HOMEWORK #17 (due start of class February 26)
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LEARNING GOALS for this assignment:
1. To apply your understanding of the transit method of exoplanet detection.
2. To apply this understanding in practical situations in modern astronomy.

TO RECEIVE FULL CREDIT:
1. Staple multiple pages and identify yourself by Star Name (worth 5 points!).
2. You must **show how** you derived your answer by writing all the logical steps that led you to it. Follow the format of the "Homework Example" on our Web site.
3. All sentence responses must be typewritten and in complete sentences. You may handwrite any arithmetic. Use good English grammar.
4. **If you work more than three hours on this assignment, you should stop, record your work here, and contact Dr. McCarthy or Mr. Hammer (our Teaching Assistant) for help.**

Part I. Reading

In Ryden and Peterson's textbook, read sections 15.2 and 15.3 about "*Energy Generation in Stars*" and "*Nuclear Fusion Reactions*."

Part II. Exoplanets and the Transit Method of Detection

The lightcurve for the transiting exoplanet Kepler-7b indicates that the flux from the star is reduced by 0.68% periodically by a planet on a 4.885 day orbit. Radial velocity measurements confirm it is a planet with 0.433 times the mass of Jupiter. Calculate the density of Kepler-7b and compare your answer to the density of water (1 g/cm^3). Can you explain why it might have this density?
[HINT: Also calculate its semi-major axis and incident flux]

Some info about the star: G0V, M ~ 1.347 M_{Sun}, R ~ 1.843 R_{Sun}, L ~ 4.15 L_{Sun}.

Additional information which might be useful:
$R_{Jupiter}$ = 7.15 x 10^4 km
$M_{Jupiter}$ = 1.9 x 10^{27} kg
R_{Sun} = 6.96 x 10^5 km
M_{Sun} = 2.0 x 10^{30} kg