1.

a. "He used the angles the sun made on the summer solstice and the distance between the two locations. The angle was 7° in Alexandria and 0° in Syene." —K Sutara. "He used the distance between two towns and measured the angle of the sun in both towns on the same day at the same time."—E King

b. "M & Q found that the variation in 51 Peg's velocity … was very small…. From this they could determine that the center of mass… was located very near the center of 51 Peg.—W. Hack. The most common wrong answer was to say that 51 Peg moves toward and away. This is true even if 51 Peg orbits another star.

c. "Venus orbits the sun one full orbit (1 year) before it makes a complete rotation on its axis (1 day).—M van Strien

d. "[Scientists] were able to understand that when [outer] planets appeared to move east to west [with respect to the stars], it was actually the earth overtaking the other planet. This led to the idea that the sun is at the center of the solar system, not earth."—E Braun

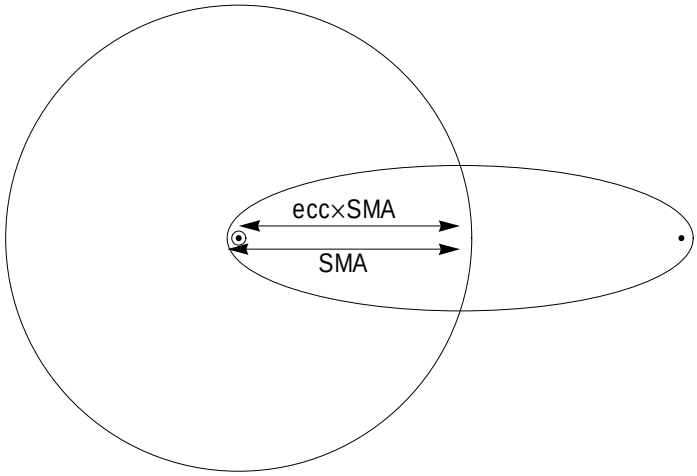
e. The arrangement of stars would be the same on the 8th. Jupiter can move with respect to the stars, because it and Earth move.

2.

a. Since the period is exactly that of Jupiter, its semi major axis is that of Jupiter, 5.2AU.

b. The major axis of the comet's orbit is the same as the diameter of Saturn's orbit. The sun is at a focus.

c. At its closest point the comet is SMA(1-ecc) = 5.2 (1-0.99) = 0.052AU from the sun. It does get closer than Mercury.



3.

a. The horizon is perpendicular to where you are standing at 9pm. One horizon is drawn on Earth as if the Earth's orbit is big; the other as if the Earth's orbit is very small compared with the distance to the stars. Sco, Sag, Cap, Aqu, Pis, and Ari are visible. Since the horizon turns counterclockwise, Sco is setting.

b. Right ascension 0hr is to the left. 6hr is down. At midnight, the horizon is up and down. Therefore the Crab Nebula rises at midnight, and you would be able to see it until dawn.