29:52 Exploration of the Solar System
Homework Assignment # 4
Quiz must be completed on ICON by 8 AM, Monday, February 22

Note: I have tried to avoid questions which simply consist of repeating a fact from the readings or class (although a large number of facts about astronomy constitute knowledge about astronomy). Instead, I want you to think about what you have learned, use it, and be able to read a new conclusion.

1. The Moon is in what astronomers call a *prograde* orbit, meaning the direction of the Moon's revolution about the Earth is in the same direction as the Earth's revolution around the Sun. Both are counter-clockwise as viewed from above the plane of the ecliptic. Imagine that the Moon's orbit were *retrograde*, meaning opposite to the motion of the Earth's revolution (i.e., clockwise, when the Earth's revolution was counter-clockwise). In this case, what would be the *synodic period* of the Moon?
   (a) 25.1 days
   (b) 27.3 days
   (c) 29.5 days
   (d) 31.7 days

2. You know that in a few hours it will be full moon. You have become an expert with your SC1 chart (too bad you have to give it back at the end of the semester), and you measure the coordinates of the Moon to be Right Ascension (RA) = 4h15m, declination (dec) = 21 degrees. What is going to happen in the next few hours.
   (a) a total eclipse of the Sun
   (b) a total eclipse of the Moon
   (c) an annular eclipse of the Sun
   (d) it is not possible for any kind of eclipse to occur with these conditions

3. A train is moving due north at 79 miles per hour (Amtrak speed limit for Class 4 tracks), goes into a curve, and comes out moving due west at 79 miles an hour. The engineer runs the train so that the speedometer is reading 79 miles per hour the whole time the train is in the curve. Has the train undergone an acceleration (answer True or False)?

4. Kepler's 2nd Law is a consequence of the fact that one of the physical quantities below is constant for a planet in orbit around the Sun. Which quantity is it?
   (a) the kinetic energy

(b) the potential energy
(c) angular momentum
(d) linear momentum

5. The Moon is gradually receding from the Earth (see the book). In the distant future, what type of astronomical phenomenon will cease to exist?
(a) total solar eclipses
(b) annular solar eclipses
(c) total lunar eclipses
(d) full moons

6. Which of the following lunar surface features can you see with the naked eye (without using binoculars or telescopes)?
(a) impact craters
(b) rilles
(c) terrae
(d) lunar mountain ranges

7. Imagine that you are an astronaut who has gone to the Moon. You are standing in your space suit on the north pole of the Moon. Where in the sky do you see the Earth?
(a) at the zenith
(b) it rises in the east, transits the meridian, and sets in the west
(c) on the horizon, due south.
(d) approximately 10 degrees above the horizon, at the same azimuth as the Sun.

8. Locate a Moon map on the internet (or do it the old fashion way and go to the physics library and get a printed map), and find the crater Kepler (near the equator, on the left hand side of the Moon). Look at Kepler and its surroundings, and choose one of the following statements as true.
(a) Kepler is misidentified as a crater; it is really a Mare
(b) Kepler is a rare example of a crater which is in the lunar Terrae
(c) Kepler must have been one of the first craters formed on the Moon
(d) Kepler must have formed after most of the craters on the Moon

9. The "Sea of Crises" is a Mare on the Moon that is visible to the naked eye. The basin (big hole in the ground) that constitutes the Mare was formed at some time in the past. Based on information in the book, when did the *basin* form?
(a) before 5 Gyr ago (5 billion years ago)

(b) between 4.5 and 3.8 Gyr ago
(c) between 3.5 and 3.2 Gyr ago
(d) between 3 and 2.3 Gyr ago
(d) in the last 2 Gyr