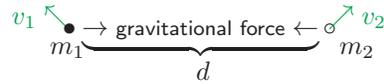


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AST 9: Homework 3b

1] The general 2-body problem in gravity asks if we can calculate what will happen when 2 bodies of masses m_1 and m_2 with initial velocities v_1 and v_2 , respectively, and an initial separation d interact gravitationally.



As said in class the answer is “yes.” We can calculate precisely how each body will subsequently move.

The 3-body problems asks if we can calculate what will happen when 3 bodies interact gravitationally, if we know their initial separations and velocities. Do a web search to find out what we know in this case, and write down the source you used. Also print out and bring at least one picture of possible behavior.

2] In 2013 an asteroid with an initial mass of 12 million kg entered the earth’s atmosphere. It exploded in the atmosphere above Russia and released energy equivalent to over 20 Hiroshima atomic bombs.



Assume that this asteroid came from the asteroid belt and “fell” (meaning it was pulled to earth solely by the gravitational force of the earth) 300 million km. Had it hit the earth head-on in a direct collision, how much would the earth have moved toward it prior to colliding? (Mass of earth is about 6×10^{24} kg.)

3] When we consider the sun-earth system, why is it OK to consider the sun as stationary and the earth as moving around it?

4] If two objects are moving away from each other initially, will gravity always force them to slow to a halt and fall back to each other? What is the key concept that allows us to analyze and predict what will happen here?

5] Read the NASA article “What is a planet?” that’s linked on the course web page and list in your own words a summary of the four characteristics of a planet.