

Physics 1306, Exam 2 Sample Questions

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For all questions there may be more than one correct answer or there may be NO correct answers. Mark all correct answers on the answer sheet with a number 2 pencil. You will be graded RIGHT MINUS WRONG, answer by answer, not question by question! (i.e., You will receive one point for each correct answer marked and have one subtracted from your score for each incorrect answer marked. You will receive neither penalty nor bonus for any answer left blank.) DO NOT GUESS!!!!

1. During the collapse and fragmentation of an interstellar gas cloud to form stars:
 - (a) the cloud will generally collapse into a flat disk, due to conservation of momentum.
 - (b) the most dense portions of the cloud will collapse the slowest.
 - (c) as the core of the cloud becomes more dense, it will become opaque to radiation.
 - (d) as the cloud becomes more dense, it will cool significantly.
 - (e) in the later stages of the collapse, a strong outward blowing wind will develop in the cloud.

For the following 3 questions, consider the following hypothetical nuclear reactions:

- (a) $^{15}\text{O} \longrightarrow ^{15}\text{N} + e^+$
 - (b) $^4\text{He} + ^8\text{Be} \longrightarrow ^{12}\text{C} + \gamma$
 - (c) $^{13}\text{N} \longrightarrow ^{13}\text{C} + \nu_e$
 - (d) $^1\text{H} + ^1\text{H} \longrightarrow ^2\text{H} + e^- + \gamma + \nu_e$
 - (e) $^1\text{H} + e^- \longrightarrow n + \nu_e$.
2. Reactions in which electric charge is conserved.
 3. Reactions in which baryon number is conserved.

4. Reactions in which lepton number is conserved.
5. Black holes:
 - (a) are supported against gravitational collapse by electron degeneracy pressure.
 - (b) have diameters of approximately 10 km.
 - (c) have gravitational fields that are so strong that even light can't escape.
 - (d) are often detectable due to their pulsed radio emission.
 - (e) are remnants of the supernova explosions of the *most* massive main sequence stars.
6. The giant branch:
 - (a) is located above and to the right of the main sequence on an HR diagram.
 - (b) contains stars whose surface temperatures are all very high.
 - (c) contains all of the red stars.
 - (d) has stars that are no longer burning hydrogen anywhere inside.
 - (e) contains stars that have radii larger than they did during their main sequence phase.