earth.

In truth, because the Earth and Moon are in motion around the Sun, the Moon complete its 360° orbit around the Earth (the sidereal month) before the cycle of phases is complete (the synodic month).

4. (1 point) A sidereal month is
   A) slightly shorter than a synodic month.
   B) slightly longer than a synodic month.
   C) exactly the same as a synodic month.

5. (1 point) Why?
   A) Because a sidereal second is slightly shorter than a synodic second.
   B) Because a sidereal second is slightly longer than a synodic second.
   C) Because the once the moon completes a sidereal month, it has moved (along with the Earth) with respect to the sun, and has to rotate slightly further to return to its starting phase.
   D) Because the moon does not orbit the sun, it stays in the same position all the time.