Kepler Problem
Concept Questions

Question1 Which of the following are Kepler's Laws?

A. Each planet moves in an elliptical orbit, with the sun at the center of the ellipse.

B. Each planet moves in an elliptical orbit, with the sun at the focus of the ellipse.

C. A line from the sun to a given planet sweeps out equal areas in equal times.

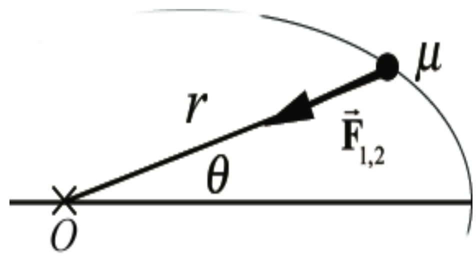
D. Planets move equal distances in equal times.

E. The periods of the planets are proportional to the cube of the semi-major axis lengths of their orbits.

F. The periods of the planets are proportional to the 3/2 power of the semi-major axis lengths of their orbits.

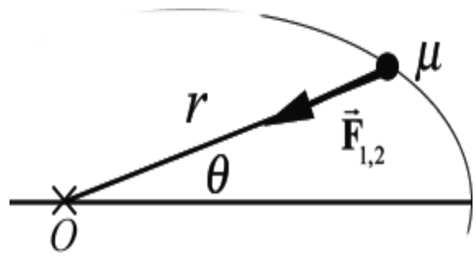
1. A,C,E
2. A,C,F
3. A,D,E
4. A,D,F
5. B,C,E
6. B,C,F
7. B,D,E
8. B,D, F
9. None of the above

Question 2 The angular momentum about the point O of the "reduced body"



1.is constant.
2.changes throughout the motion because the speed changes.
3.changes throughout the motion because the distance from O changes.
4.changes throughout the motion because the angle θ changes.
5.Not enough information to decide.

Question 3 Suppose the central force is radially symmetric i.e. the force may be a function of distance r from the central point but it is independent of the angle θ. The mechanical energy associated with the motion of the reduced body about the central point is



1.is constant.
2.changes throughout the motion because the speed changes.
3.changes throughout the motion because the distance from O changes.
4.is not constant because the orbit is not zero hence the central force does work.
5. Not enough information to decide.

Question 4: Reduced Mass If $m \equiv m_1 = m_2$, the reduced mass $\mu = \dfrac{m_1 m_2}{m_1 + m_2}$ is:

1. m
2. $2m$
3. $m/2$
4. None of the above

Question 5: Reduced Mass If $m_2 >> m_1$, the reduced mass $\mu = \dfrac{m_1 m_2}{m_1 + m_2}$ is:

1. m_1
2. m_2
3. $m_2 + m_!$
4. $m_2 - m_!$
5. None of the above