

1. What is the force of attraction between a 60.0 kg student in the senior parking lot and the school? The distance between the two is 100.000 m and the mass of the school 65,000,000 kg.

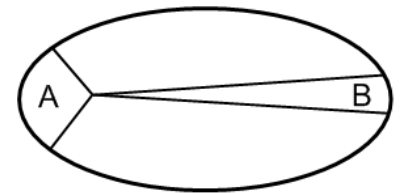
2. Two asteroids, ($m_1 = 1.00 \times 10^{12}$ kg and $m_2 = 5.00 \times 10^{12}$ kg), are floating in space. The force of attraction between them is 10.000 N. How far apart are their centers of mass?

3. While on the surface of the the Earth a student has a weight of 450 N. If she is moved twice as far from the center of the Earth, then how does hew new weight compare to her old?

4. A planet is in orbit as shown below. Where are the two possible locations for a Sun?



5. In the picture below, the area in section A = the area in section B.
 - a. According to Kepler's 2nd law, which section takes more time for the planet to travel?



- b. What does this mean about the relative speed of an orbiting body?

6. The Earth moves in nearly a perfect circle around the sun. Where is the sun with respect to that circle?

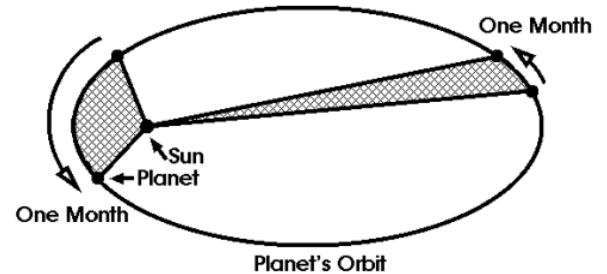
7. What is the eccentricity of an ellipse? Give a description in words/diagrams as well as the formula.

8. What happens to the ellipse when the eccentricity becomes zero?

9. What happens to the ellipse when the eccentricity becomes one?

10. On planet Blob the *average global* temperature varies dramatically over the planet's year. What *might* you infer about the eccentricity of Blob's orbit?

11. Use the diagram to explain how and *why* a planet's speed changes as it travels around its sun. Think about when a planet travels faster/slower in its orbit.



12. The planet Pluto is 39.5 Au's from the Sun. How long does it take to go around the Sun once?

13. The moon Io revolves around Jupiter in 0.0048 sidereal years. Io has an mean orbital radius of 0.0028 AU. If the Jupiter moon has a period of rotation of 0.0097 sidereal years, then how far away is Europa from the center of Jupiter?

14. Using Kepler's 3rd Law of Planetary motion, determine the distance between the center of the Earth and the center of the Moon. (Hint: you'll need some info from google)